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The Aviation Consumer

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COMPOSITE COMPLEXITIES

A non-pilot recently asked me if 14 years since new was old for a Cirrus. I didn't have to pause when answering that it certainly is not. But after thinking about it for a while, it occurred to me that while the modern composite design of a Cirrus—or Diamond or Columbia—may still seem new even after 14 years, the earlier models in the fleet are indeed aging. When these mass-production composites came to market, there was much speculation on how the airframes would hold up and how difficult they would be to service when they break. Owners of earlier models are now finding out.

When fiberglass airframes gained popularity, one sales pitch was that the design would be cheaper to maintain because compared to all-metal designs, corrosion is mostly a non-issue. It was also said that fiberglass airframe structures are simpler than their metal counterparts, which means there is less to disassemble and inspect during annual inspections. That may be true, however, it's false to say that a fiberglass airframe isn't susceptible to corrosion because there are plenty of metal parts inside the structure, including critical flight control components.

When one of the first new Cirrus models ended up in my local maintenance hangar for an oil change, I remember a seasoned mechanic shaking his head and chiding its owner to trade it in before its composite structure needed even basic repairs. Those were, and still are the sentiments of many old-school airframe mechanics. I've always thought this was a narrow-minded outlook on progress, but there's no arguing with the reasoning that it wouldn't be difficult to find a shop that could fix airframe damage on an all-metal Beechcraft or Piper, to name a couple. That's not the case with a composite airframe, even these days when airport ramps are littered with composite models.

In our March 2014 issue, we reported on the CIES digital fuel level sensors and electronic fuel quantity gauge retrofit that was accomplished on a first-gen Cirrus SR22. The retrofit doesn't require any modification of the composite structure in and around the fuel tanks since the new digital fuel senders bolt in where the original analog senders did. But while accomplishing the installation, the shop found that the sealed mounting nut plate—that's the metal assembly that the fuel sensor attaches to—was broken, likely the result of someone overtorquing it. It went from bad to worse because once the nut plate was removed, it was revealed that the composite flange at the upper portion of the fuel tank was warped. Since the composite flange is sandwiched between the metal nut plate, whatever or whoever broke the nut plate also damaged the surrounding composite. The metal portion of the repair, which includes riveting and sealing a new nut plate in place, is relatively easy and inexpensive. For parts and labor, the total repair is around $150. But repairing the damaged composite was another matter.

Since the technical folks at Cirrus Aircraft never encountered this type of damage to that area of the structure, there wasn't an approved repair technique or replacement part in inventory. That meant that Cirrus had to engineer a replacement flange assembly. To the aircraft owner's surprise, he had to pay for these factory engineering costs. Like it or not, that's not uncommon with major composite repair work on certified aircraft, and you should understand this when considering the purchase of a used composite model.

While this early-gen SR22 was serviced within the Cirrus authorized repair network for most of its life, it's obvious that someone either didn't understand the consequences of overtorquing the nut plate or was careless in doing so. Regardless, it's an example that repairing and maintaining a composite aircraft could be more complex than a metal one. —*Larry Anglisano*

AoA FOR MALIBUS

Thanks for your coverage of angle of attack systems for general aviation aircraft in the September 2014 issue of *Aviation Consumer*. The MMOPA (Malibu-Mirage Owners and Pilots Association) has taken the position that this technology is an important enhancement to safety and we applaud the FAA for working to streamline the installation approval process as a minor alteration in many aircraft.

However, as owners and pilots of a pressurized aircraft, we were disappointed that the FAA guidance excludes pressurized aircraft, and that the installations for which must be "evaluated on a case-by-case basis." Of course, that means subject the interpretation of one's local FSDO, which is the can of worms everyone is trying to avoid. I thought your readers would be interested in some important progress the MMOPA has made, which might be helpful for other type clubs.

Earlier this year, MMOPA initiated a project with Alpha Systems (with guidance from the FAA and Piper Aircraft) to define an AoA installation procedure for the PA46. That installation was successfully completed earlier this summer and all parties agree it falls within the boundaries of a minor alteration and the authority of a mechanic to install and return the aircraft to service with a simple log entry. This means there is no field approval, FAA 337 form or STC required. That's a photo of the Alpha Systems indicator, above, installed on the PA46 windshield post.

Our goal is to encourage installation of this potentially life-saving technology throughout the Malibu and GA fleet. Details of the PA46 installation are available free to our members at mmopa.com. Non-members may email me for a copy at jsisk@mmopa.com.

Jonathan Sisk, Ombudsman
Malibu-Mirage Owners and Pilots Assoc.

CAMERA LEGALITIES

Your excellent GoPro/Garmin VIRB action camera comparison article in the September 2014 issue briefly mentioned external camera mounting. Do you have any concrete insights or information on the current legality of doing so on certificated aircraft? What I've read in the past ranges from "can't legally be done" to "grey area." Have there been updates in regulations or interpretation? Or has it reached the point that so many pilots are doing it that it's being ignored?

Greg Brown
via email

Good question, Greg. There's no specific regulation that addresses camera installations, but we suspect there might be one soon. We heard from a reader that's being threatened with an FAA violation because a camera mount was glued to the fuselage of his Cessna, even though a mechanic signed it off in the aircraft logbook as a minor alteration. Based on our research, a violation might be difficult to prove.

We presented the topic to the FAA's aircraft certification division in Washington, D.C., and were provided with a FAA memo (it's guidance, not regulation) that addresses external camera mounting and its alteration status.

In it, the FAA's Aircraft Maintenance Division, in coordination with the Small Airplane Directorate, ACE-100, states (in part) that because of the varying installation possibilities of this equipment, determining a major versus minor alteration is done on a case-by-case basis and is made by the installer.

The key here is understanding the definition of a major alteration. Those are alterations that have an appreciable effect on weight, balance, structural strength, performance, powerplant operation, flight characteristics or other qualities affecting airworthiness.

The memo also says (in part) that the use of suction cups or other temporary methods of attachment (not including permanent attachments to the aircraft) would not be considered a major modification to the aircraft.

However, the memo goes on to say that the use of these types of attachments are not supported by the FAA, and may (in the case of an inflight detachment) lead to "careless operations" as provided for in FAR 91.13 and 91.15.

You should bear in mind that attaching a camera mount—particularly the surface mounts offered by GoPro—using the strong adhesive on the mount will likely result in a permanent installation, unless you want to use a heat gun to remove it. According to an FAA safety inspector we spoke with, that's a good reason to have the installation evaluated and signed off as a minor alteration by a certificated mechanic.

AFFORDABLE TRAINERS

Editor Larry Anglisano's commentary on affordable trainers in your September 2014 issue was right on the money, no pun intended.

As he pointed out, AOPA is doing the right thing to present affordable trainer solutions, but for $90,000, I demand more than what the Yellow Bird 152 can deliver. On the other hand, maybe it will finally drive down the cost of overpriced LSAs.

William Hastings
via email

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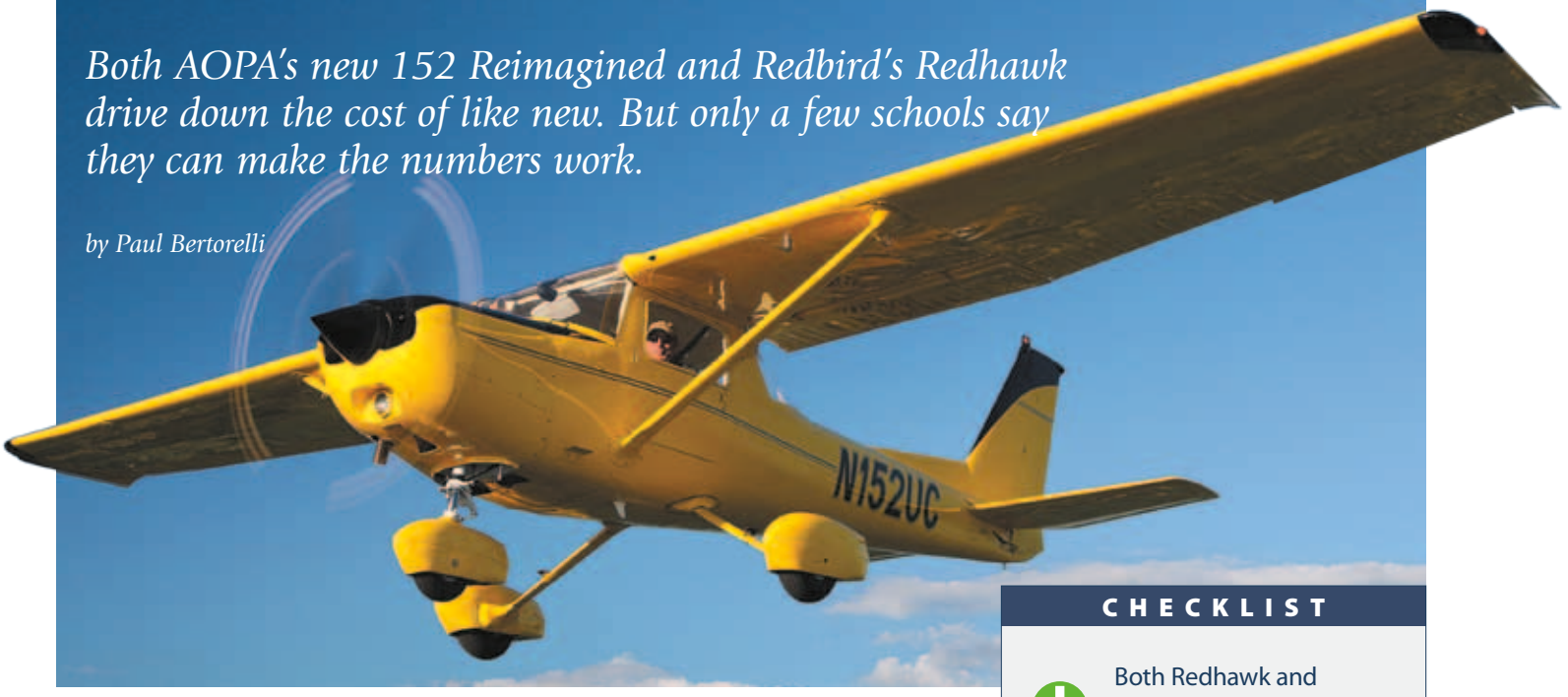
AIRCRAFT COST ANALYSIS

Refurbed Trainernomics: Cheaper But Not Cheap

Both AOPA's new 152 Reimagined and Redbird's Redhawk drive down the cost of like new. But only a few schools say they can make the numbers work.

by Paul Bertorelli



CHECKLIST

- Both Redhawk and Yellow Tails present as new airplanes.
- Compared to new equivalents, both represent much lower prices.
- Schools say taking on debt to acquire them tarnishes their appeal.

A month after Cessna announced its $420,000 diesel Skyhawk, our test-the-waters opinion sampling drew two reactions from flight schools: impolite guffaws or stony silence. Logically, that ought to make emerging refurb projects like Redbird's Redhawk and AOPA's new remanufactured Cessna 150s/152s a shoe-in cinch for a market starved for affordable trainers. Well, not exactly. Both the AOPA and Redhawk projects are aimed at taming the escalating cost of the world's most popular trainers, but the overwhelming majority of schools we interviewed about both of these airplanes say they're still too expensive, albeit a dramatic improvement over the price of new Skyhawks, which are increasingly out of reach.

At AirVenture 2014, AOPA unveiled what it's calling the 152 Reimagined and a year ago at the same venue, Redbird showed off the Redhawk, a spinner-to-tail redo of 35-year-old 172s sexed up with Continental diesel engines and glass panels from Garmin.

The 152 Reimagined, top, and below, has a modern metal panel and a digital navcomm.

Both attracted attention and although there appears to be buyer interest, they may be a hard sell to flight schools. To be fair, AOPA's target market tilts toward flying clubs, which the association hopes to become active in promoting and organizing, but schools are on the radar.

YELLOW BIRDS

The refurbed 150s and 152s will form the nucleus of that effort, according to AOPA president Mark Baker. In an interview at AirVenture, he told us that the association isn't planning to get into the aircraft sales business, but undertook the 150/152 refurb project as a proof of concept.

"Most people would say it's a great flying airplane. There are thousands of these units out there. The conversation is really…you can find a way to fly," Baker said. "The proof of concept is really are there people interested in

adding a plane to their flying club? We can get the financing in place and the insurance that can support this kind of purchase. We're not in the aircraft business. That's not what we do. We want to take the narrative to the public," he added.

The association bought three aircraft on the used market and turned them over to Aviat Aircraft in Afton, Wyoming. Aviat builds the Husky and the Pitts lines and has extensive experience in repairing and refurbing.

Each aircraft was disassembled, stripped to bare metal, primed and repainted. All of the original wiring was replaced with new and any airframe damage, corrosion or wear was repaired. The interiors would be recognizable to any pilot who learned to fly in the 1970s, but all the components are new, including seat upholstery, headliners and instruments. In the aircraft we examined, the old Royalite upper panel was replaced with a painted metal panel, although the airplane retained its plastic lower panel and door panels, albeit with new material.

Avionics are adequate but minimal. A single Garmin GTR 225 does navcomm duties, paired with a GTX327 transponder and a PS Engineering PM 3000 intercom. A Garmin aera 560 portable in an in-panel mount lives above the navcomm. For now, the aircraft do not have ADS-B Out. Beyond these upgrades, the rest of the panel is original equipment, albeit new. For the 152, the engine is an overhauled Lycoming O-235.

Price? For the 150 refurb, the all-in price is $89,900 and for the 152, $99,900. While those prices aren't high by new aircraft standards, they do approach the price on restart 172s, say a 1999 or 2000 model.

"I can't argue that you can go buy a good 172 today for a lot less than this costs," Baker told us at AirVenture. "But it's probably not having new wiring, new Plexiglas and hasn't been gone through from an end-to-end perspective. So I recognize that some people will say they can buy a good 152 for less and we encourage that. But if you want something that's pretty new and will run to TBO plus, this is the best way we can see of doing this," Baker said.

COSTING IT OUT

We interviewed more than a dozen U.S. flight schools to sample opinions on both the AOPA project and Redbird's Redhawk. We also asked the schools what numbers are reasonable to apply for calculating operating costs.

At AirVenture, AOPA offered hourly operating costs that are summarized at right. These total $63.88 per hour, which the flight schools we contacted said were reasonable. However, we think they're slightly low, at least in the flying club context. The calculations were based on 700 hours a year and an eight-member club. In our view, that would be a very busy club indeed. We think a more practical number is 400 to 500 hours. In addition, an engine reserve of $5 is too low even if a 2400-hour run on an O-235 is factored in. *Bluebook's* engine overhaul cost is about $21,000, so we think at least an $8 reserve is closer to reality. That brings the adjusted hourly to about $70 an hour—still quite reasonable, in our opinion.

In the flight school context, where margins of 30 percent are routinely added to net costs, that would yield a customer rental price of about $91 an hour. Our survey revealed that's actually on the low end of what schools are typically charging for 152s. But would any schools be willing to put a fully refurbed Cessna 152 on the rental line? "No. That's a ton of money

152 REIMAGINED COST SUMMARY

EXPENSE ITEM	AOPA NUMBERS (700 HRS)	OUR NUMBERS (500 HRS)
AIRCRAFT COST	$99,900	$99,900
INSURANCE	$4.06	$5.68
FINANCE COST	$11.69	$15.44
FUEL	$30.74	$33
100-HOUR INSPECTION	$4.29	$5
ENGINE RESERVE	$5	$8
MAINTENANCE RESERVE/OIL/DATA	$5.38	$6.95
ANNUAL	$1.43	$3
TIEDOWN/ HANGAR	$1.29	$1.80
NET COST 500 HRS	$89.58	$78.87
NET COST 700 HRS	$63.88	$70.35
RENTAL WITH FLIGHT SCHOOL MARGIN	$116.97	$102.53
	$83.04	$91.35

NOTES: Calculations assume same aircraft cost and same loan terms; 30 percent down and 6 percent interest for a 12 year note. AOPA's best-case assumed 700 hours per year, but we did calculations for both 500 and 700 hours. Our costs are adjusted for expenses flight schools told us were realistic. Flight school margin assumes 30 percent. All the hourly rates with the margin added are within the range of rental rates we found around the U.S.

At AirVenture, right, the Yellow Bird drew queries from flight schools, clubs and, surprisingly, individual owners.

REDBIRD REDHAWK SUMMARY				
EXPENSE ITEM	BROWN NUMBERS (480 HRS/40 PER MONTH)	OUR NUMBERS (480 HRS/40 PER MONTH)	BROWN NUMBERS (1080 HRS/90 PER MONTH)	OUR NUMBERS (1080 HRS/90 PER MONTH)
AIRCRAFT COST	$249,900	$249,000	$249,000	$249,000
LEASE CHARGE	$46.25	$46.25	$20.56	$20.56
LEASE HOURLY	$55	$55	$55	$55
INSURANCE	$12.97	$18.75	$5.76	$8.33
FUEL	$27.75	$30.03	$27.75	$30.03
CONSUMABLES/ UNSCHEDULED	$2	$4	$2	$4
NET COST	$143.97	$160.98	$111.07	$117.92
MARGIN FOR SCHOOL AT $160/ HR RENTAL	$16.03/10%	-$0.98/-0%	$48.93/30.6%	$42.08/26%

NOTES: We used numbers provided by Brown Lease in one column and our own data developed from insurers and flight schools on insurance and tiedown costs in the comparitive column. Brown's $55 covers the engine reserve and all maintenance charges. For fuel, we used the $5.46 national average price for Jet A, with a fuel burn of 5.5 GPH.

and at the end of the day, you're still going to have a 152. It's the price point. You could buy a shelled-out 152, put in an engine, a panel and paint and you're not going to be anywhere near $99,000," said Cody Pierce of Aces High Flight School in Long Beach, California.

Pierce's comments framed this reality in the training market: It runs on 35-year-old airframes with low hull values that are affordable to buy and insure. Schools avoid financing because the monthly nut eats them up during slow periods.

"In my flight school, top dollar would be $37,000 or $38,000 152s. They produce a decent enough revenue to pay for them and make them worthwhile. I don't know that I'd be willing to pay $99,000 for a 152, even though it's refurbished," said Dennis Brampton of St. Charles Flying Service, near St. Louis.

Brampton has been in the business for decades and says that although some customers like newish looking airplanes and will pay more to rent them, there's a limit. "Someone working on a private pilot's license? No, they're not going to pay the extra $10," Brampton said. Attitudes vary by region and local market, but flight schools generally told us that as long as airplanes are well maintained and presentable, whether they're new or vintage isn't important to customers. "New, no. Modern, yes," said Gregory Johns of Infinity Flight in Trenton, New Jersey.

The Redhawk, below, is powered by the Continental CD-135 diesel.

REDHAWK

As we noted in the October 2013 issue, Redbird was hoping to bring the Redhawk in for about $200,000. But it's gone 25 percent higher than that target, with an asking price of $249,000.

For that, the buyer gets a completely remanufactured late 1970s or early 1980s 172 with a new Continental diesel, a Garmin G500 glass panel with autopilot, fresh paint and an upgraded interior. (The airplanes originally had the Aspen Evolution system, but Redbird switched to Garmin.)

Like the AOPA Yellow Birds, the Redhawk presents as new, right down to the new airplane smell. At AirVenture, Redbird CEO Jerry Gregoire told us the company is working on completing the seventh and eighth Redhawks. Three are on the flight line at the company's San Marcos, Texas, Skyport. Brown Aviation Lease, which places aircraft in flight schools, has developed a program for the Redhawk. One is a power-by-the-hour lease, the other a purchase arrangement for schools who prefer that option.

Under the lease, a school would receive a Redhawk for no money down and an $1850 monthly lease payment to Brown, plus $55 per flight hour, dry. The school would buy its own fuel, insurance and incidentals such as tiedown or hangarage. Although the school would also do its own maintenance on the aircraft, Brown would reimburse those costs.

The final cost to the customer is difficult to pin down precisely because of variations in the cost of fuel and insurance. Brown's Nick Abate told us the company used $6000 a year as an insurance cost, but schools were skeptical of that price. We think for a $250,000 hull value, $8000 to $12,000 a year is more likely.

Using Brown's numbers, at 40 hours a month—typical of the schools we talked to—the net cost of the airplane is $143.97 per hour on a fuel cost of $5.55 per gallon. Adding a 30 percent mark up to that yields a rental rate to the customer of $187—a high number even for newer G1000 Skyhawks and far too high for all but one or two of the schools we talked to. To keep the rental rate at a more saleable $160, Brown uses a 10 percent

margin to the school for the 40-hour mark. Obviously, schools won't like that because they'll make less money on an airplane that may siphon business from airplanes earning higher margins by dint of being older.

However, the Redhawk's margins look better the more it flies because the fixed payment and insurance are amortized over more hours. At 60 hours a month, the net cost drops to $124.23, giving the school a 22 percent margin at $160 an hour. Some schools in urban areas think the rental rate can be inched up to as high as $179, but no more. Although the flight school's margin looks better at this rate, the distinction against an earlier model G1000 Skyhawk begins to blur.

The flight schools we interviewed had mixed reactions to the Redhawk numbers. Most liked the idea of the lease option on a newer airplane but worry about high insurance costs and a monthly payment that could approach $3000.

"It's something I would not do," said Stan Rodenhouser, who has operated the flight school at Freeway Airport near Washington, D.C., for more than 40 years. "It's too expensive for us. Maybe the Embry Riddles or the larger schools could make the Redhawk work, but I don't think the small flight schools out there in the real world will be able to make it work," he added.

"When you get up over $200,000, we just can't afford it. You know, we're all like golf courses. We rely on the weather. This past winter literally killed us. We went through so much cash reserve, it was scary," Rodenhouser told us. A high monthly payment might be the difference between survival and bankruptcy, Rodenhouser explained.

Just up the coast from Freeway, Infinity Flight Group, at Trenton-Mercer Airport in New Jersey, has signed on to be an initial Redhawk lease customer. With eight aircraft on the line in an affluent area, the school's market can support the higher rental rates newer aircraft command.

"To us, it makes a lot of sense when fuel ends up being 40 percent of your operating costs," said Gregory John, CEO of Infinity. "When you look at the total package and what it offers in the training environment, what we like about what Brown is doing is that I can get a new airplane and not have to worry about what am I gonna pay this month and what am I getting into? I can very easily track my costs and what it costs to operate the airplanes," he explained. Aiding that effort is a cost tracking software package Brown offers with the airplane.

Airplanes newer than about 2008 aren't players for the school because of high hull and insurance costs. Even on the Brown leases, Johns concedes the margins for the school will be lower. "To be honest, that's something we've been struggling with. It does have a lower margin at lower hours. It doesn't really make sense unless you're a high-utilization school, which we are. Anything less than 50 hours, I think you're better off sticking with the traditional options," Johns told us.

ANALYSIS

"Traditional options" mean that the bulk of the flight training industry survives on operating older aircraft—mid-1970s to mid-1980s Cessnas—that are paid for and/or leased from other owners. The aircraft remain serviceable, have little debt load and although not cosmetically impressive, they'll do. The AOPA 152 Reimagined and the Redhawk are nicer to look at, but they don't compete economically. The intoxication of new fades for customers paying high rental fees.

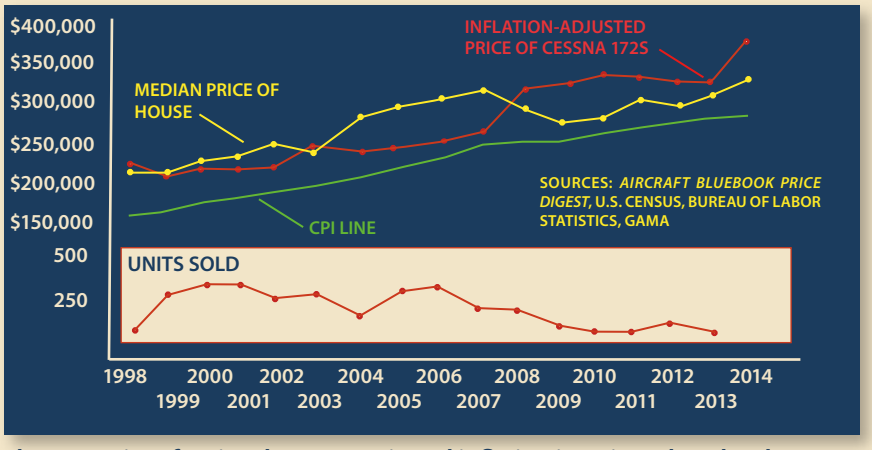
The comparison is more favorable when these two refurbs are compared to new airplanes. For that tiny fraction of buyers who can afford to even consider a new Skyhawk or even a newish used model, the Redhawk offers a somewhat cost-effective alternative. The "somewhat" qualifier is a caveat based on the Redhawk's expensive-to-replace diesel with its required periodic gearbox changes. Continental says it will raise the engine TBRs, but in our view, it needs to deliver on that promise, along with more durable gearboxes.

In the meantime, the Redhawk will find customers—and is—in the strata of buyers who want new but are repelled by $300,000-plus trainers. But at this point, the Redhawk isn't a slam dunk for smaller schools because it just doesn't reduce costs to the renter enough. What would? A $150,000 refurb which is, coincidentally, the value of a 2006 Skyhawk.

Does that mean that flight training will increasingly tilt toward larger, more heavily capitalized schools for the rarified few? Redbird's Gregoire thinks so. He says Mom and Pop flying schools are on the way to extinction. "That model is permanently broken," Gregoire said.

As for AOPA's Yellow Tails, we didn't find a strong undercurrent of interest among flight schools. They simply don't see the merit of spending $99,000 to buy an airplane that does the same thing a $35,000 airplane does, even though our analysis shows they can make money with them. AOPA says it got good feedback at AirVenture on the club idea and surprisingly strong individual owner interest. If that market develops, they could be on to something.

HOW CESSNA PRICES HAVE ESCALATED



That new aircraft prices have outstripped inflation is a given, but the chart above shows by just how much. In 2007 and 2008, Cessna sharply increased prices on the Cessna 172S. It's unclear if sales volume, lower graph, was already tanking or if the higher prices drove sales lower.

Dynon SkyView Touch: Plug-and-Play Hybrid

Dynon's SkyView integrated avionics gets a hybrid touchscreen interface, external autopilot controls and new software that plays better with Garmin.

by Larry Anglisano

Dynon Avionics, arguably the volume leader in LSA and experimental avionics, believes that a touchscreen feature set can be difficult to operate in turbulence.

While many users have adjusted to touchscreen, especially given the popularity of cockpit tablets, some buyers we speak with aren't sold on the concept of touchscreen panel-mounted equipment. Turbulence can create a challenge when reaching for and fingering the screen, unlike a tablet computer that might be anchored to the knee or to some structure that's within close reach.

Dynon's solution for the second-generation SkyView Touch integrated avionics suite is a hybrid user interface. With the new SkyView Touch, nearly any function that's accomplished with touch can also be done with keys and knobs. This flexibility makes the SkyView Touch easier to sell to buyers that aren't sold on touch avionics, while also making it easier to use in smaller cockpits.

Already own a non-touch SkyView? Dynon makes it easy to upgrade with a plug-and-play display swap, although there are some new hardware options that advance the system to a higher level.

STIFFENING COMPETITION

Let's get this out of the way. Dynon isn't alone with a new plug-and-play touchscreen system for LSA and experimental applications. Garmin's G3X Touch system (we evaluated it in the May 2014 issue of *Aviation Consumer*) has attracted a lot of attention since it was introduced this spring. Moreover, nearly a half-dozen light sport aircraft manufacturers—including Van's Aircraft, Cub Crafters and Flight Design—have chosen the G3X Touch as standard or optional equipment. That market has been otherwise dominated by Dynon. Further, the non-certified G3X Touch is the main focus in the Flight Design C4—an aircraft that's currently being certified under Part 23 criteria. How will Flight Design do that and what does it mean for existing Part 23 models? See the sidebar on page 11. We think it could be a significant breakthrough for lower cost avionics.

But as market-dominant and bullish as Garmin is, Dynon has a loyal following of its own and for good reason. With an earned reputation for offering cutting-edge and affordable equipment that's easy to install and widely compatible with other brands (something that Garmin has taken a hit for in recent years), Dynon had only two hardware platforms in 15 years. This attests to the company's dedication to supporting future product growth, both in hardware and software, without the need for major rewiring or having to modify the panel layout to accommodate new boxes. This concept, and Dynon's feature-rich user interface, is likely the reason why the original SkyView is installed as OEM and aftermarket retrofit in thousands of light sport and experimental aircraft.

SkyView software version 10.0 and higher includes the analog PFD function. Dynon says this can be helpful for pilots transitioning from round gauge instruments to an EFIS.

CHECKLIST

- Finally, a complete interface with Garmin GNS430/530 and GTN-series navigators.
- Plug-and-play compatibility with first-gen SkyView suites.
- For LSA and experimental aircraft only, since the system lacks TSO.

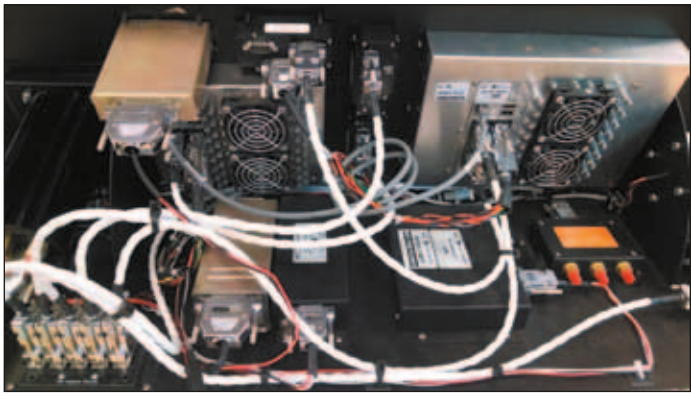
THREE SCREENS IN ONE

The SkyView Touch is available in dual-or single-screen configurations and can support up to four displays. While SkyView is also offered in a 7-inch screen version, the Touch platform is only available on the larger SV-D1000 screen—a 10.2-inch, 1024 by 600-pixel active matrix LCD display that performs well in bright sunlight. That's a plus for canopy-equipped LSA models that get splashed with bright sun.

Each SkyView display uses two joystick control knobs (one on each side of the lower bezel) and eight hard keys on the lower bezel. Joystick and button labels are also on the screen for accessing via touch. Joystick and button functionality is contextual, based on what is on-screen. The onscreen labels show the user the button's current active function on the lower data bar. The main data bar at the top of the display can show the status of supporting systems, including autopilot modes and transponder codes, to name a couple. We think it's logical.

Not all panels can accommodate three or even two 10-inch displays, but a single SkyView Touch screen can be configured as a three-screen layout. For example, you can display PFD (primary flight display), moving map and engine data at the same time. It's not optimum, but the screens are large and sharp enough that it works. We're impressed how SkyView nicely presents a synthetic view of terrain, runways and obstacles on those big, crisp displays. It really is a brilliant view.

In a multi-screen configuration the system synchronizes the most important information between the two displays, so setting the baro, speed and altitude bugs, engaging the autopilot, or acknowledging warnings only needs to be done on one display. There's also reversionary, where you can specify a reversion mode that automatically changes the screen configuration to a specific layout when only one display remains powered on. Then there's swap mode, where you can swap the entire screen contents of the left and right display without having to select and deselect setup parameters for each page on each display. This seems like a nice option to have for flight instruction or flying with a partner.



The SkyView in the Siai Marchetti, top, has full-IFR capability since it interfaces with the Garmin GNS430W. SkyView's core modules connect through a common failsafe network, middle. SkyView Touch displays primary engine and fuel data and is compatible with a variety of engines, from Rotax to Lycoming models.

The touch functionality doesn't really change the operation of the SkyView, but instead adds another layer to the user interface, which should be reassuring to existing users and those new to touchscreen avionics. For instance, if you want to change the altitude or airspeed bug on the PFD's altitude and airspeed tape, touch the corresponding tape and use the left joystick knob to alter the bug setting. The same goes for changing the baro setting and almost any other common function that you work with on a regular basis.

The SkyView map display is touch enabled so you can pan around the map, pinch to zoom and touch features on the map to gain more information. There's also a direct-entry feature that's accessed with an INFO label on the map screen. Touch it and you have access to an onscreen virtual keypad for entering waypoint identifiers, with the option for navigating directly to it. Speaking of navigating on the map, one of the nits we had with the earlier SkyView software was its inability to overlay Garmin GNS and GTN navigator course lines and approach data on the SkyView map. Software 10.0 and higher finally brings the interface to the level that users would expect.

Dynon retains its proprietary map navigation software (for more basic interfaces that don't include a remote GPS) that gets the job done for advanced VFR navigation.

The $250 remote knob panel, upper left, and $550 remote autopilot control panel, middle, can be used in conjunction with onscreen touch controls. The SkyView Touch PFD, upper right, can be user-configured with or without synthetic vision.

Like other so-called hybrid avionics systems, we suspect most users will use a combination of touch and knobs/keys on the SkyView Touch.

CARE FOR A SIX-PACK?

One of the other interesting enhancements with SkyView software version 10.0 or later is the traditional six-pack flight instruments display. Dynon says the traditional presentation, called an analog PFD, could be helpful for pilots that are transitioning to an EFIS presentation because it allows them to toggle between the two modes—PFD or six-pack.

The analog PFD six-pack presentation can be displayed with synthetic vision in the background or with it turned off completely. All of the information boxes for density altitude, true airspeed, autopilot alert banners, flight director and bugs appear just like they do for the EFIS tape presentation.

Dive in with a full EFIS presentation and SkyView Touch takes the user interface to an advanced, yet utilitarian level. The HSI display is mostly traditional with a magnetic compass rose (with cardinal points displayed in letters), heading bug and a rate of turn indicator. But what is different is the cyan-colored ground track GPS pointer that's located on the inner area of the compass rose. Comparing GPS track to current heading quickly shows the difference between where the aircraft's nose is pointing and where it's actually going over the ground. However, a track bug replaces the familiar heading bug when the autopilot is flying in GPS ground track mode.

When it comes to autopilot, it's integrated within the SkyView architecture and is full-functioned. It has indicated airspeed hold, vertical speed command, nav and GPS tracking and flight director. Dynon has its own optional drive servos that are microprocessor-controlled and utilize a lightweight aluminum case that houses a stainless steel gear train. For failsafe, a shear pin is utilized for pilot override of the clutch. But when that shear pin breaks—as we witnessed in a speedy Marchetti—the servo has to be removed and sent back to Dynon for a replacement pin. We wish this could be more easily accomplished in the field.

REMOTE KNOB CONTROL

The optional remote knob control panel adds three additional dedicated knobs to the SkyView Touch system for the most frequently adjusted bugs. One knob is dedicated to each of the Altitude Bug (ALT), Altimeter Setting (BARO) and Heading/Track Bug (HDG/TRK) on the primary flight display.

These knobs behave exactly like the SkyView joystick knobs do when they are set to these functions: Turn them to adjust the value they control. Press and hold them to synchronize the ALT and HDG/TRK bugs to the aircraft's current altitude or heading/track, or to set the altimeter setting (BARO) to standard pressure.

There's also an optional autopilot mode control panel, which has many of the same mode functions as on the screen, including a dedicated Level button for leveling the wings.

Dynon builds plenty of automation in the SkyView Touch and the system can be configured for a variety of voice callouts. These callouts interact with the altitude and minimum descent altitude bug on the PFD. For altitude alerts, you'll hear "approaching altitude" as the aircraft flies within a preset deviation of the bug's value.

There's also a "leaving altitude" prompt as the aircraft flies away from the bugged altitude. The thresholds that trigger the two above alerts are individually configurable and the altitude alerter will work even if the autopilot isn't engaged. When the MDA bug is set, the system warns "approaching minimums" when descending through 200 feet above the MDA, and "minimums" when descending through the MDA.

While the audio callouts can play through any audio panel switched or unswitched inputs, Dynon offers its own intercom and comm radio, in addition to an ADS-B transponder.

INSTALLATION EDGE

That's what we give the SkyView Touch over the competition. That's because SkyView's core modules connect through a common SkyView Network, which is made via simple D9 network cables (serial-style, though they're not serial ports).

Dynon sells these cables in different lengths and configurations to suit different aircraft, simplifying the wiring throughout the aircraft that you'd normally have to build strand by strand. Compare that with Garmin's G3X Touch, which uses a CAN bus for interfacing each component in the system, for which the installer will have to build the harnesses.

Dynon's SV-D1000 touch displays can be transplanted into an existing SkyView installation and are entirely compatible with the SV-ADAHRS-200-series module, SV-EMS engine monitor module, the SV-GPS-250 GPS receiver modules, in addition to supporting systems like the SVX-PNDR transponder. There's also the SV-BAT-320—an optional backup battery system that powers a typical SkyView display and most of its connected modules for at least 60 minutes during electrical failure.

When it comes to failures, the SkyView network minimizes the risk using dual data pathways in every cable. This allows SkyView to cope with broken wires without losing any capability, while letting the pilot know there's an issue that needs to be addressed, via CAS warning.

For engine display, the SkyView Touch requires an optional engine module ($650), in addition to all of the probes, sensors and transducers that mount to the engine. Dynon offers kits for a variety of engines, including Lycoming, Continental and Rotax.

Dynon says it has the lowest ongoing navigational data costs in the industry. U.S. aviation and obstacle databases (updated on the 28-day cycle) are available for free on the Dynon website. All geo-referenced VFR sectionals, IFR charts, approach plates and airport diagrams are $99.

A basic SkyView Touch bundle with a single screen, synthetic vision and basic wiring harness starts at $3995. But when you add a second screen, engine module, second ADAHRS, autopilot servos, ADS-B transponder, communications transceiver and the optional knob and autopilot control panels, the price can quickly approach the $17,000 mark. But think about it, in the world of certified avionics, that's roughly the cost of one Garmin GPS.

Contact www.dynonavionics.com 425-402-0433.

ALL EYES ON A GENTLER PART 23

As much as there is to like about Dynon's SkyView Touch, the buzz kill is that the non-TSO system is off limits to existing Part 23 certified aircraft. In our view, it's an outdated limitation that might have little if any bearing on system reliability and safety.

Since regulation and better judgment restricts VFR-only LSAs from flying in instrument conditions, their avionics shouldn't be used for sole means primary navigation. In the eyes of the FAA, this limitation is supposed to curtail the risk factor should the system fail at the worst time. But IFR-equipped experimental aircraft regularly fly in instrument conditions, and have so for years with non-certified equipment leading the way. Pilots of experimentals accept the perceived risks that tag along with non-certified status. Without statistics, it's impossible to know if new, non-Beta, non-certified systems like Dynon's SkyView Touch and Garmin's G3X Touch will increase the risk of crashing because they don't have a TSO, but we suspect they won't.

In many ways, Dynon's SkyView Touch has more failsafe than many certified retrofit avionics. One of the areas that the FAA is concerned with is the system's interaction with the aircraft electrical bus. But Dynon's data and power path design helps ensure that one critical failure won't take down the entire system. There's also the backup battery.

But one area that's worth considering is DO-178B software certification guidance, and Design Assurance Level. In certified equipment, this TSO-governed criteria addresses various potential failures of the software and the outcome it might have on the flight, from no effect to catastrophic. This software standard might not exist in uncertified equipment.

By now you've probably heard about the ARC's (Aviation Rulemaking Committee) proposal to the FAA that could relax the certification standards for some light aircraft. How the revised rules will read, and whether it will affect aftermarket avionics retrofits and the requirement for TSO is unknown. The FAA already announced it would miss the December 2015 deadline.

The age-old standard is that an aircraft's initial type certificate has the final say over which equipment can be installed. Flight Design is currently certifying its C4 composite single under Part 23 regulations, but is boldly attempting certification with Garmin's non-TSOd G3X Touch. The system is such an integral part of the aircraft, it even has its own name—Flight Design Vision Touch by Garmin. That's the C4 Vision Touch cockpit in the photo below.

Flight Design says it can get away with Garmin's uncertified equipment because the proposed changes to Part 23 has a provision for use of non-TSO equipment when blanketed under the aircraft's type certificate. For IFR eligibility and functionality, the Vision Touch interfaces with the certified GTN750 GPS navigator. You'll also notice the round gauges in the center of the panel. Should the changes to Part 23 fall by the wayside, those traditional gauges could be used as primary, while the surrounding Vision Touch is technically used for backup.

Flight Design says the decision to use a system that does not have a TSO approval on its own, but will be certified together with the airframe, allows for a significantly lower price point. While the Part 23 revision is delayed until at least 2017, we'll be following it closely.

AIRCRAFT FLIGHT TRIAL

Denali Scout: Power, Handling, Fun

An extra 30 HP has turned a very good backcountry airplane into a great one. The Denali provides a good combination of STOL capability and decent speed.

by Rick Durden

Let's begin with the conclusion: American Champion's decision to add 30 HP to the long-serving, 180-HP Scout, to make what it calls the Denali Scout—created the stud brute of the two-place, backcountry airplane set. It keeps the honest handling and excellent ground manners of the Scout while notching up the climb rate from very good to nearly breathtaking. There are some shortcomings that we'll outline—they are all carryovers from the original Scout and not safety of flight matters.

SYSTEMS, LOADING

Adding power to an established airframe to get better performance seems like a no-brainer when it comes to improving the breed, but power is destabilizing—the airframe and control system may need significant changes. Second, there really ain't a free lunch—more power means more weight in the engine room, accommodating a different, probably bigger, prop and figuring out how to store and supply fuel for a hungrier engine. Oh, yeah, there is going to be a whole new vibration harmonic for the airframe to compensate for (cracked structure is no joke), and the empennage is going to have to absorb higher intensity power pulses with each passage of a prop blade.

After flying the Lycoming IO-360-A1B6-equipped Denali with the new four-into-one exhaust system, new metal cowling and new, larger horizontal tail with an airfoil, rather than flat, cross section, it seems to me American Champion engineers did a nice job of incorporating the power into the airframe.

The fuel system remains the same as the 180-HP Scout. It is a dirt-simple, off-on arrangement (accident data has long shown off/on systems to be the safest) with 35 gallons of usable fuel in two wing tanks. Thirty-five gallons isn't much—so there is an optional system that adds another 35 gallons of usable fuel by plumbing in a second tank just outboard of the standard tank in each wing (apparently almost all buyers order the extra tankage).

The inboard and outboard tanks are connected by three fuel lines—smaller ones down low, fore and aft, and a three-inch line near the middle of the tank. The four tanks are also connected at the top of each by a line that goes to a single fuel vent below the right wing. The fuel caps are not vented. From a belt and suspenders perspective, I'd like to see a secondary vent.

The fuel fillers are located in the outboard tanks of the optional system—so as the tanks are filled, the fuel flows from the outboard into the inboard tanks due to wing dihedral. Because fuel can be added faster than it can flow into the inboard tank, to completely fill the tanks, it may be necessary to wait a few minutes after

CHECKLIST

- ⊕ The extra 30 HP has been well integrated, preserving the Scout's handling.
- ⊕ The extra power gives rocket-like takeoff and climb performance.
- ⊖ For $250,000, you should be able to fly with the windows open.

Both sides of the cowl open to expose the IO-390, above. New airfoil tail improves handling in pitch and cross-controlled stalls, below.

a tank first appears to be full, and then add more to top it off. Seventy gallons gives excellent endurance, but filling the tanks in the Denali Scout I flew meant the airplane was single-place—only 288 pounds could be carried in the cabin. The Denali Scout has what I consider to be a very good useful load—708 pounds in the one I examined. With two 200-pounders in the seats, 51 gallons of fuel could be carried, plenty for most flights.

The problem I ran into was figuring out how much fuel was in the airplane. The float-type gauging system gives a rough estimate of quantity and does clearly show when the fuel is getting low, but that's it. I suspect owners will either create measuring dip sticks for preflight, order the optional JPI EDM-930 Engine Data Management System and track fuel flow and quantity added, or simply add fuel until "it looks about right" and accept that they may be flying over gross.

American Champion will install just about any avionics package a buyer desires, from bare bones through an Aspen glass panel. The basic airplane includes just VFR instrumentation—not even including a slip-skid ball, something I think is essential.

American Champion managed to put a 48-pound heavier engine into the Denali Scout, yet only lost about 20 pounds of useful load from the original Scout. Both have the same, 2150-pound gross weight.

There is no issue with running out of the front end of the c.g. range when flying solo, with no baggage. I did a number of weight-and-balance calculations and did not run into fore or aft limitations with any loading combination. The main baggage compartment has a 10.4-cubic-foot capacity and can carry 100 pounds. The airplane I flew had the optional 3.6-cubic-foot extended aft baggage area that holds 30 pounds.

FIT, FINISH AND FLYING

The fit and finish of the airplane was very good—far better than new airplanes used to be—but not quite to the level that is expected for a current new airplane that costs well into six figures. There was some overspray on interior panels and a mismatch on some interior colors. When a new $40,000 truck has virtually perfect fit and finish, I think it's reasonable that a quarter-million-dollar airplane be at the same level.

While we're talking about pricing, the base price for the Denali Scout is $249,000, $23,000 more than the 180-HP Scout and competitive for new airplanes in its peer group.

The airplane I flew had a number of options, including 31-inch bush wheels, wide rear seat, extended baggage, long-range tanks and a basic avionics package. It was priced at $259,000.

I have always thought well of American Champion's crashworthiness design. Fuel is contained in metal tanks that are located between the wing spars. The Denali I flew had a five-point restraint system and the quick-release cabin door. Being able to jettison the door prior to a forced landing, in my opinion, increases the chances for the occupants to get safely out of the airplane after it stops.

In working with American Champion to set up this review, it was recommended that I fly the Denali Scout in the backcountry where it could show what it could do. I flew it into the Idaho wilderness, including a stop at Sulfur Creek Ranch, with Kasey Lindsay, an experienced off-airport pilot and American Champion dealer.

The walk-around inspection of the Denali is conventional; there are six fuel drains with the long-range tanks, and you need a screwdriver to open the cowling halves. The Scout sits high normally; due to its beefed-up landing gear for better prop clearance—but the 31-inch Alaskan bush wheels really made this Denali stand tall.

Nevertheless, boarding was easy—far easier than a Super Cub—with the step in the right place and plenty of room to maneuver into either seat. There was plenty of shoulder and head room and adequate leg room in both seats. With adjustble seats, my 6 ft 4 in.

BACKCOUNTRY AIRPLANES: ATTRIBUTES

Lot's of airplanes are alleged to be good for backcountry operations by pilots who want to seriously recreate. Most of them have been reviewed in this magazine.

The Denali Scout I flew for this review was made available by Northwest Backcountry Aircraft of Nampa, Idaho—and I spent an extended period speaking with the proprietors, Kasey Lindsay and Bob Hannah, experienced backcountry pilots, about what makes a good airplane for that type of flying. I've combined their thoughts along with reviews in this magazine of rugged, utility airplanes, to come up with a list of attributes of a good backcountry airplane.

Landing gear strength and stability. It has to absorb punishment from solid touchdowns as well as ever-present rocks, brush and holes. The brake lines should be protected, as there's a good chance a gear leg is going to strike something that could break an exposed brake line.

The gear geometry should make ground handling as easy as possible and minimize the risk of nose over in tailwheel airplanes. The most common cause of accidents in backcountry flying is loss of control on landing—gear design matters.

Good visibility over the nose during all phases of landing and takeoff. Hitting obstructions short of the the runway and just after liftoff are common cause of backcountry accidents. An airplane that has the nose block forward visibility is at risk of hitting something. The nosewheel King Katmai is proving popular partially because of its good visibility over the nose. The design of a tailwheel airplane should allow a competent pilot to apply the brakes while the tail is off of the ground to allow good visibility over the nose and maximize deceleration.

Suitable stability in pitch to allow precise speed control on final.

Flaps should provide high drag and rapid deceleration so the airplane doesn't float if the pilot isn't perfect with airspeed control.

A design that allows installation of oversize tires.

Power. Lots of it. When things go wrong, the ability to climb steeply and rapidly may mean everything. As Kasey Lindsay put it, the airplane has to be able to "climb like a rocket and come out of the sky like a piano."

No nasty behavior in a slip—and the ability slip steeply, hold the slip into the flare and straighten out at the last moment.

Good prop clearance, high wing for brush clearance, plus good overall visibility. When maneuvering for a runway in a canyon, a skylight means you can see what you need to see in a steep turn. Having lots of window area, with few bars and posts that can get in the way is important—especially when looking down and aft, something you do surprisingly often.

Excellent control response in gusty crosswinds and the ability to pin the airplane after landing so a gust doesn't put it back into the air.

Easy access to the flap control.

Easy to use, fast-acting trim system.

The ability to go around at the last possible moment, without a lot of trim change when going to full power in landing configuration—you don't want to have to be stiff-arming the stick or yoke while you're trying to get maximum performance out of the airplane.

A good mix between STOL ability and cruise speed. Sacrificing everything for STOL means a slow airplane in cruise. The ideal backcountry airplane will handle a 500-foot strip safely and get there and back home without having to time the trip with a calendar or worry about running out of fuel.

frame fit better in the Scout than in either a Super Cub or Husky.

Starting the aircraft is performed with the mixture at idle cutoff—it's advanced when the fuel-injected engine fires. Lindsay and I made a number of hot starts during the day and did not have any problem doing so.

PERFORMANCE

The Scout has excellent visibility over the nose, one of the reasons it's a good bush airplane. However, with the 31-inch wheels on this Denali, the nose was high enough that S turns were needed when taxiing. One of the major concerns in backcountry flying is being able to see obstructions on a runway. That proved not to be a problem on the Denali as the tail could be raised immediately on takeoff, giving the ability to see the runway clearly.

Published takeoff distances are a 388-foot ground roll and 708 feet to clear a 50-foot obstacle at sea level. Fourteen degrees of flaps are used; liftoff is at 50 MPH (American Champion uses MPH in its manuals, except for publishing a 15-knot maximum demonstrated crosswind component). Best angle-of-climb speed is 56 MPH. With the wide-chord, two-blade MT prop being swung by 210 HP, the Denali's angle and rate of climb is impressive. Best rate of climb is 82 MPH—the manual shows a 1428 FPM rate of climb at sea level. The engine is flat-rated, so climbs are performed at 2700 RPM and full throttle.

The Denali I flew did not have a vertical speed indicator, but a portion of the flights Lindsay and I made were in company with a 180-HP Scout. Loaded to near gross weight, the Denali handily out-climbed the standard Scout. In cruise, at similar power settings, the Denali was slightly faster.

Book cruise figures for the Denali at 9000 feet are 143 MPH at 75 percent power and a fuel burn of 12.2 GPH and 130 MPH at 65 percent power with a fuel burn of 8.2 GPH. I found it impossible to get cruise numbers in the Denali. It did not have any EGT gauging (something that makes no sense). I tried to use the American Champion book technique for lean-

Basic panel, with a Garmin aera796, top. Denali in its natural habitat, the Idaho wilderness, below.

ing—lean until the engine begins to run rough and then turn the mixture knob back in three full turns. The idea is to run at 150 degrees rich of peak EGT for best power.

The problem I had was that the engine never began to run rough. It would go smoothly from rich of peak to lean of peak—there was no way to discern peak EGT. In my opinion, an engine monitor should be standard equipment on the Denali.

Book cruise numbers and the experience flying level with the 180-HP Scout confirmed my initial opinion about adding power to the Scout—the extra power of the Denali would generate impressive climb performance but not much extra cruise speed.

Assuming the book is correct, going from 65 to 75 percent power gives a 13 MPH speed increase—but that comes at a cost of an extra four GPH, a 50 percent increase in fuel burn.

In cruise, you can't fly it with the window or door open. It's a little thing, but it's a big thing—dealers tell me that the demographic of most purchasers of new, backcountry airplanes are folks who buy them as a second or third airplane purely for fun and to look cool on the ramp—and being able to motor around with their clothes blowing in the breeze is a huge part of the mystique. In my opinion, American Champion needs to figure that out.

HANDLING

Handling is honest and predictable, with one glitch—it's solid in pitch, light in yaw and, with aileron spades installed, requires only moderate force in roll. However, the aileron design, combined with outboard-mounted spades, generates massive adverse aileron yaw.

I especially liked the trim system—it works from a sliding knob below the throttle quadrant—it's fast, positive and effective.

The airplane was rock solid in slow flight—I trimmed it for hands-off flight at 49 MPH IAS.

Stalls were consistent with the Citabria line—mild, with no roll off if the ball is centered. They proved consistent with the published speeds of 54 MPH clean and 45 MPH with full flaps.

Approaching for landing, the airplane slows easily to about 85 MPH, well within the white arc for flap deflection. There is a notable pitch down with flap extension—so the nose is well down, giving excellent visibility on approach. Full flaps are only 27 degrees and didn't seem to provide a lot of drag. Normal approach speed is 75 MPH. For backcountry work, a short field approach speed of 58 MPH is used.

The Denali also slips well, so it can plummet toward the runway and recover cleanly for touchdown. Throttle response was immediate and linear, so the approach could be modulated precisely and a go around quickly initiated.

Tail-low wheel landings are the preferred backcountry technique in the big-tire Denali Scout, as they minimize energy at touchdown while allowing the pilot to see the runway surface clearly. They proved amazingly easy to accomplish. In addition, by raising the tail slightly just after touchdown, the angle of attack was reduced so the airplane was firmly on the ground and the weight was on the mains so braking could be effective.

CONCLUSION

The additional 30 HP and engineering work to integrate it has, to me, allowed American Champion to improve on one of the best backcountry airplanes on the market. Is it worth $23,000 more than the Scout? That's a marketing question, and given that I was told the demographic for these airplanes is a male who has at least one other airplane and wants a hotrod to play safely in the backcountry, I think the extra power and performance may be a bargain for them.

Portable Transceivers: ICOM and Sporty's Win

ICOM's A24 has proven durability and reliability, making it worthy for use as a primary comm. For simple backup, try Sporty's SP-400.

by Larry Anglisano

Back in the day, King's KX99 handheld transceiver ruled the roost. It was a big, heavy and solid performer. Today, portable transceivers are far more advanced, but their purpose hasn't changed.

In lesser aircraft without electrical systems, a portable might be the only option for communicating. Portable transceivers can also bring sizable amounts of utility to your mission, especially when used to fetch clearances, listen to the ATIS before engine start and talking (and navigating, God forbid) your way down during primary radio failure.

COCKPIT ACCESSORIES

Search the transceiver section of the Sporty's catalog and it's easy to be overwhelmed by what appears to be a wide variety of models. But we found that many are defeatured versions of a flagship model.

We gathered a variety of them to see which offers the best mix of rugged fit and finish, good battery endurance and a logical user interface and settled on four favorites.

SPORTY'S SP-400

When we looked at these things a few years ago, the $349 SP-400 that's built by an independent Japanese company and branded by Sporty's Pilot Shop stood out as an all-around solid performer and good value. We liked it so much, we bought one to use as a primary radio in a Piper Cub. This created the basis for a long-term evaluation that had the SP-400 back to Sporty's twice for repair. One was an issue with the AA Alkaline battery pack (a rechargeable pack is optional) and the other was a failure of the set's audio output jack. Thanks to Sporty's exceptional customer service and a five-year warranty, both repairs were accomplished at no charge and downtime was minimal.

While we found it to be a good performer in previous evaluations, Sporty's dropped the oversized and bare-bones SP-200 model. Along with a variety of models from ICOM and Yaesu, the company primarily sells the SP-400. Measuring 6.54 inches tall, 2.35 inches wide and 1.46 inches deep, the radio is one of the larger ones on the market.

But among other models, we think the SP-400 is the easiest to use. It has basic controls that are placed where you might expect them to be, including a dedicated volume (which also serves as a power control) and squelch rotary knob placed on the top of the case.

Compared to earlier versions, the latest SP-400 has an improved LCD display that's easier to read in direct sunlight and has a dedicated night mode for use in the dark, plus user-adjustable contrast and backlighting control.

The SP-400 doesn't have a lot of features, but it does have localizer and glideslope with adjustable OBS, storage for 20 memory channels, plus NOAA weather radio band.

The benefit of not having a lot of

CHECKLIST

- ⊕ Yaesu FTA-230 is the perfect size for stashing in a map or shirt pocket.
- ⊕ Sporty's SP-400 is the standout winner for ease of use.
- ~ You'll need an external antenna to talk any sizable distance.

Handheld transceivers come in various sizes and features, main photo. From left to right, Yaesu FTA-750L, Yaesu FTA-230, ICOM IC-A24 and Sporty's SP-400 were tops in our roundup.

features is the ability to use the radio without having to reference the user's guide—an edge we give the SP-400 over most of the other radios we evaluated. That could pay big in an emergency situation.

But unlike the others, the SP-400 doesn't come standard with a headset adapter. That's a $26 option. When used with the adapter, the radio provides transmit sidetone, which is the sound of your voice during modulation. When used as a primary radio, that's imperative, in our view.

ICOM

ICOM's line of aviation portables has been the same for as long as we can remember. As a result, the radios lack some of the gee-whiz appeal found on the more modern Yaesu models. But ICOM makes up for it with a durable build quality and a utilitarian feature set. That's why the ICOM A24 has remained an accessory in our own flight bag for years.

The A24 is the flagship model and has VHF comm and nav functionality (the A16 is an identical unit less navigational functions). ICOM brags of the unit's single-handed operation for use while flying and it fits the task, in our view. With battery pack, it stands roughly 5 inches tall, making it efficient for storing in a map pocket. At 2 inches wide, 1 inches thick and weighing roughly 15 ounces, we find the radio comfortable to use in the cockpit, even when using the headset adapter. We still wish the radio had a one-shot squelch adjustment. For instance, the squelch is adjusted by pressing a dedicated squelch key and then setting the threshold with the right rotary knob.

Until you become familiar with the operation, you'll likely grab the more prominent rotary knob at the top of the case to adjust the volume, but this knob changes the frequency (a feature we prefer rather than keying it in from the keypad.) But even so, we find this knob is annoyingly close to the flexible antenna.

If you ever had the need to use it, the nav feature is easy to use and offers both To/From navigation and the current radial. It also shows a CDI. We like the NOAA weather radio alert function when plugged into a wall outlet and the weather function can also be used when on the air-band. There's a 200-channel memory bank for frequency storage, which might be overkill. The only frequencies we store in our unit is the local ATIS, ground control and departure frequency.

The utilitarian ICOM A24, upper right, doesn't have much gee-whiz appeal, but it's the right size and wins our 10-plus year reliability test. Perhaps with more functions than many pilots will use, we think the Yaesu Spirit FTA-750L has a logical menu and intuitive feature set.

All of the ICOM units have a good display with characters that are easy to read in all lighting conditions. The unit has a 1650 mAh NiH battery with excellent endurance. An alkaline battery pack is optional and you'll want it for use as an emergency radio, unless you can always remember to keep the rechargeable topped off. We can't.

On the topic of batteries, we don't like that the unit doesn't indicate when it's charging. In other words, the other units in the group verify the battery is being charged with simple red and green LEDs. Not the ICOM. You have to guess that it's fully up to charge—or that it's charging at all when it's plugged in.

ICOM's A14 is a communications-only portable with a special 700mW loudspeaker using a BTL amplifier (essentially dual amplifiers that drive both ends of a speaker load). Trans-

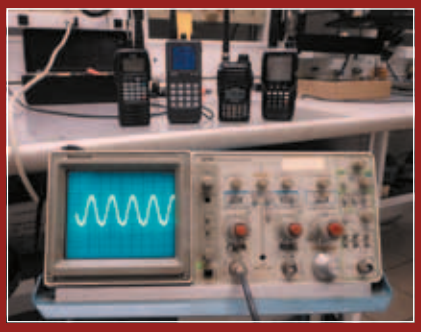
SELECT PORTABLE RADIOS COMPARED

MODEL	STREET PRICE	CHASSIS SIZE	RECEIVER	COMMENTS
ICOM IC-A24	$349	5.7 X 2.1 X 1.6	COMM/VOR/ NOAA WX	Rugged chassis and controls, proven long-term reliability.
ICOM IC-A6	$299	5.7 X 2.1 X 1.6	COMM/NOAA WX	The A24 packaged without a navigation receiver.
ICOM IC-A14	$230	4.5 X 2.0 X 1.5	COMM/VOR/ NOAA WX	Insanely loud speaker is made for ground ops, loud cabins.
SPORTY'S SP-400	$349	5.5 X 2.5 X 1.4	COMM/VOR/ LOC/GS	Solid-performing comm and nav makes for a worthy primary radio.
YAESU FTA-750L	$399	5.2 X 2.4 X 1.3	COMM/VOR/LOC/ GS/NOAA WX/ WAAS GPS	WAAS GPS missing a database, logical feature set.
YAESU FTA-550L	$299	5.2 X 2.4 X 1.3	COMM/VOR/LOC/ NOAA WX	Most of the FTA-750L features but without GPS.
YAESU FTA-230	$229	4.09 X 2.4 X 1.2	COMM/VOR AUDIO, NOAA WX	Compact footprint, quirky feature set, submersible.

BENCH RESULTS: HOT LITTLE RECEIVERS

To get a sense of how each radio compares in terms of comm and nav receiver performance, we put them on the avionics test bench at VIP Avionics in Hartford, Connecticut. Don Boccaccio, VIP's bench genius, looked hard at comm transmit power, receiver sensitivity and modulation quality, in addition to nav receiver performance. As Boccaccio put it, "These are hot little receivers."

Each radio transmitted at least 1.0 watt of power, although the ICOM A24 had the most, at around 1.5 watts. It's important to stress this isn't nearly enough power to transmit any sizable distance while using a portable antenna. Realistically, you'll need an external antenna. The transmitter modulation quality, measured with a calibrated spectrum analyzer, was about equal among the radios, except on the Yaesu Spirit 750L where it was notably worse. But when it came to nav receiver performance, the Yaesu 750L blew the others away. Injecting a raw nav signal directly into its receiver, it received the VOR down to 0.5 microvolts and the glideslope at 0.63 microvolts of signal. The others stopped receiving at around 1.3 microvolts, on average. The lesser the number, the greater the distance the receiver will receive.



Still, we think comm performance and ease of use is more critical than nav performance. In these areas, the ICOM and Sporty's shine. But if we had to fly a glideslope using a portable radio as primary (which is awkward, at best), we would want to do it with a Yaesu 750L, based on the results of a critical bench evaluation.

lation: Loud. So loud, in fact, that we used the A14 while standing next to a Citation that was spooled at ground idle and were able to hear the tuned ATIS broadcast. We think the A14 is a good option for ground support or for emergency use without a headset.

YAESU

Yaesu is a familiar name in the amateur and marine radio market. The company's Vertex Standard line of land mobile equipment (which included airband transceivers) was taken over by Motorola during a division merge. Yaesu continues to manufacture the aviation radios, but dropped the Vertex name.

When we evaluated the Yaesu/Vertex line in 2010, we dinged the radios for having nonstandard SMA antenna connections, since most connections to external antenna systems will have BNC connectors. Yaesu apparently listened because all of its aviation radios now utilize BNC antenna connections.

Yaesu's flagship aviation portable, the FTA-750L Spirit, is the only portable on the market that has a built-in WAAS GPS. The problem is the GPS doesn't have the functionality most pilots would expect, including a database of airports and navaids. Instead, it's up to the user to either manually enter or download the lat/long coordinates of the waypoints with Yaesu's PC programming software.

Yaesu packs a lot of features into the Spirit 750's reasonably small 5.2 by 2.4 by 1.3-inch chassis.

The 1.7 x 1.7-inch dot matrix, backlit LCD display is a mediocre performer in bright sunlight, although manually boosting the contrast helps.

Despite having a feature set that's busy for a portable radio, we found the Spirit 750 easy to get along with thanks to a straightforward menu structure. A dedicated Menu key and bezel-mounted arrow keys (or the inner rotary knob) move you around the menu structure, while an Enter key selects the function. And there are plenty of functions.

Adjusting the frequency is accomplished with the outer knob on the top of the radio (or by direct keypad entry), while volume is adjusted with the inner knob—something we like. It's just natural having a dedicated rotary knob for volume and it's missing on the lesser Yaesu FTA-230. What is missing on the FTA-750 is a one-shot squelch control. Instead, press the squelch button on the side of the radio (below the transmit button) and then rotate the knob to set squelch threshold. The squelch settings are linear, but we wish it had a dedicated squelch knob.

There's plenty of frequency storage capability—up to 200 channels—which are accessed from the Memory Book icon from the unit's onscreen menu. The menu screen also gains access to a countdown timer, NOAA weather channels, a setup menu for adjusting the display and accessing what's called the Split Mode, which allows you to transmit a call to a flight service station while receiving on the VHF navigation band. The display automatically shows the CDI, based on the signal it's receiv-

continued on page 32

CONTACTS

ICOM, Inc.
800-253-1498
www.icomamerica.com

Sporty's Pilot Shop
800-776-7897
www.sportys.com

Yaesu USA
714-827-7600
www.yaesu.com

Electroair's Affordable Electronic Ignition

Electroair's STC'd electronic ignition system promises to reduce fuel consumption and increase power at a cost-effective price. Owners tell us it works.

by Rick Durden

CHECKLIST

- Hotter spark and advanced timing give more efficient combustion.
- Saving from 1.5 GPH gives an 800-hour payback for the system.
- Benefits are not as pronounced for lower altitude operations.

There have been a number of attempts to bring electronic ignition to the piston general aviation world—with varying rates of success. One we have been following is Electroair, a Howell, Michigan, company that developed an electronic ignition system (EIS) originally for homebuilts, and went on to get an STC for production airplanes—four-cylinder engine models first, then six-cylinder machines. It's in the application process for turbocharged engines and may have that approval soon after this article appears.

Electroair has some 500 of its EIS in the field, and the owner feedback we got was uniformly positive (see sidebar).

BENEFITS

A magneto-based ignition system always fires the spark plugs at the same point—usually 25 degrees before top dead center—with the idea that the combustion event will reach maximum pressure by the time the piston reaches about 11 to 17 degrees past top dead center.

This one-size-fits-all system has worked well for years, especially at lower altitudes. However, as there is less oxygen for the fuel-air mixture at higher altitudes, the thinner mixture burns slower, delaying the development of maximum pressure in its combustion to a point past 17 degrees past TDC, reducing the power output. It's long been known that advancing the spark at higher altitudes results in more power, as well as more complete combustion of the fuel. Electroair's approach is to use a computer to sense altitude and various engine parameters to set the ignition timing so the spark generated a combustion event that provided the most power, most efficiently.

ELECTROAIR'S SYSTEM

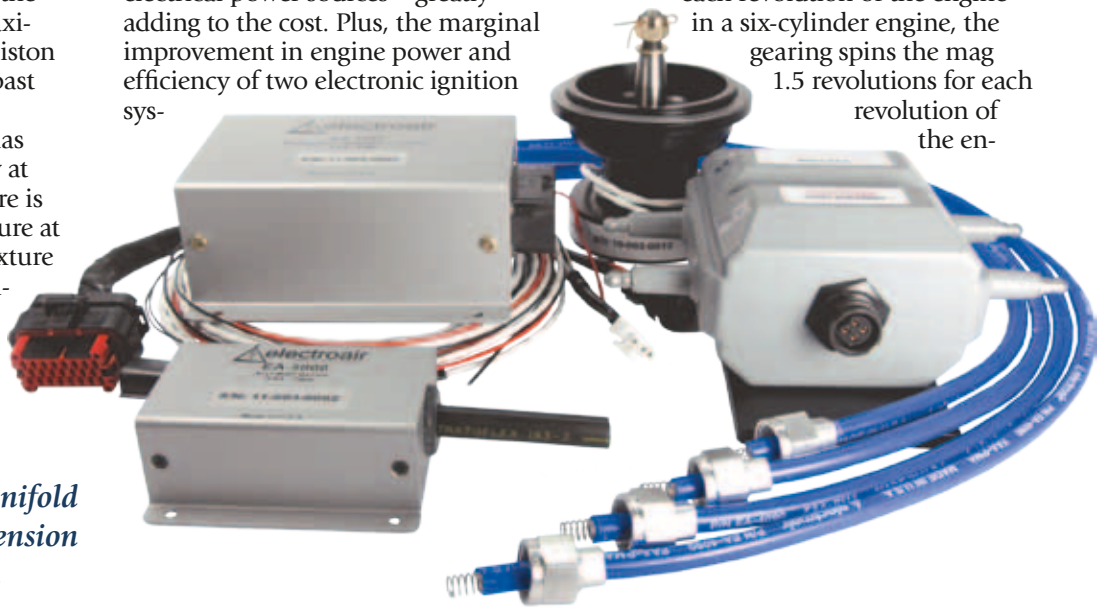
Electroair's high-energy, tuned electronic ignition system was developed from a high-performance automotive system designed for racing. In service on aircraft, it replaces one of the magnetos.

While replacing both mags would be more sophisticated, FAA certification would require dual, independent electrical power sources—greatly adding to the cost. Plus, the marginal improvement in engine power and efficiency of two electronic ignition systems over one doesn't appear to be worth the cost of the second system—in a nutshell, the fuel savings curve isn't linear.

The system has four main components: a manifold pressure sensor, direct-fire coil pack, electronic control unit and a mag timing housing (four-cylinder engine) or timing ring that mounts on the crankshaft just behind the prop flange (six-cylinder engine). There is also a set of high-tension cable leads with terminals installed provided with the kit.

Timing is picked up by a "60 minus 2 tooth" trigger wheel with a single magnetic pickup; it provides a high-resolution signal feeding continuous RPM information to the control unit—similar to automotive units in the 1980s.

In four-cylinder applications a mag timing housing encloses the trigger wheel/mag pick up and replaces one of the magnetos. In a four-cylinder engine, the accessory gearing is such that a mag is spun one revolution for each revolution of the engine—in a six-cylinder engine, the gearing spins the mag 1.5 revolutions for each revolution of the engine.



The four-cylinder EA-41000 kit includes coil pack, mag timing housing, electronic control unit, manifold pressure sensor and high-tension cable leads with terminals.

OWNER COMMENTS: IT WORKS

We contacted several owners who had installed the Electroair electronic ignition system on their airplanes. All reported reduced fuel burn and increased power—those who commented on it said that with the Electroair system on their bottom spark plugs, they no longer had any fouling because of the hotter, longer spark.

Zeke Valtz, proprietor of Horizon Aviation, which runs two flight schools in New England, told us that he let Electroair use his PA30 Twin Comanche for certification of the system. He is progressively putting the EIS on his flight school aircraft, beginning with a Cessna 152.

Valtz reported that after 450 hours of engine time on the PA30, his records show that at 75 percent power the airplane used to cruise at 171 KTAS on 17.2 GPH (total). With the Electroair system, he has a choice; the airplane cruises at 179 KTAS on 17.2 GPH or he can choose to cruise at 171 KTAS on 15.1 GPH, saving 2.1 GPH. Valtz said, "The system doesn't quite make breakfast for me, but I'm very, very pleased. It does everything they said it would."

Vlatz's 152 has 300 hours since conversion—he is still gathering data on performance. He noted that thus far it has shown no plug fouling, which is saving him money in cleaning plugs, as 152s are notorious for fouling plugs. Valtz said that he anticipates a 700-hour breakeven for the electronic ignition system on his Cessna 172s and told us that he considers the system a smart investment.

Don Ferguson installed the Electroair system in his O-320-D2J Lycoming-powered Cessna 172. After a year and 150 hours of operation, he said his records show a fuel saving of 0.6-0.7 GPH. There have been no mechanical problems, no fouled plugs and he's saved the cost of scheduled maintenance on the removed magneto.

Jeff Walker owns Seaplanes North, based in Anchorage, Alaska. He installed the Electroair EIS on his company Cessna 185. Fuel burn at cruise is from one to two GPH less than before, which has saved him substantial money because of the increased range. He has runs where he used to have to buy high-priced fuel in the bush, but now can go round trip without refueling.

Dave Seastead of Angel City Flyers said that the system is simple and straightforward to install. "The instructions are specific enough that the mechanic won't be left to guess, but flexible enough that the mechanic is free to exercise good judgment to customize the installation and tailor it to the specific aircraft, especially in regards to component location."

Tim Hahn of Carson Aviation Services told us that his company installed the Electroair system on a Cessna 172P and now can't get customers to fly the company's other 172 because the modified airplane, with an O-320, "acts like it has an O-360." He said the company is seeing a 1.5 GPH savings in fuel.

Hahn reported that the installation gave them no major problems, but said that the instructions must be followed explicitly. He was adamant that the maintenance technician should read them completely before starting work. For a first-time installation, it was eight hours from uncowl to recowl. Based on his experience thus far, Hahn recommended that owners not wait for overhaul to install the system.

Spencer Suderman had the Electroair EIS installed on the IO-540 in his Pitts S-2B so that he could climb to a high enough altitude to break the world's record for turns in an inverted flat spin. He said that before the conversion, he could not get above 21,000 feet—afterward he reached 23,000 feet and was still climbing at 125-150 FPM. In cruise, he now saves as much as two GPH if he goes to at least 8500 feet—higher is better for fuel savings. Oh, yes, he now owns the spin record.

gine. Accordingly, Electroair's sixcurrent six-cylinder system still removes one magneto (and covers the opening) but uses a timing ring that mounts on the crankshaft as described above to get engine RPM and crank position.

Mike Kobylik, one of the two owners of Electroair, told us that on some six-cylinder engine installations there is already some component in the area where the timing ring needs to go, so the company is finishing up development of a mag timing housing for those engines.

The dual microprocessor electronic control unit receives RPM and manifold pressure information and advances the timing to compensate for altitude and throttle position based on proprietary and patented algorithms. Timing can be advanced as much as 20 degrees by the system.

The direct-fire coils produce a much stronger spark than do magnetos—on the order of 70,000 volts versus 15,000 volts. In addition, the spark produced lasts through 20 degrees of crank rotation versus five for a mag—creating a hotter, longer-lasting ignition source. This also improves starting and reduce spark plug fouling—which owners confirmed. Because of this, Electroair recommends installing the electronic ignition system on the bottom plugs, as they are more prone to fouling. With the more robust spark, the plug gap has to be increased.

Because the remaining mag still fires at 25 degrees before top dead center when the electronic ignition system has advanced the timing, the mag's spark occurs with combustion already underway. Its spark is wasted. That's no big deal, and it's one reason why the system is referred to as a wasted spark system.

COST

Price of the four-cylinder system is $3400; for the six-cylinder system it's $5500. The list of aircraft for which the systems are approved is long, and includes both singles and twins. Kobylik did tell us that before an owner buys a kit, he or she should check with Electroair to see if the airplane involved has any design features that will make installation prohibitively expensive. Kobylik would not give us a generic installation time because he said there were simply too many

Installation on a Diamond DA20 with coil pack on firewall with plug leads attached, top. Spencer Suderman's Pitts S2B approaching 23,000 feet using Electroair's EIS, bottom.

variables, especially if the airplane has any mods. Owners told us to expect four to eight hours, however, our survey included a limited number of aircraft types.

The installation instructions we looked at were impressively complete and well-written. We noted that the coil pack mounts on the hot side of the firewall, while the manifold pressure sensor and electronic control unit mount on the cold side. Kobylik stressed that the owner and maintenance technician should sit down and go through the instructions step by step before beginning installation—because they are on the company website—before ordering a kit. Kobylik said the technician can identify potential areas of challenge based on knowledge of the specific airplane and call Electroair with questions. Owners and two maintenance shops that had installed the system said that the instructions are clear, but have to be followed exactly—and that when they called with questions, Electroair was immediately responsive. They also praised Electroair for fast shipment of parts.

SAVINGS

Electroair forecasts fuel savings of one to two GPH—depending on engine size and altitudes regularly flown (higher is better). The savings are on top of what is obtained through normal leaning, whether rich or lean of peak EGT.

Assuming $600 for installation on top of a $5500 for a six-cylinder engine and a savings of $7.50 per hour in fuel (1.5 GPH at $5 per gallon), and conservatively not taking any savings for unneeded mag maintenance or plug cleaning, the system pays for itself in just over 800 hours. Assuming the engine runs to a 2000-hour TBO (and there's no reason to replace the electronic ignition system at TBO—it keeps on going), the additional savings is about $8900, not counting unneeded mag maintenance.

According to Kobylik, installing one electronic ignition system gives about 85 percent of the improvement in fuel consumption and power that result if both mags are replaced with the Electroair system. The additional cost of a second system and an independent power source would mean that the payback for the increased efficiency might not be reached within engine TBO—so the company has not pursued FAA approval of a dual electronic ignition system.

The owners we spoke with who kept track of their airplane costs told us that they expected the system to pay for itself in 700 hours. That made it popular with the two flight school proprietors we interviewed, even though those airplanes usually operated at low altitudes—but their instructors taught their students to lean appropriately.

POWER INCREASE

One flight school said it had converted one of its two Cessna 172s and the improved rate of climb from the electronic ignition system made it the more in-demand airplane for renters. We received limited hard data on power increase with the Electroair system—although what we got matched our expectation that the power increase would become more apparent as altitude increased.

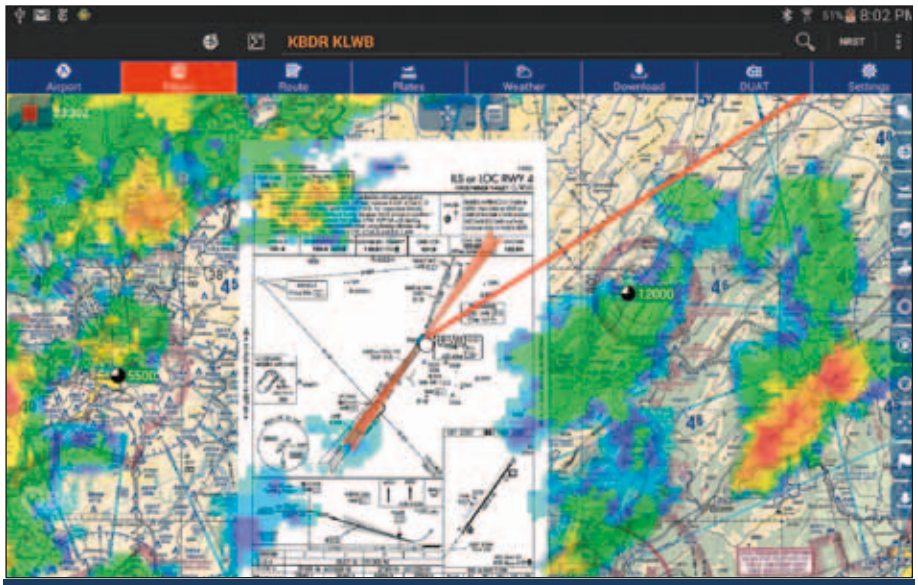
One owner told us that the static RPM increase on his 172 at nearly sea level demonstrated an increase in four HP using traditional horsepower versus RPM change calculations.

Spencer Suderman installed the Electroair system on his Pitts S2B because he wanted to break the world's record for number of turns in an inverted flat spin. With a dual mag system, the airplane would not climb above 21,000 feet. With one Electroair system installed, he was able to climb above 23,000 feet, a nearly 10 percent increase in maximum altitude. (He did break the record, making 81 turns.)

CONCLUSION

The automotive industry has demonstrated the value of electronic ignition—we've been waiting for it to be fully integrated into piston aircraft engines. While Electroair's system is not as sophisticated as those in the current automotive world, it is, to us, a simple, elegant way to get a significant fuel consumption and performance benefits in an FAA-approved package at a price that has an attractive cost/benefit ratio.

Contact Electroair at www.electroair.net or 866-494-3002.



TABLET APPS

AvNav EFB for Android: Free Charts, Easy Menus

For five bucks a month, the AvNav EFB navigation app for Android delivers fast map rendering, DUAT brief and file, plus free georeferenced charts.

by Larry Anglisano

As we've said in recent reports, there's a rapidly growing market of navigation apps designed solely for Android tablets. We think that's a good thing because our evaluations have proven that many Android devices work well in the cockpit. We even prefer Samsung's latest Galaxy tablets over Apple's iPad. Some have longer battery life and better screen quality.

Introduced at AirVenture this summer, AvNav EFB for Android includes optimized flight planning, free georeferenced charts and DUATS interface. We've been using the AvNav EFB on a new Samsung Galaxy and like the app's simplicity and fast map rendering. It's still in the developmental stages, so it lacks some major features that iOS app users may be used to, including synthetic vision/attitude display and GPS approaches.

SINGLE-TOUCH TAB

AvNav EFB was developed by AvNav founder, software architect and Piper Comanche owner Sanjay Kumar. Kumar originally intended for the app to be used primarily for preflight planning, but ultimately made it a inflight navigation app.

Kumar purposely avoided a deep menu structure and in particular, "back" buttons because he feels they lend to a dated and frustrating user interface. As a result, AvNav EFB—optimized to run on Android 4.0 tablets and phones—was designed with a page-and tab-driven user interface. This means each major function has a dedicated, single-push tab located in a menu bar at the top of the page.

The AVNav EFB map page is powered by a high-performance BA3 Altus mapping engine, which also powers most popular iOS Apps. This BA3 engine helps to ensure flicker-free mapping and fast rendering performance. Mapping is optimized for the Android multitasking operating system and displays VFR sectional charts and IFR high and low enroute charts, along with overlays of animated ADS-B NexRad weather graphics, METARs, terrain data, plus daily updated fuel prices.

Graphical rubberbanding—that's where you pinch and drag the course line on the map to modify the route—is always on and results in fast map redraws.

We like the simple but complete terrain awareness feature that includes a terrain altitude optimizer. The app shows terrain and obstacle data along the route of flight, while showing terrain above the flying altitude in red. Additionally, while planning a route, you can experiment by varying your altitude to find the lowest altitude to clear the terrain for the planned route of flight.

On the topic of route planning, SUA and MOA airspace data currently doesn't exist, but is planned for a future revision, as is AIRMETs, SIGMETs and runway extended centerlines.

We like the simplicity of the apps flight-planning functions, including the straightforward altitude optimizer feature that compares altitudes with ground speed and temperature. Simply tap a VFR/West, VFR/East, IFR/West or IFR/East tab and a chart shows ETE, headwind or tailwind component, fuel burn and temperature for a given altitude.

AVNav EFB mimicks the ForeFlight Mobile iOS app with a Plates on Map feature, main photo. Nexrad imagery from various portable ADS-B receivers layers on top.

CHECKLIST

- ✚ Tab-style menu logic makes for an easy user interface.
- ✚ Plenty of useful features, including flight planning optimizers, DUAT interface.
- ⛔ SIDs, STARs, attitude data and synthetic vision is missing, for now.

You can also select an altitude in the flight plan for optimized winds aloft data. Basic navigation data including GPS groundspeed, time, distance and bearing to the next waypoint is displayed at the bottom of the map page.

With the DUAT file and brief function, you can file a flight plan and obtain weather briefings—route or area briefings—directly inside the app. AvNav keeps a history of all filings and briefings that you can review at a later date. Much of the information is automatically copied from the active flight plan, which reduces the need to enter it manually. It really streamlines the process, in our view.

DATA ON THE CHEAP

A dedicated Airport tab accesses complete AFD information on over 44,000 airports around the world, although AvNav mapping only includes Continental United States. We're told that Canadian coverage is planned for a future revision.

The airport page function has everything you might want to know about an airport, including frequencies, runways and procedures, weather, NOTAMs, remarks and FBO data, with daily updated fuel prices provided by Globalair.com. This data is accessed with dedicated tabs at the top of the Airport page.

Where other apps charge additional fees, AvNav's $4.99 monthly subscription fee includes georeferenced approach plates and airport diagrams as standard. The rub is that the library of georeferenced plates isn't as complete as you would find in other apps. AvNav uses FAA public data, chart and approach plates and simply recreates the data from PDFs. So far, there are 11,000 georeferenced plates and 650 airport diagrams in AvNav EFB.

Kumar told us that he's cautious when recreating this data for georeferencing and if there's any doubt about the quality and integrity of the georeferencing, it's excluded from list. You can still view the chart, of course, but you won't see ownship data on it. Kumar said that as additional quality control measures are put into place, additional georeferenced plates will be implemented.

Like the ForeFlight Mobile app for Apple iOS, AvNav has a Plates on Map feature. This overlays the chart on top of the map display, and Nexrad weather graphics is overlaid on top of the chart.

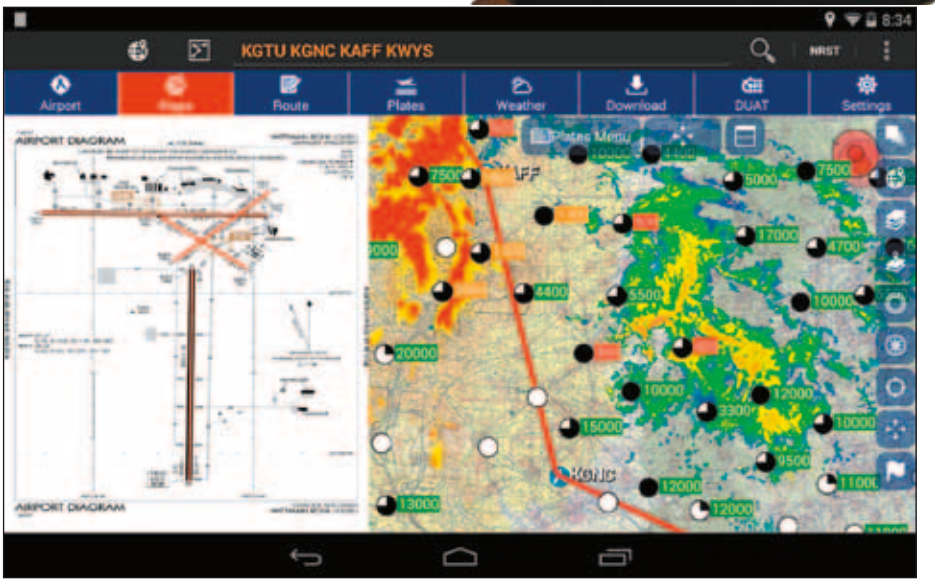
On a side note, we sensed a bit of apprehension when talking with Kumar about how pilots are using tablet apps in flight. While acknowledging that some pilots use this non-certified data, including georeferenced approach plates for primary navigation, he noted, "It makes me nervous," he said.

Rightfully so. As a software architect, he knows the more data and functionality you build into an app, the more chances there is of the app crashing. As a result, it's made him work that much harder to track program crashes and improve the integrity of the app, even if means holding back functionality and available data. In our use, we never once experienced the slightest hiccup in any of the app's functions.

AvNav is compatible with a variety of third-party ADS-B hardware interfaces. Current interfaces include the SkyRadar-DX, the Levil Technology iLevil receivers and the Dual XGPS170. AvNav EFB won't overlay attitude or synthetic vision at this time, even if the receiver provides it.

A free trial of AVNav EFB can be downloaded on the Google Play store. Contact www.avnavefb.com.

The Dual XGPS170, top, is one of several compatible ADS-B interfaces. The $399 Samsung Galaxy Tab 8.4 seems the right size for palming an electronic approach plate, middle. AVNav EFB can display plates and surface charts in full screen or in split-screen mode, bottom photo.



Bellanca Viking

After all these years, the wood and fabric single still earns respect for its sprightly climb rate, sturdy build and pleasant handling.

In an era when the state-of-the-art aircraft have to be baked in an oven after being laid up in plastic sheets squished together in vacuum bags, it's hard to imagine that a wood and fabric wonder like the Bellanca Viking still exists. But it does. And although there aren't great squadrons of them around, the Viking retains a loyal, almost cultish following.

Why? Because there's nothing quite like it, that's why. The Viking's performance isn't stellar, but it's credible with most of its contemporaries, the aircraft handles well with few gotchas and it's so strongly built that owners still delight in showing the famous factory picture of a dozen cheerleaders standing on the wings. "Try that with an aluminum airplane," goes the advertising tag line.

The Viking is nothing if not sturdy. Inside the wing are two laminated wood spars running the length of the wing, connected by a system of ribs. Inside the fuselage is a lattice work of stout steel tubes that form the engine mount, then carry through the fuselage to form the tail. Add laminated spruce forming one axis and a steel roll cage forming the other and you've got a very sturdy airframe with better occupant protection than many modern designs can claim.

MODEL HISTORY

The Viking's family tree traces its roots back to the Bellanca Cruisaire, a triple-tailed retractable taildragger design reminiscent of aviation pioneer Giuseppe Bellanca's early designs. The first Model 17 Viking appeared in 1967, powered by a 300-HP Continental IO-520-D.

The Bellanca Super Viking is like an American muscle car compared to the European imports.

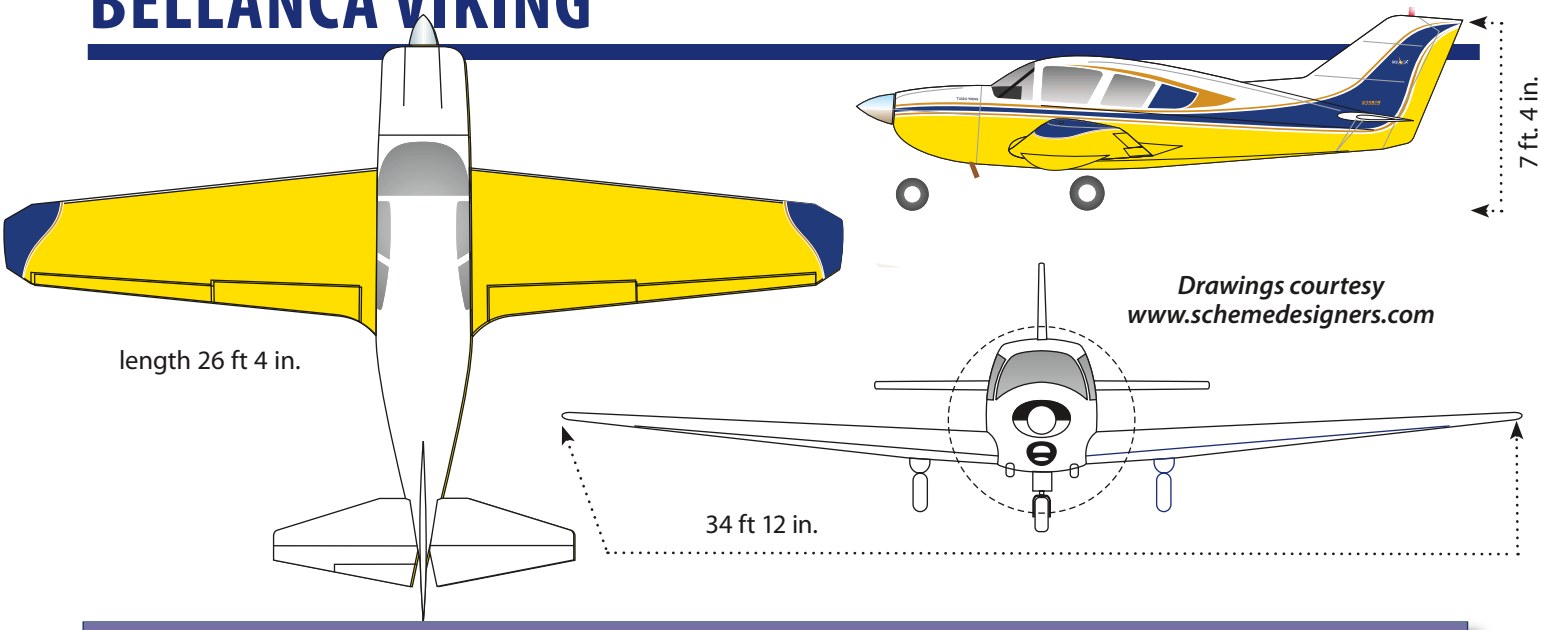
The model evolved gradually, but other than the engine, there were few major changes. The Continental-powered Viking was called the 17-30, while the 17-31, introduced in 1969, was powered by a 290-HP (later 300-HP) Lycoming IO-540, either normally aspirated or turbocharged. Either engine was available for much of the early production run; the 17-31 was discontinued after 1979 and in 1996, the Continental IO-550 was made available as an option. Some earlier airplanes have been retrofitted. The original hydraulic gear and flap actuation system was redesigned midway through the 1968 model year with the introduction of electric flaps.

The original fuel system—five tanks, two fuel selectors, eight possible combinations of selector settings and several sometimes incomprehensible gauges—was simplified to a left, right and aux system in 1974. After that mod, the fuel mismanagement accident rate for Vikings dropped dramatically. Production continued at a modest rate—in the peak production year, 1973, just under 200 were built—significant volume by modern standards, but a trickle for that era.

Bellanca Aircraft Corp. went bankrupt in 1980, the year things turned sour for the entire industry. In 1984, the company got back on its feet and started building Vikings again on a limited, custom-order basis. Only nine were built in 1984 and 1985 and none in 1986. About 38 were produced between 1984 and 2005.

In 2001, Bellanca went bankrupt again. In 2002, a group of six Bellanca enthusiasts bought the company from the state of Minnesota and established Alexandria Aircraft

BELLANCA VIKING

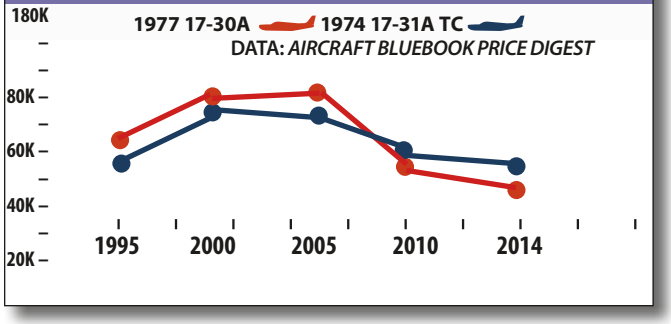


Drawings courtesy www.schemedesigners.com

SELECT MODEL HISTORY

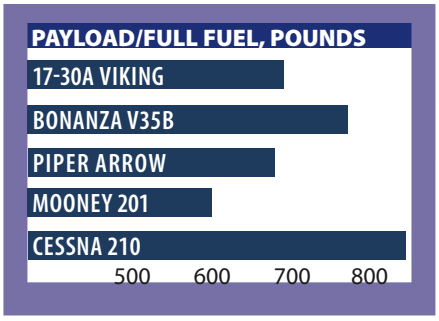
MODEL YEAR	ENGINE	TBO	OVERHAUL	FUEL	USEFUL LOAD	CRUISE	TYPICAL RETAIL
1967-1970 VIKING 17-30	CONT. 300-HP IO-520-D	1700	$30,000	60	1078 LBS	170 KTS	±$31,000
1969 VIKING 17-31TC	LYC 250-HP IO-540-GIE5	1600	$40,000	72	1190 LBS	190 KTS	$40,000
1969 VIKING 17-31	LYC 290-HP IO-540-GIE5	1600	$40,000	72/92	1108 LBS	190 KTS	$31,000
1970-1974 VIKING 17-30A	CONT. 300-HP IO-520-D (K)	1700	$30,000	92	1108 LBS	170 KTS	±$39,000
1970-1974 VIKING 17-31ATC	LYC 290-HP IO-540-GIE5	1700	$40,000	72	1190 LBS	190 KTS	±$49,200
1975-1980 VIKING 17-30 300A	CONT. 300-HP IO-520-K	1700	$30,000	92	1140 LBS	170 KTS	±$68,200
1975-1978 VIKING 17-31A-300	LYC 300-HP IO-540-K1E5	2000	$40,000	92	1140 LBS	190 KTS	±$53,000
1980-1990 VIKING 17-30A	CONT. 300-HP IO-520-K	1700	$30,000	92	1108 LBS	170 KTS	±$87,500
1991-1997 VIKING 17-30A	CONT. 300-HP IO-520-K	1700	$30,000	92	1108 LBS	170 KTS	±$135,300
1998-2001 VIKING 17-30A	CONT. 300-HP IO-520-K	1700	$30,000	92	1108 LBS	170 KTS	±$206,200

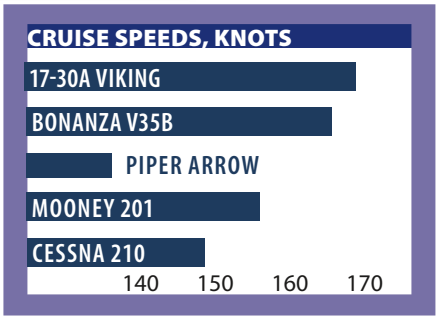
RESALE VALUES

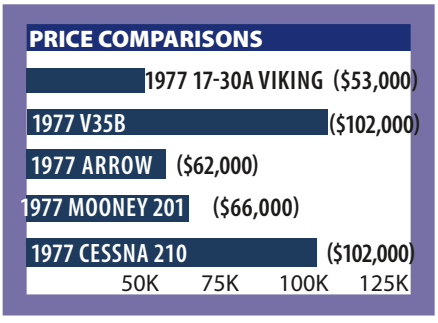


SELECT RECENT ADs

AD 08-05-11	MUFFLER AND TAILPIPE CRACKS
AD 96-18-07	NOSE GEAR BRACKETS
AD 98-02-17	LANDING GEAR FITTING ASSEMBLIES
AD 86-25-06	MAIN AND AUX TANK INSPECTION
AD 76-08-04	WOOD DETERIORATION CHECKS







That's the instrument panel in Mark Sellers' 1985 Viking, top photo, and proof that it can accommodate plenty of avionics. Owners describe Vikings as comfortable, but not overly roomy. David Pile's Viking interior, lower photo, is typical of the attention to detail the airplanes boast, especially the nicely upholstered seats. Occupants sit inside a stout welded steel cage, providing exceptional crash protection.

Co. LLC. Their immediate goals were to provide technical support and parts to owners and A&Ps in the field.

By early 2010, however, market conditions no longer supported this enterprise and the assets of the factory were put up for auction.

There are about 1360 or so Vikings in the fleet, most of which are Continental-powered. The owners of AALLC also reduced parts prices substantially and rewrote the type certificate for Continental-powered Vikings, which helped prospective buyers looking to replace a run-out 520 with a 550.

MARKET SCAN

And there are enough Vikings on the market to offer buyers a good choice at remarkably good prices. According to the *Aircraft Bluebook Digest*, early Continental-powered 17-30s hover around $30,000 while mid-1970s Vikings are in the high $40s. The latest models, which the *Bluebook* shows as 2001, are valued at $206,000. We found several for sale in *Trade-A-Plane* online. All things considered, these prices represent a good value, but one owner told us that prices have dropped recently.

Look for one that has flown regularly and, above all, has been hangared or at least sheltered. Moisture in the wings is the biggest threat to the value and the airworthiness of the airplane and drying them out at 160 knots is the best thing for them, owners say.

PERFORMANCE, PAYLOAD

By modern standards, the Viking is a credible but not exceptional performer. Normally aspirated models cruise at around 160 knots, 10 knots slower than heavy singles like the Cessna 210 and A36 Bonanza. The turbo helps, of course. Haul the airplane up to FL200 and you'll see 190 knots. On the other hand, a Viking will outclimb a 210 or an A36.

The book claims 1210 FPM and owners report similar numbers. For all its power, the Viking's useful load is typically 1000 pounds or so and even less with a lot of equipment on board. That's in the range of an average 200-HP retractable, such as a Mooney or Arrow. On top of this, the big engine requires a lot of fuel, which further limits the cabin load.

Fuel capacity is either 60 or 75

gallons, but owners say there don't appear to be many 60-gallon versions. In fact, aux tanks in early models bring the total to 90 gallons. "With full fuel, my 1973 Viking will carry three passengers, or two passengers and baggage," one owner told us. This payload is typical of all aircraft of this era. Commented another about his turbo: "Lycoming engine, heavier than the Continental, plus two turbos, equals a pathetic full-fuel legal load of two adults plus bags." Compare that to a Cessna 210, which has a useful load pushing 1400 pounds in some cases and can typically haul 90 gallons and four people plus baggage.

But the Viking has always been more sports car than pickup truck. With all four seats occupied by FAA-standard humans and 100 pounds of baggage, the airplane can ship maybe 40 gallons of avgas—enough to fly 250 miles with IFR reserves. However, most owners of post-1973 Vikings comment that they're content with a choice of full seats or full tanks and insist that their bladders usually give out before the fuel does.

HANDLING

"The way the Viking handles will put a smile on your face; very smooth and responsive controls," said Lange White about his 1967 Viking. White isn't alone with his sentiments.

The Viking is almost universally praised for its light, smooth aileron control. "The Viking is a very stable aircraft in turbulence and IMC conditions with no Dutch roll due to the very ample vertical stabilizer. It rolls and handles like a sports car—not like a station wagon," reports owner David Alger. "My Viking has the same empty weight as the Lance I used to fly, about 2225 pounds. But the control feel and harmony are just wonderful. Low-speed control on the Viking is excellent and makes short field operations easy, and the stall is very mild. It's also a very good IFR platform, not twitchy and pleasantly light on the controls," says Mark Sellers.

Landing can be tricky, however. Power off, with gear and flaps out, the Viking has an awesome sink rate that owners liken to Steinway pianos. The steep descent angle, however, does allow a skilled Viking

VIKING ACCIDENTS: FUEL, RLOC

Our review of the 100 most recent Bellanca Viking accidents renewed our faith in one of aviation's hoariest axioms: the more fuel tanks in an aircraft's fuel system, the more likely the pilot is to mismanage the system. We counted 23 accidents in which the pilot got the big silence up front because of fuel starvation. In virtually every event, there was still a significant amount of fuel in at least one other tank–although a few did manage to use all of the fuel aboard before turning the airplane into a glider.

We found 22 engine power loss accidents, at least half of which were catastrophic engine failures, some attributable to shoddy or a near absence of maintenance. However, the circumstances of at least four listed as engine failure for unknown reason were such that we suspect they were fuel mismanagement events—the post-crash evidence wasn't clear.

Runway loss of control (RLOC) accidents accounted for 21 percent of the total, about what we expect to see in a nosewheel airplane. Several pilots reported that all was well until the nosewheel touched down and the airplane darted, leading us to wonder whether there was more to the story.

There were an additional four accidents in which the airplane departed the runway with the pilot along for the ride and the subsequent investigation revealed that some component of the nosegear steering linkage had come adrift before things got exciting.

In one case, a weld on the nose gear broke and lowered the nose to the runway.

Given the amount of power available to a Viking pilot, we were not surprised to see only two accidents due to blown go-arounds. When something went wrong on landing, it appears most pilots who made the sensible decision to go around, pulled it off without hitting anything.

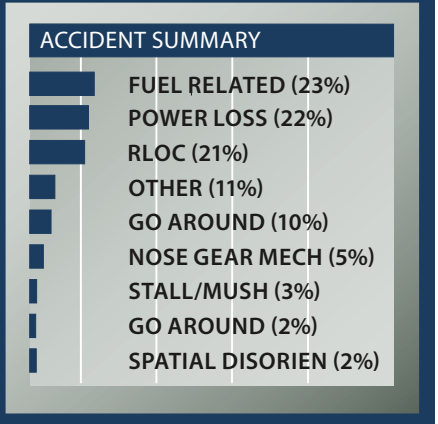
One pilot found out that there was a reason the aux tank was to be used in level flight only. It was a quarter full when he selected it going through 2000 feet AGL on climbout. The engine promptly quit due to fuel starvation and he didn't get it going again.

A VFR Viking pilot decided that it would be best to delay his planned trip for a day when faced with rotten weather. Upon seeing the same weather the next day, he launched. About a half hour later, he flew into freezing rain, lost control of the airplane and shed the outboard portion of the right wing before impacting the ground vertically.

One Viking pilot ordered 40 gallons of fuel for his airplane—the confused lineman put in four gallons, the pilot didn't check and the fuel gauges didn't work. He and his passenger survived the night forced landing.

After buying a Viking, the new owner took some dual in it, but never bothered to get a pilot certificate. He took three drinking buddies for a flying and drinking ride one night, ran out of fuel and put it in a lake. Only he survived.

Our favorite was the owner who ran a Viking out of fuel. The investigators found that he'd been using auto gas, the airplane hadn't had an annual in 22 years, the pilot hadn't had a flight review in 11 years, a medical for nine and his certificate had been suspended 11 years previously.



It's not quite the famous cheerleader photo, but you get the idea. That's at least 600 pounds standing on the Viking's exceptionally strong wing. A factory film made during the 1970s shows an impressive aerobatic routine with the airplane.

pilot to make short landings and the excellent climb rate enables the airplane to depart from short fields just as well.

The Viking's cabin dimensions are modest at best, a reflection of its 1930s design heritage. "The cabin is small for two guys my size," reports a 210-pound Viking pilot. Even a rabid pro-Viking zealot admitted that the cabin is "not roomy." Not as tight as a Mooney, maybe, but no 210, either.

Interior appointments draw raves. Many Vikings have a leather or crushed-velour upholstery that puts the chintzy interiors of Pipers and Cessnas to shame. Cabin noise, on the other hand, is high, although some owners tell us it's no worse than other aircraft. "A Viking is certainly no louder than any other single engine GA aircraft of similar vintage. Anyone flying any single-engine GA airplane without ANR won't be able to hear much after a while anyway," says Craig Gifford.

We don't think there's much to differentiate the two normally aspirated engines from an ownership point of view. The turbo is another matter. Prospective buyers should carefully consider whether the extra acquisition cost, complexity, fuel consumption and potential overheating problems are worth the benefits of turbocharging. Since it's a turbo-normalized system—you get full power all the way to the flight levels rather than an extra boost on the ground—in most cases (outside the Rockies, at least) the answer is probably not.

One reader who owned both advised against the turbo version. The gear system is robust, but there's apparently some confusion in the field about exactly how to adjust the limit microswitches to make the system work well. The emergency gear extension in a Viking is two-thirds foolproof and one-third tricky. When the mains retract, they fold forward and are held there under pressure, so dumping pressure causes them to fall into the slipstream and lock.

Step one of the emergency extension procedure is to slow the airplane to 90 knots, so the over-center spring can push the nosegear through the slipstream and let it lock. No cranking or huffing and puffing necessary—just slow the airplane down.

HANGAR IT

Owners were all but unanimous in emphasizing the need to hangar a Viking. "Absolutely imperative!" said one. "A crucial necessity," echoed another, although one reader insisted a shade hangar in a dry climate is good enough.

"I keep my Viking inside. But I would keep any airplane I fly IFR inside. Wood deterioration is a function of moisture content. Keep your wood dry and rot can't happen. Simple as that. That said, I often fly in rain and leave the plane outside on trips," reports Mark Sellers.

The primary reason is to prevent the accumulation of moisture that can trigger wood rot in the wing, but it's also a good idea to protect the fuselage fabric from ultraviolet radiation and moisture.

The "lifetime" Dacron covering will last a long time in a hangar, but owners report the need to recover in as little as six years if the airplane is left outside.

Factory support for the model is, well, iffy. Still, owners say parts are generally available from Alexandria Aircraft LLC and the Web site is still up at www.bellanca-aircraft.com. Furthermore, the airplane's rag, tube and wood construction mean that experienced mechanics can fix about anything on the airplane.

"I personally don't worry about AALLC because it's really the shops at Rocket, Weber, Witmer and MARS (nicely covering all parts of the U.S.) that keep these airplanes flying. The future of 100LL poses a far greater risk to the Viking future than the status of the factory," says Craig Gifford.

OWNER COMMENTS

I bought my first Viking in 1969. Since then I have had a total of five Vikings and have over 6000 hours in them. I suppose this in itself would be a good testimonial. My current model is a 1998 Viking with an IO-550 engine and one of the last ones built.

The Viking is a pleasure to fly. Its systems are very simple, making repairs much less expensive than the "iron" aircraft. I often fly with very heavy loads, finding that the performance is not diminished significantly.

I have inadvertently gotten into icing situations several times in the past 40 years and on one occasion accumulated a large amount of rime ice at 12,000 feet. I knew I could get down to an altitude where the temperature was above freezing, so I just kept going to see what the airplane would do. Of course, the airspeed dropped significantly, but I was able to maintain altitude with no problem. I think the relatively thick wing has a significant advantage in that respect.

With the IO-550, I run lean of peak all the time and true 170 knots, saving 2 GPH. Running ROP adds about 7 knots. I find the IO-550 about 10 knots faster than the IO-520 and I think most people have experienced the same. Annuals run about $3000 depending on how much extra stuff I want to have done.

Rocket Aviation in Plainview,

Texas, does all the major repairs and they are never more than a phone call away.

I keep the airplane hangared all the time (except when traveling) and have never had a problem with the wood. Think about it. There are 200-year-old homes made of wood and amazingly they are still standing. I plan to fly the Viking until I quit flying.

David Alger
Lago Vista, Texas

I began my "affair" with Vikings when I was in high school in Plainview, Texas, back in the early 1990s. At Miller's Flying Service (a legend among Bellanca drivers), I learned to fly in a Cherokee 140 and with 54 hours in my logbook, less than a week after my private checkride, I began my checkout in the Viking at the ripe age of 17.

In my flying career, I have flown many types of Piper, Cessna, Mooney, Beech, Cirrus and Diamond aircraft. However, I found myself coming back to the Viking as I shopped. I found a 1989 model that had been meticulously maintained and I bought it in August of 2007. I could not find another airplane that I could purchase in the mid-$150,000 range that had this performance. Bonanzas are twice as expensive in the same vintage and

David Alger's 1998 model, above, is one of the last Vikings built and has a factory IO-550 engine. A handful of airplanes have been field converted to the same engine.

Says Ty Flippin of his Viking, below: "I can cruise a minimum of 180 KTAS at 6000 feet burning around 17.5 to 18 GPH running rich of peak, but more regularly fly LOP at around 170 to 172 KTAS on 13.5 GPH."

First flown in September 1966, that's the first Bellanca Viking built, serial number 30001, left, is co-owned by Chuck Byrd.

they are slower, but larger inside. Operating costs are about the same as any other airplane in the category.

I generally let Rocket Aviation (formerly Miller's) do my annuals. This is simply because they know the airplane inside and out and are experts on how to detect issues early and fix them efficiently. All my other maintenance is at a local shop. There's nothing really tricky to maintaining a Viking other than keeping it relatively dry.

An annual generally runs me $2000 to $3000 out the door and I always fix everything that even remotely looks like trouble. Insurance runs me around $2300 annually for a $160,000 value.

I can only knock the Viking on two things. One, the baggage area is small. We have to pack in duffle bags and think about everything we take. My wife misses the space our 182 had, but the extra 30 knots in speed is worth it to me!

The landing gear extension speed is pretty slow and this slick airplane can be a challenge to slow down. A speed brake mod would be nice.

Overall, I could not be any happier with my Viking. Everywhere I go, I get comments on it. It has ramp appeal that a 182 or even a Cirrus just cannot have. It is in the same category of efficiency with a Mooney, but has slightly more interior space. It costs half as much as a Bonanza to purchase. It's a simple airplane to fly. Everything feels natural. It's one of those airplanes that you sort of feel guilty when turning on the autopilot.

Ty Flippin
Via e-mail

My Viking is not an antique. It is not a relic or a curiosity that should be surrounded by a rope at the fly-in. It's a working airplane and I use it the way you would use any 300-horsepower, 200-mile-an-hour, complex airplane. I fly about 150 hours per year for business and pleasure, the majority of it IFR. I fly in rain and I tie the plane down outside on trips. It is every bit as useful as comparable airplanes made of metal or plastic. My useful load is 1070 lbs, my full fuel (75 gallons) useful load is 620 lbs.

I have owned my '85 Viking for 10 years and the maintenance expenses have been tolerable; about what you would expect from a complex retractable with an IO-550 and parts availability has been good. The factory in Alexandria, Minnesota, is actively supporting and developing the product.

There is, however, no denying my Viking is different from most of what you find out on the ramp. The craftsmanship and variety of skills needed to build an airplane like this kept production numbers low. When I bought my Viking, a couple of airport friends shook their heads and said the wood and fabric would eat me alive.

After 10 years of ownership, I have needed zero wood work and a couple of fabric patches, which were cheap. Admittedly, steel tube fuselages, wood wings and fabric covering have their own set of maintenance issues, but any aircraft material has a life span and ages in its own way. My airplane is now 30 years old and looks pretty good from five feet, but I'm wondering what to do next. For those of us who don't have over half a million bucks for a new four-seat GA plane, refurbishing and restoration is the name of the game.

That's why I am seriously thinking about recovering my Viking. The fabric has an unlimited life, but the paint sitting on top of it does not. I suppose I could do a peel-and-repaint, but I'm looking at a full recover. It won't be cheap, but considering what I'll get when I'm done, it could be worth it. The entire skin of my plane will be replaced (except the fiberglass cowling and the boot cowl) and the entire structure revealed and inspected. The tanks will be dropped out of the wings, tested and reinstalled. With the wings already open, I might as well upgrade to the 84-gallon fuel system found in later model Vikings, which will result in a useful load increase to 1130 pounds. In a world where a Cirrus CAPS parachute repack starts at $10,000 and reskinning a couple of ruddervators on your Bonanza can be breathtaking, spending around $40,000 to get what amounts to a zero-time airframe, plus modern urethane paint that should last for at least another 30 years, doesn't seem so crazy.

None of this expense would make sense if I didn't really like how the plane performs. Remember, this is an airframe designed back when it was the flying qualities that sold airplanes—not big color screens. I reliably cruise at 170 knots. The control harmony is outstanding which makes the aircraft an excellent IFR platform. The low speed control is truly remarkable, and the stall is very mild and predictable, which makes

short field operations a pleasure. The ride is particularly noteworthy. The wood spars seem to flex just enough to smooth out the bumps. Put on a Continental IO-550 turning a three-blade prop, together with a cushy interior, and you get something that goes like a sports car and rides like your grandfather's Oldsmobile.

My only complaint is that my Viking has only adequate interior space. It certainly isn't big and roomy by contemporary standards. Guiseppe Bellanca was a little fella, 5'2", and looks like he weighed 110 pounds. That said, the cockpit ergonomics are excellent and all the controls come to hand nicely. Even the environmental controls are good.

I regularly put four people and baggage in the plane, with the usual trade off for fuel. I flew to AirVenture at Oshkosh this year with three larger than standard-sized guys, a pile of camping equipment and full wing tanks.

Mark Sellers
Philadelphia, Pennsylvania

I first flew the Bellanca Super Viking in the late 1970s when I worked as a rent-a-pilot. On my first flight, before the gear was even up, I knew I was flying something special. I logged about 100 hours in the BSV in the 1970s and enjoyed every one of them.

The Super Viking is like an American muscle car compared to the European imports; it does with horsepower what the others try to do with finesse.

In 2004, I was looking to buy a fast plane for cross-country flights and the BSV made the list with some more common aluminum models. I researched speed, features and prices for a month and the BSV rose to the top of my list. Since owning N4201B, I average about 125 hours a year. I typically fly it on trips exceeding 200 miles primarily for pleasure. Here is a bullet list of some comments:

Pro:

- The Viking is cheap to purchase. I saved about $75,000 over similar performance aircraft.
- Most parts are readily accessible since very few are proprietary. I had to replace a rudder (corrosion) and found one at salvage for $250.
- Very smooth in turbulence. The wing gives much like the 787.
- High rate of climb gets one to cruise speed much sooner.
- Very few ADs to comply with.
- Little if any repairs between annuals.
- Very strong airplane in an accident. The cockpit is enclosed in a steel roll cage. An accident in Mexico destroyed two trucks, but the pilot and pax walked away.
- Overall, a fun aircraft to fly. Quick on the controls and quite solid in an IMC environment. Some say the elevator is heavy, but I would call that a stable IFR platform. Trim for 100 knots on a radar base and there it stays.

Con:

- Tricky for the novice pilot to land. A BSV can be ground looped and one needs to hold the nosewheel off as long as possible.
- Snug cockpit. Not as tight as a Mooney, but it's not made for four large men, either. I rarely fly with anyone in the back.
- Needs to be stored in a hangar. No issues with leaving it out on trips, but it should be hangared at home. The sun degrades fabric faster than aluminum.
- Pre-buy and maintenance needs to be done by someone who knows the BSV. You can spend a lot of money teaching a Cessna mechanic the quirks of the BSV.

Frank Holbert
Via e-mail

I am the ring leader of a four-person co-owner group that shares the first Bellanca Viking built—serial number 30001. I just flew the plane yesterday from Dothan, Alabama, to Birmingham, Alabama, and back. I just paid the bill last month for the annual inspection at a high-end general aviation maintenance shop and it was just under $7000. We had to replace one cylinder.

I've been flying the plane for over three years now, but the logbook shows her first flight as September 20, 1966. The plane was featured on the front cover of the February 1967 *Flying Magazine*. I'm looking forward to the 50th anniversary of the plane.

Chuck Byrd
via email

The Aviation Consumer

Transceivers

(continued from page 18)

ing, including localizer and glideslope. There's also a compass rose and a SOG (speed over ground) function, based on the unit's internal WAAS GPS receiver—a helpful feature, in our view, for use in emergency situations. But again, we had hoped for a more useful GPS navigator.

There's also a Dual Watch mode that automatically checks for activity on a preset priority channel. For example, if an approach frequency is set to priority Dual Watch will monitor it for 200 millisecond intervals while you operate on another frequency. The FTA550 is a defeatured version without GPS receiver and is $100 less.

We're fond of the Yaesu FTA-230 radio because of its compact footprint. At 4.09 inches high, 2.36 inches wide and 1.2 inches deep, it's easy to slide into a shirt or pants pocket and even easier to lose in a flight bag. Thanks to its outstanding rechargeable battery life, we found it in a backpack when it received a transmission from an overflying airliner one night. It was powered on for much longer than the advertised 8-10 hours of endurance.

The FTA-230 is submersible (3.3 feet for 30 minutes), making it a good fit for water ops. The keypad and LCD display uses Yaesu's effective Omni-Glow orange backlighting, although the unit's small stature could make the keys challenging for fat fingers. Volume is controlled with dedicated up and down arrow keys on the keypad and we would prefer a rotary knob.

The FTA230 has a VHF nav band receiver but not CDI, NOAA weather band and accommodates 150 channels in memory.

TOP PICKS

Our thanks to Gulf Coast Avionics in Lakeland, Florida, for graciously providing some of the radios and guidance for our evaluation.

Based on simplicity alone, we think the Sporty's SP-400 stands out as the winner and is worthy for use as a primary radio. But when it comes to long-term durability and reliability, the ICOM A24 navcomm and comm-only A14 are proven, if you can live without advanced features.

If you can deal with its quirky user interface, the $230 Yaesu FTA-230, left, packs a big punch in a palm-sized package.

While the GPS-equipped $400 Yaesu FTA-750 is loaded with more functions than any other radio on the market, a GPS waypoint database and navigation function would give it more real-world utility. We do, however, like the GPS ground track that can be useful in an emergency.

If a compact size is a major consideration, we think the Yaesu FTA-230 is the clear winner, but it has a quirky feature set. On the other hand, it has a good display, excellent battery life, is priced right and its comm transmitter performed well on the bench.

Last, consider installing an external antenna. The few hundred dollars it might cost could pay off when you need to transmit more than a few miles away.

FEEDBACK WANTED

PIPER COMANCHE

For the January 2015 issue of *Aviation Consumer,* our Used Aircraft Guide will be on the Piper Comanche, the respected four-place single. We want to know what it's like to own these planes, how much they cost to operate, maintain and insure and what they're like to fly. If you'd like your airplane to appear in the magazine, send us any photographs you'd care to share. We accept digital photos e-mailed to the address below. We welcome information on mods, support organizations or any other pertinent comments. Please send correspondence on the Piper Comanche by November 1, 2014, to:

Aviation Consumer
e-mail at:
ConsumerEditor@hotmail.com