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EDITOR

Rick Durden

MANAGING EDITOR

Larry Anglisano

EDITORIAL DIRECTOR

Paul Bertorelli

CONTRIBUTING EDITOR

Jonathan Doolittle

SUBSCRIPTION DEPARTMENT

P.O. Box 8535

Big Sandy, TX 75755-8535

800-829-9081

www.aviationconsumer.com/cs

FOR CANADA

Subscription Services

Box 7820 STN Main

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Canada

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FIRST WORD

What's Going On at Avidyne?

At *Aviation Consumer*, our job is to sift through marketing hype and conduct impartial evaluations of products and services. Sometimes this includes products that aren't yet to market, creating uncertainty regarding the product's future. That was the case nearly a year ago when we covered Avidyne's IFD540 and IFD440 GPS navigators (September 2012).

We recommended the IFD series as an easy way to modernize a stack of aged Garmin GNS navigators. The major attraction is the IFDs plug-and-play design, which slides into a Garmin GNS530W and GNS430W installation. Avidyne said the larger IFD540 would be available later last year, while the smaller IFD440 was supposed to be delivered earlier this year.

As we go to press, Avidyne has yet to deliver either of these units. Muddying the water was Avidyne's early buy-in program, where the company collected deposits in exchange for aggressive discounts. We cautioned, as we always do, against forking over money without having the product in hand. Not surprisingly, some buyers we spoke with have considered demanding a refund.

Since our job doesn't end when the ink on these pages dries, we followed up with Avidyne to get hard answers. According to Avidyne's marketing director, Tom Harper, there's no specific problem that caused the product to slip from earlier expectations.

"The FAA is currently in the process of conducting its initial formal evaluation, which has extended longer than scheduled due to FAA availability and also due to inclement weather," Harper noted.

When asked why the company announced the products so early in development (AirVenture 2011), Harper told us the obsolescence of the Garmin GNS530 and GNS430 opened up a new market. "At that time, we wanted customers to know that there would be future alternatives in the GPS product category," said Harper. He also told us the units would include additional capabilities not previously announced. Keep tabs on www.avidynelive.com.

The IFDs are late, but we don't think they're lost. We applaud Avidyne for not releasing the product before it's ready, but stand our ground in not recommending you pay anything for a product that you can't have now.

Just after the above was written, readers concerned by recent moves by Avidyne—on repair pricing and its extended warranty—contacted us. On investigation, we understand the concern and why the Internet buzz is big.

As background, you may recall that Avidyne went through a period in which its customer service record was not good. We reported on the problems, the assertive steps it took to fix them and that those steps were successful. We think Avidyne was a model for how to fix a broken customer service program. According to Tom Harper, part of the process was keeping the price of its fixed rate repairs low. Yet, it recently raised them dramatically. For example, a PFD fix went from \$3250 to \$5900. That percentage raises eyebrows.

A lot of owners of glass airplanes hedge their repair cost bets by buying extended warranties. We think it's a sensible approach. For years, Avidyne owners bought its FlexCare program. Most recently, its price was \$3700 for three years. There's more information about extended warranties on page 18.

About the same time it raised the flat rate repair fee—a good way to push customers to buy an extended warranty—Avidyne announced that FlexCare was being replaced by AeroPlan and that it cost \$1000 less than FlexCare. This



continued on page 32

ADS-B For EFIS

I enjoyed reading your evaluation of the three most prominent ADS-B EFIS products in the June issue. I received my Stratus II about three days before reading your article. There is one, important negative feature of the Stratus II: It will only show the horizon in the landscape mode. If one has an iPad on a yoke mount, it will most likely be in the vertical position, so the horizon will be 90 degrees off. Otherwise, the iPad has to be taken off the yoke mount and held in the horizontal position, not easily done.

I spoke to Appareo about this situation and

was told that they have had other complaints, but have nothing in the pipeline to correct it. The result is that the horizon feature is not really usable—something that would be unpleasant if the attitude indicator fails while in the clouds.

My reason for spending the extra \$200 to buy the Stratus II was to have the horizon feature. Had I known about the situation beforehand, I would have opted for the original Stratus model and saved \$200.

Lorne Harmon
Via email

Engine Shop Survey

I must have missed reading the call for shop recommendations recently, but in reading your editorial in the July issue, it appears that you and I had similar experiences with Bill Cunningham at Powermaster. He's a solid, honest guy who does what he says and does a good job.

I had the opportunity to use Powermaster for engine services twice in a year's time for my Bellanca Super Viking. First, they performed an excellent overhaul on my first-run engine. About a year later, due to my one and only act of pure stupidity in an airplane—prop strike at night—they performed a tear-down

inspection and rebuilt the engine for me again. It came back running even better than before.

At the next annual, my maintenance tech discovered a new FAA interpretation on cylinder installations that meant I'd have to pull and replace the cylinders. Powermaster had followed the rules when it did the work—but the rules changed.

Powermaster stepped up to the plate and helped me solve the problem with minimal cost and excellent service. I wouldn't go anywhere else.

and helped me solve the problem with minimal cost and excellent service. I wouldn't go anywhere else.

Ty Flippin
Via email

I want to add my two cents

to your engine shop survey in last month's issue, having had experience with two of your top-ranked shops in the last 10 years. In 2004, Triad overhauled the IO-360 engine on my Piper Arrow. Unfortunately, the case was repaired by a station that was sanctioned by the FAA and eventually closed. The engine leaked oil from day one. Multiple trips to Triad did not resolve the problem. I was told that I had not followed the oral break-in instructions I was given (no written guidance).

In December 2012, my mechanic found a crack in the case with oil leaking through the crack. The engine was removed and sent to Zephyr Aircraft Engines. Numerous cracks were found in the case and the cylinders required replacement. I had Zephyr overhaul the engine with a new ECI case, new cylinders and accessories. I've put 30 hours on the engine and am delighted with its performance and that it only burns one quart of oil every 12 hours.

My experience with Triad was not good, although Mike Branham in the shop was terrific in our dealings. Zephyr was very helpful—it obtained a new case over the holidays, presented me with, and explained, options on cylinder use and delivered the engine on time. I exchanged multiple emails and

telephone calls with Charlie Melot, Herman and LJ regarding decision points and overhaul progress. I still chat with Charlie from time to time; he always returns calls and emails with answers to questions. Zephyr is a very classy operation with an excellent work ethic and knowledgeable people.

Dave Seaman
Via email

Belly Degreasers

Nice article in the July issue, but GOJO hand cleaner works great and costs almost nothing.

Vince Massimini
Via email

My wife and I are both pilots and subscribe to a variety of aviation magazines—our favorite is *Aviation Consumer*. I personally find value in just about every article, and I have purchased several of your recommended products.

I just received the July issue. After years of using WD-40 to degrease the belly of two different planes, I'm going to try a bottle of Aero Cosmetics Wash Wax. Thank you for the article.

Kennard Yamada
Via email

CONTACT US

Editorial Office
616-901-6516
E-mail: consumereditor@hotmail.com

Subscription Department
P.O. Box 8535
Big Sandy, TX 75755-8535
800-829-9081

Online Customer Service:
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Cessna Engine Upgrades: Wide Market Choice

You want more power? You got it. There's a mod for virtually every model. We look at a cross-section of what's available. As usual, there's no free lunch.

by Rick Durden

No replacement for displacement. There's no substitute for horsepower. The clichés have been stuck in your head for a few months. You own a single-engine Cessna and you want more performance, but you don't want to buy more airplane. You want to know if you can drop more engine in your airframe, how much it will increase performance, what it will cost and whether you'll get the investment back when you sell the airplane.

We'll walk you through the answers to those questions while providing a sampling of some of the amazing number of engine mods available




for single-engine Cessnas. We'll also discuss how to look at the cost-benefit evaluation of a conversion.

THE FIRST QUESTION

Reality question: Is it better for the owner of a 150-HP, 1968 172 with a Bluebook value of \$30,000, who is worried about hot day takeoff performance, to pay north of \$40,000 for an engine and prop upgrade or just sell the airplane and buy a mid-time 1968 Cessna 182 for \$44,000 or a 1977 HawkXP for \$42,000? That's a \$12,000 to \$14,000 Delta before sales tax and other costs of selling and buying. An airplane replacement gives the



CHECKLIST

-  Performance increases come in climb and can be significant.
-  Cruise speed increases with increased power are only modest.
-  Prices are high—do not plan on recovering the cost when you sell.

needed takeoff performance, and the difference in price will go a long way toward paying for the slightly higher fuel burn.

The answer seems obvious—until it's overhaul time for that 1968 Skyhawk. An overhaul is going to run \$20,000, installed. Suddenly the idea of swapping engines makes a lot more sense, especially if the owner has the airplane equipped just the way he or she likes it.

IMPROVED PERFORMANCE?

Most of the airframes getting engine mods are long in the tooth—and not as aerodynamically sleek as they once were. On top of that is a hard rule of aerodynamics—the equation for speed increase with horsepower increase is that the airspeed increase is proportional to the cube root of the horsepower increase. If you want to go 10 percent faster, you have to have 33 percent more horsepower.

Therefore, many of the mod shops don't tout cruise speed increases—and we view speeds that are claimed with a jaundiced eye. As Chris Shaw of Del-Air told us, "If you've got an airplane that's a pig in cruise to start with, a bigger engine will only give you a slightly faster pig."

Our rule of thumb for deciding on a power increase is that a desire for more speed doesn't pay off. The exceptions are the turbonormalizing mods for the 177RG, 185 and T and P210s, which allows them to carry horsepower up high where they can scoot. If you just want more speed and your engine isn't near time for overhaul, our opinion is that mods to clean up

A 310-HP IO-550-N/TS engine installed in a Cessna 182 by Texas Skyways.

the airframe make more economic sense than an engine change.

Where horsepower increases shine are in rate of climb and takeoff distance. If your 150-HP Skyhawk requires 80 HP to remain level at Vy, there are 70 HP, more or less—depending on what the engine is really putting out—available to make the airplane climb. With a 180-HP engine, there are now 100 HP working to make the airplane climb, an increase of 42 percent. That's a lot, and it's directly proportional to the increase in rate of climb.

COST

When considering a power-enhancement, figure on paying at least twice the installed price of a regular engine overhaul. Most of the mods provide either a factory re-man or new engine (it may be buyer's choice), and almost invariably require a new prop because of the change in engine power output and vibratory environment.

Some companies refuse to publish a price. When we asked, they told us that each airplane is different (in some cases, the available list of options on the mod itself is huge), so they require the prospective customer to call, discuss what's in the engine room now, spec out the options on the mod and then get a price. We were also told that it's not uncommon for an airplane to show up for the mod and have some essential components, such as the engine mount, in such poor shape that the mod shop will not perform the mod without repairing or replacing those components.

DEL-AIR

Long known for bumping the horsepower of a Cessna 150 by 50 percent, creating the "150/150," Del-Air (559-784-9440, no website), offers both 150-HP and 180-HP upgrades for the Cessna 150. There is a gross weight increase for some models of the 150 with the conversion. Aerobat owners should be aware that hanging a larger engine results in loss of aerobatic category certification. Del-Air sells kits that include everything except the engine and prop: the 150-HP Lycoming O-320 kit is \$12,038; the 180-HP Lycoming O-360 kit is \$12,291. Chris Shaw at Del-Air said to figure on 95 hours labor for the installation.

Del-Air also offers a 180-HP conversion with your choice of fixed pitch

WHY MODEST POWER WHEN NEW?

It's an axiom of aviation that any aircraft owner eventually wishes the airplane had more performance. Many wonder why the airplane came equipped with such modest power in the first place, especially when bigger engines were available. The brief answer to that question is that airplane design is an exercise in compromise and economics. Every aircraft manufacturer has a engineering department that could come up with a four-place single that would cruise at 300 knots, but the cost of doing so would be eye-watering, as would the price of the gem that would be produced. The chances of selling enough to make a profit would be miniscule.

What's truly challenging is designing an airplane that has enough power to meet FAR climb requirements, the ability to carry enough fuel for decent range and a payload that makes it useful—all wrapped into a package that can be built and sold at a price that will mean enough airplanes go out the door to cover costs.



A bigger engine on a given airframe doesn't give much benefit in cruise speed—getting more speed by increasing power is a cubed function—and cruise speed is what sells airplanes. Besides, that bigger engine costs more, so fewer airplanes will be sold. More power means more weight and requires more fuel and a place to store it—or more cost and fewer sales. It's no surprise that the Cessna 172 sold in greater quantities than the 182, which sold more than the 210.

That the 150-HP 172 proved to be in the middle of the all-time

sweet spot for airplane sales is no consolation to the owner of one based on a 2500-foot runway and who has to stay 200 pounds under gross to clear the trees on a summer day. Hanging a 180-HP engine up front, especially with a constant-speed

prop, may be just the prescription for increased takeoff and climb performance the owner needs—and the increased fuel burn may be small enough that the loss of range isn't an issue.

or constant-speed prop for the Cessna 170A and B, 172 and 175. The kits range in price from a low of \$7866 to \$14,186.

TORNADO ALLEY TURBO

Ada, Oklahoma-based Tornado Alley Turbo (www.taturbo.com) offers the Cardinal Cruiser conversion for the Cessna 177RG. It turbonormalizes (turbocharging that does not increase the engine's power—it maintains sea-level horsepower) the existing 200-HP Lycoming IO-360 engine. We reviewed this mod in the May 2009 issue and found that it climbed at 600-800 FPM to 17,500 feet and cruised at 177 knots on 11 GPH once

there—compared to the 145-knot cruise speed of an unmodified Cardinal RG. Price, installed, is \$38,950. Kits can be shipped.

The other Cessna upgrade offered by TAT is the Turbo Cyclone for the 185. This turbonormalizing kit can go on either a Continental IO-520 or IO-550 engine. It allows sea-level power up to 24,000 feet. Price for this conversion is \$42,950, installed. It includes a two-year, 250-hour warranty on turbo components and four-year, 1000-hour warranty on exhaust and induction air components.

P. PONK AVIATION

Norma and Steven Knopp reversed

AIRCRAFT MODEL	HORSEPOWER OPTIONS	PERFORMANCE	SAMPLE PROVIDERS
CESSNA 150	150 AND 180 HP	NOT PUBLISHED	DEL-AIR (559-784-9440)
CESSNA 170A AND B	180 HP	NOT PUBLISHED	DEL-AIR (559-784-9440)
CESSNA 172	180 HP	NOT PUBLISHED 130 KNOTS 130 KNOTS	DEL-AIR (559-784-9440) AIR PLAINS (WWW.AIRPLAINS.COM) PENN YAN AERO (WWW.PENNYANAERO.COM)
CESSNA 175	180 HP	NOT PUBLISHED	DEL-AIR (559-784-9440)
CESSNA 177RG	TURBONORMALIZING	177 KNOTS AT 17,500 FEET	TORNADO ALLEY TURBO (WWW.TATURBO.COM)
CESSNA 180	265-275 HP 250 HP 280 HP 285 HP 300 HP	158 KNOTS NOT PUBLISHED NOT PUBLISHED NOT PUBLISHED 152-156 KNOTS	P. PONK AVIATION (WWW.PPONK.COM) TEXAS SKYWAYS (WWW.TXSKYWAYS) TEXAS SKYWAYS TEXAS SKYWAYS AIR PLAINS (WWW.AIRPLAINS.COM)
CESSNA 182	265-275 HP 250 HP 280 HP 300 HP 310 HP	158 KNOTS NOT PUBLISHED 159 KNOTS 152-156 KNOTS NOT PUBLISHED	P.PONK AVIATION (WWW.PPONK.COM) TEXAS SKYWAYS (WWW.TXSKYWAYS) TEXAS SKYWAYS AIR PLAINS (WWW.AIRPLAINS.COM) TEXAS SKYWAYS
CESSNA 182, 182RG, TR182	300 HP	167-170 KNOTS	AIR PLAINS (WWW.AIRPLAINS.COM)
CESSNA 185	TURBONORMALIZING 300 HP	NOT PUBLISHED 15 KNOT SPEED INCREASE	TORNADO ALLEY TURBO (WWW.TATURBO.COM) TEXAS SKYWAYS (WWW.TXSKYWAYS)
CESSNA 205	300 HP	15-17 KNOT SPEED INCREASE	TEXAS SKYWAYS (WWW.TXSKYWAYS)
CESSNA 206	300 HP 310 HP 310 HP	12-14 KNOT SPEED INCREASE NOT PUBLISHED NOT PUBLISHED	TEXAS SKYWAYS (WWW.TXSKYWAYS) ATLANTIC AERO (WWW.ATLANTIC-AERO.COM) RAM (WWW.RAMAIROAFT.COM)
CESSNA 207	300 HP	12-14 KNOT SPEED INCREASE	TEXAS SKYWAYS (WWW.TXSKYWAYS)
CESSNA 210, T210	300 HP 310 HP 310 HP	12-14 KNOT SPEED INCREASE NOT PUBLISHED NOT PUBLISHED	TEXAS SKYWAYS (WWW.TXSKYWAYS) ATLANTIC AERO (WWW.ATLANTIC-AERO.COM) RAM (WWW.RAMAIROAFT.COM)

the spelling of their last name to create P. Ponk Aviation (www.pponk.com). In addition to overhauling engines, P. Ponk offers the Super Eagle conversion for the Cessna 180 and 182 and advertises resulting cruise speeds in excess of 158 knots. The company modifies a stock Continental O-470 or TSIO-520 engine to come up with a normally aspirated, carbureted 265- to 275-HP engine with a designation P.Ponk O-470-50. TBO goes up to 2000 hours if an oil filter is installed.

P. Ponk does not publish full pricing details, as each engine and installation is tailored to the specific airplane. However, it does state that overhaul and modification of an engine, depending on cylinders installed, averages \$26,495 to \$28,995 and the two- or three-blade propeller to be used costs from \$10,595 to \$13,600.

TEXAS SKYWAYS

It's not easy to keep track of the many engine upgrades offered by Texas Skyways (www.txskyways.com). For the various models of the Cessna 180 you have your choice of a 250-, 280- or 285-HP engines, all carbureted and all modified by Texas Skyways and having TBOs as long as 2500 hours. In our conversation with proprietor Jack Johnson he explained that his company does not publish prices because he's seen so much difference between the installed equipment and condition of airplanes in the field, and there are so many nuances to the conversions that it's necessary for a prospective customer to call.

Mods for the 182 have long been a success story for the company, so it's no surprise that it is crowing about its most recent, a 310-HP IO-550-N/TS engine and Hartzell "Buccaneer" propeller conversion for the 182S and

T models that gives a claimed top speed of over 174 knots. Johnson did tell us that this conversion is priced at \$89,500 and includes a factory remanufactured engine, prop, new engine mounts and exhaust system. Other 182 conversions offer a choice of 250- or 280-HP engines, both carbureted.

For the Cessna 185, Texas Skyways offers two 300-HP mods; one with an IO-520-D engine (300 HP for five minutes, 285 max continuous) and one with an IO-550-D. Johnson told us that either will boost cruise by about 15 knots. Those same mods are available for the Cessna 205, which take an airplane with an outstanding useful load but sometimes anemic climb rate, and turn it into a short field machine and, according to Johnson, push cruise up 15-17 knots.

The 300-HP conversions are also available for most models of the 206,

Texas Skyways 300-HP IO-550 conversion of a Cessna 210.

207 and 210. Johnson said that the cruise speed increase for those airplanes is 12-14 knots.

AIR PLAINS

Wellington, Kansas-based Air Plains (www.airplains.com) offers engine conversions for most of the Cessna 172, 180, 182, 182RG and TR182 series. Its website is one of the best we saw when it came to explaining the product line, costs and precisely which airplanes are eligible for each conversion.

There is a fixed pitch prop, 180-HP Lycoming conversion kit for the 172 that includes a gross weight increase and factory-new engine that starts at \$39,000. Katie Church of Air Plains told us that labor usually runs about 60 hours and that the price can go up depending on the age of the airplane, type and condition of the engine mount.

For the Cessna 180, 300 HP is available via either an IO-520 (285-HP max continuous) or IO-550. The kit includes a factory new engine, three-blade prop and everything else needed for the swap. According to Church, some customers supply their own engine, although Air Plains does take advantage of, and pass along, engine value pricing it receives from the manufacturer. Price of the kit with the IO-520 is \$63,500; with the IO-550, it's \$70,000. The IO-520, per Air Plains, generates a cruise speed of 152-154 knots and a rate of climb of 1400-1500 FPM, while the IO-550 conversion comes in at 154-156 knots and a rate of climb of 1700-1800 FPM.

The same conversion is offered for the 182H through R models with similar pricing and published performance.

For the 182RG and the TR182, Air Plains has a single mod that hangs a normally aspirated, factory-new, Lycoming IO-540-K1A5 and three-blade prop on the firewall.

While it means no more turbo for the TR182, it's still a 65-HP power increase. Air Plains says it slides cruise speed into the 167-170-knot range and rate of climb up to 1450 FPM. Per Katie Church, the all-inclusive kit is \$100,000.



PENN YAN

Penn Yan Aero's (www.pennyanero.com) SuperHawk, a 180-HP conversion for the 1968-1982 Cessna 172, comes as a kit for \$35,309. It includes an overhauled O-360-A4M engine, Sensenich SuperHawk propeller, and all of the hardware for the installation.

Your shop does the installation—Devon Snyder advised us that it takes 20 hours in addition to a normal engine R & R. Penn Yan publishes a new cruise speed of 130 knots and a rate of climb of 1020 FPM at a gross weight of 2400 pounds.

ATLANTIC AERO

An FBO, engineering and manufacturing concern, Atlantic Aero (www.atlantic-aero.com) offers its 550 Tuned Induction Conversion for much of the Cessna 206, T206 and cantilever-wing 210 and T210 lines. A normally aspirated, 310 continuous HP IO-550 replaces the IO-520 or TSIO-520 on the airplane. The kit includes factory reman engine, three-blade Hartzell prop, six-point "smooth ride" engine mount and all hardware.

Atlantic Aero's John Ackerman told us that Atlantic Aero went after the STC when Continental dropped its "Platinum" service as a separate program and applied the Platinum standards and tolerances to all of its IO-550 engines, making it one of the smoothest engines on the market. Combined with the new engine mount, Ackerman said that the installation is so smooth that his company

has had zero warranty claims on kit components. TBO on the engine is 2000 hours, 300 more than the 520 it replaces.

Price for the kit ranges from \$66,844 for the non-turboed 206 through \$73,635 for a T210, plus a core charge at least \$2000, depending on the engine returned.

RAM

Known primarily for its engine mods for twins, RAM (www.ramaircraft.com) also offers bigger engines for the Cessna T206 and T210 series. Installed in-house or via a kit, the conversion is a 310-HP (285 HP max continuous) Continental TSIO-520 engine. RAM does not publish performance data. The existing propeller and governor can be reused—depending on their condition and ability to be reused, the conversion ranges from \$55,423 to \$66,150.

CONCLUSION

We agree with the sentiment expressed by a number of the modifiers—an owner has to go into an engine upgrade with the understanding that the cost will not be recovered when it comes time to sell, much as with an avionics upgrade. The purpose has to be to make the airplane into what the owner desires for future use, not resale.

Nevertheless, on that high, hot day, when the trees that used to loom so big now appear much smaller, a big engine conversion can be worth every penny.

Stemme S6RT: Aviation's Crossover

A high-performance glider and a capable cross-country airplane rolled into an impressive recreational aircraft—at a high-end sports car price.

by Rick Durden

Attempting to combine two genres in one aeronautical vehicle requires compromises that have historically generated less than stellar results. The mating of airplanes and cars has, for generations, given us offspring that were eminently forgettable performers as airplanes or cars. Flying boats have proven a little better—although, on the water, they are fragile beings requiring great care and, in the air, pay a penalty in fuel burn, speed and payload for shoving the weight and shape of a boat hull through the sky.

Yet, the arranged marriage, by Dr. Reiner Stemme (Stem-E), of closer relations, a glider and an airplane, has been notably successful. A few years ago, the S6 motorglider twins emerged, differing only in the ability of their landing gear to retract. We flew the S6RT (retractable, turbo-

charged) and found that it provides the pure joy of a high-performance glider while being a surprisingly efficient, two-place, traveling airplane.

DEVELOPMENT

Dr. Reiner Stemme (doctorate in laser physics), an avid sailplane pilot, formed his eponymous company in Strausburg, Germany, to build a self-launching high-performance glider. The resulting S10, with its retractable propeller, proved successful. Its high-aspect ratio, 75-foot wingspan gave it a glide ratio of 50:1, putting it well into the top end of the serious sailplane competition set. Users we spoke to described it as a self-launching glider for the pilot who wants to soar 80 percent of the time and fly an airplane 20 percent of the time.

Stemme's more recent development, the S6 series, seems to us to

CHECKLIST



Performance is excellent in both the glider and airplane roles.



A glider rating is required to fly one—a medical certificate is not.



The wing-folding mechanism is so cumbersome as to be unusable.



With a \$363,000 equipped price, the market will be small.

be targeted at a pilot who wants to split the time between airplane and sailplane flying about 50-50. With a high-aspect ratio wing spanning 59.05 feet, it has a 36:1 glide ratio (30:1 for the fixed gear), nothing to be sneered at in the sailplane world. Its turbocharged Rotax 914 F2 develops 115 HP (100 HP, max continuous) and provides a 30,000-foot maximum operating altitude, with cruising speeds exceeding 150 knots once above 10,000 feet.

The only blemish on the recreational flying aspect of the S6RT is that no aerobatics, including spins, are approved.

CERTIFICATION

The S6RT was originally certified under European Aviation Safety Agency (EASA) regs. It later received FAA certification under FAR 21.29. It is manufactured and flight tested in Germany, then crated and shipped to the U.S. distributor, Bell Aviation, in Columbia, South Carolina.

The airframe is primarily carbon fiber composite, although the center of the fuselage, housing the engine and main gear, is composite over a steel-tube framework. The engine drives a full-feathering MT prop via a shaft that runs between the seats and a gearbox just aft of the prop—a

Sleek fuselage, retractable, tricycle gear, high-aspect ratio wing and full-feathering MT prop give the Stemme S6RT excellent performance as a glider or an airplane.



Control sticks mount electric trim and brake handle; panel includes Dynon 10A EFIS and LXnav LX8000 variometer system (right). Seats have adjustable backrests and allow parachutes to be worn (lower right).

modern version of the P-39 and P-63 fighters of WWII. No, there is no aft-CG problem with an engine that is not mounted on the nose.

Flight controls are push-rod driven, except for a portion of the rudder system, which is cable-actuated. The two-segment ailerons are flaperons—they partially extend with the flaps, giving a full-flap stall speed of 42 knots. When turning, the outboard segment of each aileron deflects more than the inboard.

The manual flaps can be reflexed—deflected upward—8.5 degrees in cruise. There is also a neutral position, a takeoff/thermaling/landing 1 detent at 18.5 degrees and a landing 2 slot at 25 degrees.

Single-panel Schempp-Hirth style speedbrakes/spoilers extend from the top of the wing for descent control and to help pin the tires on the runway during rollout after landing.

FOLDING WINGS

The wings can be folded for storage in a tee hangar. Unfortunately, the folding mechanism is clumsy and requires two or three people about an hour to fold or unfold the wings, something we feel should be remedied. The older Stemme S10 has a mechanism operable by one person in under 15 minutes.

The hydraulically actuated, retractable, tricycle gear tucks into the fuselage and is completely enclosed, giving the airframe a delightfully sleek look. The trailing beam main gear uses elastomer-damped springs with a six-inch travel to absorb landing loads.

The S6RT we flew was equipped with a Dynon 10A EFIS and an LXnav LX8000 color navigation and variometer system (sailplanes use a more sensitive vertical speed indicator, called a variometer or “vario”). The LX8000 includes AHRS, terrain and a sophisticated set of audio tones for rate of climb and sink as well as



aural warnings—it’s often referred to as a soaring computer. Most buyers also specify a Garmin 696 that will click in and out of a panel mounting arrangement. The aircraft we flew had a Garmin 796 so employed. Rounding out the panel were a Becker comm radio and transponder, each taking up only the space needed for a round dial instrument.

A popular option is a set of solar panels that help keep the battery charged when soaring with the engine shut down.

PRICE

The price is, frankly, staggering, and made worse currently by the strength of the Euro. Figure \$340,000 for the basic S6RT—\$363,000 equipped with high-end avionics. Knock off \$15,000 if you buy the fixed-gear S6T. We were told this was the Ferrari of motorgliders—for performance, price and target market, it’s an apt analogy.

Bell Aviation in Columbia, South Carolina, has been the U.S. distributor for Stemme since 2007. Bell Aviation’s regular business is buying and selling bizjets and high-end turboprops. However, its proprietor, Don Bell, is a serious soaring and motorglider enthusiast and has owned



more than one Stemme motorglider. When we met with him, Bell noted that Stemme has opened a distributorship in California.

Bell pointed out that buyers for the Stemmes he’s sold have opted for most of the options; he recalled only one going out with just the basics.

Options include a second fuel tank; the standard S6 comes with a 17.2-gallon tank in the right wing (0.5 gallon unusable). Another, holding 17.2 gallons (0.3 gallon unusable) is an option for the left wing. Ethanol-free premium fuel is preferred,

MOTORGLIDER: NO MEDICAL REQUIRED

Somewhere in the murky past of regulation development, someone was faced with deciding into which cubbyhole to stuff the hybrid aircraft that consisted of a glider equipped with an engine powerful enough to allow it to take off on its own. It had to be an interesting exercise in line-drawing; looking back at it, we're glad the motorglider was placed into the glider category, even though there were some restrictions placed on it.

The FAA uses the terms "sailplane" and "glider" interchangeably. It calls a motorglider a "powered glider," discusses the breed extensively in Advisory Circular AC 21.17-2A and generally accepts what the European Aviation Safety Agency (EASA) set up in its Joint Aviation Requirements (JAR) for motorgliders. A motorglider can have no more than two seats, a gross weight of not more than 850 kilograms (900 if it has retractable gear) and minimum weight to wing span squared ratio that shows it truly is a glider and not a low-powered airplane.

All of that means that because a motorglider falls into the glider category of aircraft under the Federal Aviation Regulations, to fly one as pilot in command, a pilot has to have a glider rating on his or her pilot certificate and a logbook endorsement for self-launching.

A pilot who wishes to add a glider rating to his or her existing airplane rating generally finds out it's a lot of fun. No written test is required. It's a matter of taking and logging the flight and ground instruction speci-

fied in Parts 61.107 and .109 and then passing a checkride. Readers tell us it's one of the most pleasant checkrides they have ever taken.

If the checkride is not taken in a motorglider or a pilot hasn't logged at least five hours of PIC time in a motorglider before January 1, 1985, that pilot has to get a "self-launch" logbook endorsement under FAR 61.31(j)(1). It's analogous to a tailwheel endorsement for an airplane pilot who wants to fly tailwheel airplanes. There are three recognized ways to launch a glider: aero tow—pulled aloft by an airplane; ground launch—yanked into the sky via a winch, automobile or bungee (yes, really) and self launch—taking off using the engine of a motorglider.

The FAA requires that a glider pilot be endorsed for a particular type of launch before using it to fly a glider as pilot in command.

For generations, airplane pilots who became concerned about passing an FAA medical exam have switched over to gliders. Because a motorglider falls within the glider aircraft category of the FARs, no medical is required to fly one. And, because motorgliders don't have the 120-knot speed restriction of an LSA, pilots who want to go somewhere a little faster than an LSA and don't wish to bother with an FAA flight physical can switch over to motorgliders and do so.



altitude as the turbocharger makes itself known—150 knots by 10,000 feet. Because the engine is expected to be shut down and restarted in flight, a maximum restart altitude is published—16,000 feet.

COMBINATION OF THE TWO

Preflight is a combination of glider and two-place trainer—the only unorthodox parts include inspection of the flaperons to assure the various segments deploy appropriately at all flap settings and left/right stick positions and to install the nearly three-foot-long pitot tube. The length is dictated by the need to get the opening into undisturbed air. Since it is lightweight and fragile, it is removed between flights.

The canopy is hinged at the front and has three latches and a retention cord that is used to open and close it as well as keep it from being yanked off the airplane when parked in a strong tailwind. The canopy can be jettisoned in flight should taking to a parachute be necessary. Boarding is standard sailplane, with the added challenge that the cockpit sill is more than three feet off the ground, making for some interesting gyrations.

The side-by-side seats are reclined steeply, and have adjustable backrests for different size pilots and to allow wearing a parachute. The rudder pedals adjust fore and aft. We found that an extensive range of heights and physiques could be comfortably accommodated.

Start up is Rotax simple—pretty much pull the choke and turn the key. The noise and vibration level is less than we've experienced in other aft-cabin-mounted engine airplanes such as the Skymaster. The steerable nosewheel makes for precise taxiing, something of importance as we were very aware of the long wingspan when maneuvering. The disc brakes are activated by a handle on the stick and worked smoothly.

Takeoff acceleration is rapid and smooth; the nosewheel is raised early, with the Stemme seeming to levitate at 50 knots. The deck angle is only slightly nose up. Once the gear

with 100LL approved, but considered second best.

The empty weight of the S6RT we flew was 1599 pounds. Max ramp weight is 1984 pounds. With both standard and optional tanks full (201.6 pounds), the S6RT is a single-place machine—only 183.4 pounds may be carried in the fuselage.

The upside is that, with a fuel burn of only 5.4 GPH at 75 percent power, dropping to 3.9 GPH at 55 percent

power, carrying reduced fuel still allows for reasonable range if going cross country—shutting the engine off altogether can expand the range considerably.

Published performance is impressive on 115 HP: takeoff over a 50-foot obstacle is only 1509 feet at sea level, with a published climb rate of 970 FPM. Book cruise at 75 percent power is 127 knots at 3000 feet and increases progressively with

and flaps are retracted the climb rate settled at just over 900 FPM. Vy is 68 knots. As full power is limited to five minutes, a reduction to 35 inches of manifold pressure and 2000 RPM is made within that time.

Prop RPM is maintained electrically; the control is a knob, making it easy to adjust, just different. All that's required is to line the pointer on the knob up with the desired RPM on the placard around it.

HANDLING

The controls proved to be crisper than we expected from a sailplane. We've flown some that seemed to handle as if the stick were in a bowl of oatmeal—the S6RT was pleasantly responsive throughout its speed range. Steep turns proved easy to control, requiring less rudder than we expected for such a high-aspect ratio wing.

Stalls, both power off and dirty as well as with the gear up, one notch of flaps and full power, had a noticeable, but not sharp, break. Attempting to hold the aircraft in the stall resulted in a pitch down and roll to the right, which could be stopped quickly with opposite rudder.

Setting up 75 percent power at 3000 feet generated 123 knots versus a 127-knot book speed. We experimented with cruise speeds with the flaps at the neutral setting and reflexed upward 8.5 degrees. We could not discern a measurable difference. With the flaps reflexed, the deck angle required to hold altitude caused the instrument panel to block the view directly forward, not a good state of affairs.

When it's time to switch over to glider operations, a brief checklist is followed to reduce power, then shut down the engine and feather the prop. The noise level drops to nearly nothing, accompanied by the

The long pitot tube is easily removed after shutdown and reinstalled prior to start to avoid damage while on the ground (right). Trailing beam gear is mounted on either side of the engine, retracts aft and is completely enclosed in flight (right, below).



chirping of the vario as the hunt for thermals begins. Handling remained crisp, and we had no trouble quickly rolling into whatever turn was required to catch and then stay in a bubble of rising air. On a light-lift day, we easily maintained altitude, even when exploring the handling at different speeds.

RESTART

Restarting the engine involves taking the prop out of feather, which took longer than we expected, perhaps a minute, then starting the engine, letting it warm to operating temperature and then adding power as desired. While the engine can bail out a pilot who gets too low away from an airport, getting the prop out of feather, the engine started and up to temp is something that should not be left until only a few hundred feet above the ground.

For landing, the pattern is flown at 20 inches of manifold pressure. The first notch of flaps can come out at 100 knots—as the speed drops below 75 knots, the gear is extended. It provides a most satisfactory thump as it locks into place. A check is made for “five greens,” the three gear lights, a green light that the prop is set for high RPM and a green indicating the aux fuel pump is on. Once below 75 knots, full flaps can be extended. Power is reduced to idle and the descent is controlled with the speed brakes. Even with full flaps, the Stemme seems to want to glide forever.

60 knots is held down final prior to flaring to a nose-high touchdown—we were cautioned to avoid touching down on the nosewheel. Once the mains touch, the speed brakes are fully deployed, which help



to keep the ship firmly on the ground and give solid rolling control.

With the long wing, it's necessary to assure that aileron is applied into any existing crosswind—it's easy for the upwind wing to get lifted by a crosswind. Demonstrated crosswind speed is 16 knots, which we felt was about right.

Our overall impression was that other than a poor wing folding mechanism, the Stemme S6RT is an excellent machine for the pilot who wants to fly for the sheer fun of it and still wants to travel. Considering that no medical is needed to fly one and it's more capable than an LSA, the S6RT may be what the doctor ordered.

CONTACTS

Bell Aviation
803-822-4114
www.bellaviation.com

Stemme U.S.A.
858-874-5586
www.stemmeusa-s6.com

Spidertracks S5: Real-Time SOS

Who needs an ELT when you can have real-time satellite flight tracking, two-way messaging and enhanced surveillance through Lockheed Martin?

by Larry Anglisano

It can be said that 406 MHz ELT technology evolved too late to be the huge seller that industry leaders predicted. While 406 ELT systems were stuck in a lengthy certification process, satellite tracking systems emerged from the transportation industry and into aviation applications.

New Zealand-based Spidertracks was an early player with the Spider S3 (there's also the competing Spot line of products that we'll look at in another article). The new \$1795 Spider S5 sends and receives SMS messages through a smartphone. It also interfaces with Lockheed Martin's surveillance-enhanced search and rescue (SE-SAR) system.

ELT KILLER

If you haven't been following satellite tracking technology, trackers make ELT technology seem archaic. Trackers are arguably a better way to follow aircraft because they lay down a real-time path of digital bread crumbs that can be monitored on the Internet by anyone who cares about your whereabouts.

The Spidertracks works with Iridium—a 66-satellite communications

network—and uses an integral GPS receiver for communicating position.




Operation is seamless. Plop it on the glare shield, plug it in to power (10 to 32 volts) and wait for it to establish a satellite lock-on. Once it's up and running, the system reports a position every two minutes with speed, track, altitude, time and lat/long data. The Iridium satellites transmit the location back to the Iridium servers on the ground. From there, the Spidertracks computer servers send the data to the Spidertracks website for online tracking. Spidertracks says the system can't effectively work with a cell phone network because there would be sizable holes in coverage.

The Spider S5 has minimal and simple controls (there isn't even a on/off switch). The low-profile unit weighs under a half-pound and measures roughly 4 inches by 3 inches. We like the self-contained design, which doesn't require external antennas. This means less clutter.



The Spider S5, which is normally positioned on the aircraft glare shield, has a self-contained GPS and Iridium antenna. The unit can be operated as a portable or hardwired to the electrical system for power input.

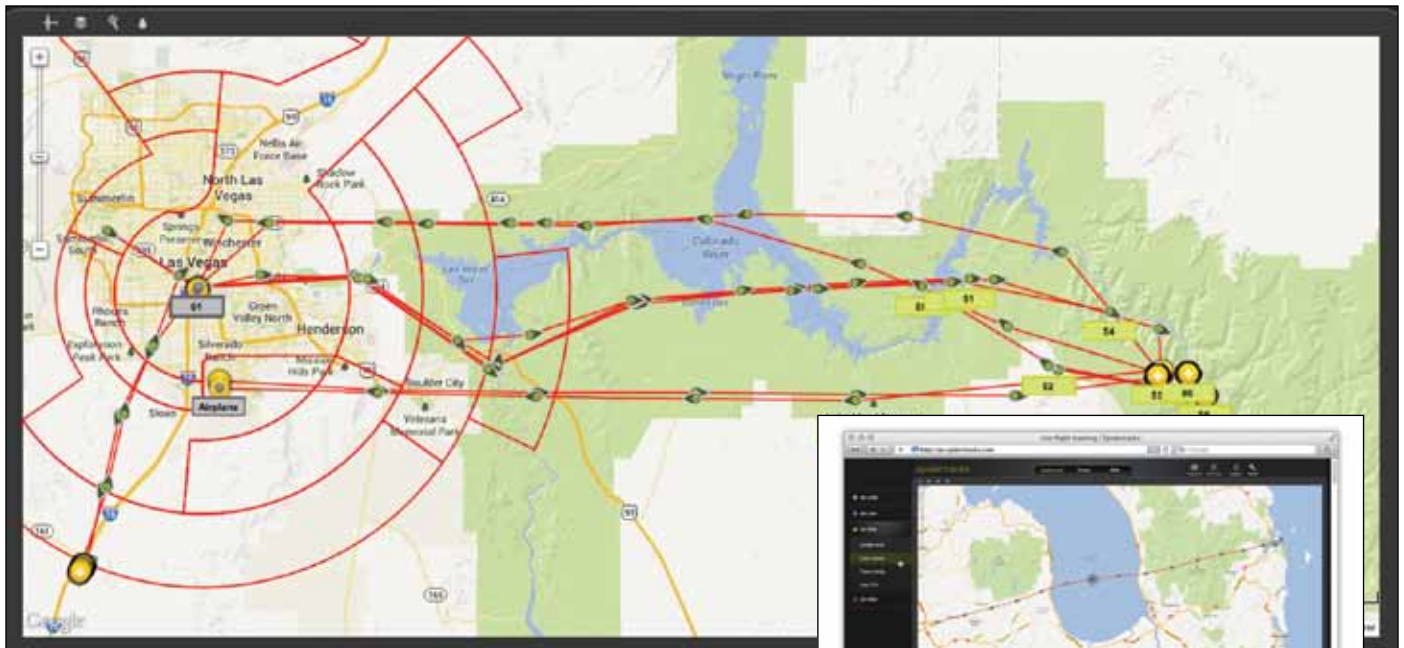
CHECKLIST

-  Satellite tracking in real time bests even the latest ELT technology.
-  Choice by Lockheed AFSS for SOS monitoring gives the system legs.
-  Tracking service isn't free. Costs add up if you use text messaging.

The "SOS" button on the keypad can be used in an emergency to send instant alert messages to your pre-set emergency contacts. The "watch" key enables tracking by sending position reports to the website. If the Spider loses power, the website will automatically send an SOS message after 12 minutes of no communication. You'll need to be vigilant in minding power losses because the Spidertracks' servers will treat a loss of power as a crash.

The "mark" button can be used to send position reports manually or for setting automatic takeoff and landing notifications. The custom messages are configured on the Spidertracks website and are triggered with the "mark" button. For instance, three button pushes could indicate that you've landed, two pushes might indicate you are established enroute and so on.

Speaking of messages, the Spidertxt feature allows you to connect your smartphone wirelessly to the Spider S5 via a Bluetooth connection. Once connected, you can send and receive SMS messages to and from any mobile phone on the ground or from the website. You can also send messages to email. The service is far from free. Each SMS message sent from the Spider to a cellphone is \$1.00 and each SMS or email sent to the Spider is \$0.50, plus a \$250 activation fee. As you can see in the pricing chart, there are various plan



The Dashboard on the Spidertracks website, inset, shows the latest location and status of the aircraft in real time. The tracking data in the main photo is the fleet of Sundance Helicopters in Las Vegas, imported to Google Earth.

options to choose from, based on the amount of flying you do.

LOCKHEED AFSS

Last fall, Lockheed Martin Flight Services launched a new website as part of an effort to offer more useful services to pilots. According to Jim Derr, who heads the Lockheed Flight services department, Lockheed is taking advantage of smartphone and tablet technology.

"Some pilots may not even be aware of the benefits they're receiving from Lockheed's systems," said Derr. This includes a search and rescue feature with the Spidertracks device.

Lockheed added the surveillance-enhanced search and rescue (SE-SAR) feature with Spidertracks in hopes of improving search response time for downed aircraft. It's simple. You register with the AFSS system and enable the tracking as you would for family members and colleagues. If the Spidertracks stops transmitting, stops moving or is manually activated to send a real-time SOS, AFSS is instantly alerted and initiates the search and rescue process.

According to Derr, a Spidertrack-triggered response can be initiated

within minutes, rather than the hours it might otherwise take.

Lockheed Martin said they went with the Spidertracks platform because the Iridium-based system was a lower cost option to implement the first of many planned additional services. They also plan to utilize ADS-B in the near future.

THE FUTURE

Anticipated to begin launching in 2015, Iridium NEXT will recreate the existing Iridium constellation architecture of 66 cross-linked low-earth orbiting satellites, covering

100 percent of the globe. According to Iridium, NEXT will enhance the Iridium mobile communications services—which includes Spidertracks.

In our view, higher data speeds, reliability and enhanced tracking could be compelling enough to retire old-school ELT technology for good.

Moreover, with Lockheed Martin on board, we think satellite tracking technology has legs. Whether or not consumers will pay the fees—and the FAA recognizes the system as a replacement for ELT technology—remains to be seen. Contact: www.spidertracks.com, 800-491-2895.

SPIDERTRACKS PRICING OPTIONS		
PLAN	USAGE/COST PER MONTH	ADDITIONAL FLIGHT HOURS
REGULAR FLYER	7 HOURS, \$15	\$4.50 (\$0.15 per report)
ENTHUSIAST	15 HOURS, \$30	\$4.00 (\$0.13 per report)
FREQUENT FLYER	24 HOURS, \$45	\$2.70 (\$0.09 per report)
HIGH FLYER	30 HOURS, \$55	\$2.40 (\$0.08 per report)
ULTRA	50 HOURS, \$85	\$2.10 (\$0.07 per report)



The Safe Flight AoA system is available with a two-inch round indicator and optional speed indexer, left. On the glare shield, the indexer is in peripheral view when your eyes move outside.

Safe Flight AoA: Lift, Speed Control

The inventors of the stall warning bring critical low-speed awareness to a higher level with a new angle of attack system. FAA sign-off is tricky.

by Larry Anglisano

The FAA says that stall-related loss of control is responsible for approximately 40 percent of fatal accidents. As a result, the agency wants to streamline the certification process and bring angle of attack indicators to all Part 23 aircraft.

In a perfect world of avionics retrofitting, AoA systems would be considered a minor alteration. That's hardly the case and part of the reason why AoA systems aren't common in small certified aircraft.

The way we see it, if any company could succeed in bringing certified AoA systems to Part 23 aircraft, it's the one that pioneered wing leading edge lift detection over 50 years ago and holds 135 patents that are spread out over a broad aircraft segment (they've developed 18 in the last five years). That company is Safe Flight Instrument Corporation, and they have a new AoA and speed control system to answer the FAA's call.

We recently flew with the system and recognized additional benefits that could save you money in the long run by improving and making your landings more efficient.

FLYING THE ALPHA

Safe Flight doesn't want pilots to just think about AoA as a way to avoid stalls. It's more about achieving consistent, stabilized speed control. While flying a safe margin above stall speed is foremost, AoA offers instantaneous speed trend information, which leads to consistent approach-to-landing flares. This is difficult to achieve by flying the pneumatic airspeed indicator alone, especially without regard for the aircraft's gross weight and CG, plus other factors, including wind gusts, ground effect and wing loading.

AoA systems can also provide redundancy for backing up a traditional airspeed indicator. AoA-

referenced speeds can improve touchdown accuracy, promote better directional control on rollout, and increase awareness of the effects of wing loading during maneuvering. Better yet, efficient landing speed can reduce wear on tires, brakes and landing gear.

All of these benefits were apparent to us when we flew the Safe Flight AoA and speed control system in the company Baron. In fact, after flying behind the system for a short time, the airspeed indicator became a secondary speed reference.

With increased sensitivity compared to an airspeed indicator, AoA indication is more useful closer to stall speed. On our demo flight, changing pitch angle close to stall speed didn't create any indication on the airspeed indicator, but the AoA precisely reacted to even small changes in pitch. This makes the system useful not only for landings, but also for takeoff and maneuvering.

STAGNATION POINT

The backbone of the Safe Flight AoA and speed control system is a lift transducer—a direct replacement for the familiar lift detector—that's used for stall warning. There's also a lightweight remote speed control computer that outputs discrete data to an AoA display and optional speed indexer. This indexer is essen-

CHECKLIST

-  Wing leading edge sensor allows instantaneous stall trend info.
-  AoA-referenced speeds promote stable and consistent touchdowns.
-  FAA approval stands in the way of availability and affordability.

tially a fast/slow indicator, providing instantaneous wing lift feedback with accuracy that's unmatched by a traditional airspeed indicator.

The system weighs less than two pounds and complies with dynamic LAA indication for integration with PFD systems, including the one in Garmin-equipped Cirrus models.

Safe Flight told us that the location of the lift transducer is critical to accurate performance. It's all about the airfoil's stagnation point—the spot on the airfoil where the airflow slows to zero. Safe Flight noted that unlike another manufacturer's AoA system, they won't compromise with alternate mounting locations.

Since it's critical to measure the location of the stagnation point, the lift transducer is mounted on the wing's leading edge, at a position corresponding to one percent of the chord line, in reference to the underside of the wing. Measuring AoA in this location, says Safe Flight, provides accuracy for both stall and slow flight warning and is essential for precise speed control.

While Safe Flight's AoA and speed control system can accommodate discrete inputs for flap and gear input, the location of the lift transducer at the stagnation point on the leading edge makes the interface unnecessary for all but a few aircraft. According to Safe Flight's Randy Green, the stagnation point at the stall is usually the same with or without flaps.

INTUITIVE

That's how we describe Safe Flight's AoA and speed control cockpit hardware. The optional speed indexer made for consistently accurate landings in the Baron. Too fast, the yellow F annunciates. Get too slow, and the red S annunciates. The center green O (aka the donut) means you're flying at exactly 1.3Vs. The indexer also makes it easy to recognize transition speeds.

You don't focus your eyes on the fast/slow indexer, but instead—if it's positioned properly—it remains in your peripheral view as you focus on the runway environment.

The Safe Flight lift transducer, top, is a direct replacement for the company's familiar lift detector for stall warning. The two-inch, panel-mounted angle of attack indicator, bottom, is designed for simplicity. Both components connect to a remote speed control computer.



The two-inch AoA indicator, if a PFD isn't being used, is best placed in the vicinity of the airspeed indicator. In the test aircraft, it was placed next to the round-gauge airspeed indicator, where the benefits of flying with an AoA were apparent. Where a pitot and static-referenced airspeed has lag, the AoA is instantaneous.

The range markings on the normalized AoA indicator are universal and designed for simple and intuitive interpretation. For example, the top of the red arc is 100 percent of available angle of attack—the point at which the aircraft will stall. The center of the white arc is 0.6 or 60 percent of available angle of attack, which is approach speed and 1.3Vs—an across-the-board number—no matter the wind gust, weight, or other aircraft factors.

PATHWAY TO CERTIFICATION

We covered AoA systems—including the Alpha Systems platform—in the May 2012 issue of *Aviation Consumer*. As we reported, Alpha received a letter from the FAA stating that their system is a minor alteration and can

be installed by any willing A&P and without an STC or 337 form. Sign it off in a logbook entry. That's not the case with Safe Flight's system.

Safe Flight's Brad Bertele made it clear that there are major differences between the Alpha Systems AoA and his company's speed control system. The installation of the Safe Flight AoA is a major

alteration because of structural, flight characteristics and interface considerations. Appendix A to Part 43 of the regulations define modification to the wings as a major alteration.

The installation of the lift transducer requires cutting a hole in the leading edge of the wing. (Alpha Systems' probe typically mounts in an inspection cover, not directly measuring AoA at the wing's leading edge.) The Alpha system also earns its minor modification status because it doesn't tie in to the flap system.

Moreover, since the Safe Flight AoA displays information to the pilot, Bertele noted that it requires a flight manual supplement—a document that was not approved by Safe Flight's FSDO ASI—but instead passed along to the New York ACO, where it is currently being reviewed for approval.

The system is projected to sell for under \$2000 and requires a voltage converter when installed in 14-volt aircraft. Safe Flight hopes to have certification in place in a few months but after talking with company engineers, we sensed their frustration with the delays in FAA certification.

With over 700,000 lift sensors in service and Safe Flight's proven track record for winning broad FAA approvals, adding AoA and speed control functions to enhance their existing lift detector technology seems trivial.

Additionally, we think this product answers the FAA's call for better stall awareness. Contact: www.safeflight.com, 914-946-9500.



Rotax 912 iS Efficiency: Better than Claimed

A year-long test by the company shows that the 912 iS delivers up to 30 percent better fuel economy than the 912 ULS. Its numbers rival diesel performance.

by Paul Bertorelli

When Rotax surprised us last year with the rollout of its new 912 iS engine, we were skeptical of a claimed 20 percent improvement in fuel economy against the old standby 912 ULS. In a four-cylinder, high-RPM geared engine, that sounded like an overpromise. During our factory tour at Rotax, we politely told the engineers we would reserve judgment until the engine hits the field.

Eighteen months later, it has and just as we suspected, Rotax's initial claims were off the mark. But in the wrong direction, if the company's recent year-long test of the 912 iS is to be believed. Side-by-side flight trials in an identical aircraft flown in a club operation show improved fuel economy of up to 36

percent, with at least 30 percent consistently achievable in routine block-to-block flight.

A back-of-the-envelope calculation reveals that these numbers rival diesel efficiency and if mogas is factored into the equation, flying a 912 iS-equipped aircraft is substantially less expensive than the equivalent 912 ULS.

TEST RESULTS

At the Aero show in Friedrichshafen, Germany, last April, we reviewed Rotax's test data with the company's Alexander Mitter, who flew the trials and accumulated flight test data over a year's time. Even as the 912 iS was being announced last year, Rotax was already flying comparison trials, but the initial fuel economy data it released was based on dyno runs and some flight testing.

To expand the data envelope, multiple aircraft were refitted with the 912 iS.

Mitter's test work focused on a side-by-side comparison in a Tecnam P92, which is considered

Rotax 912 iS, left, has found wide acceptance in the LSA market. Some 300 are in the field.

a VLA under European rules. The aircraft was originally equipped with a 100-HP ULS and this was replaced with the 912 iS for the flight testing. No other modifications were done, according to Mitter, other than fuel plumbing. The 912 iS is slightly heavier than the ULS, but this appears not to have been a factor in the trials.

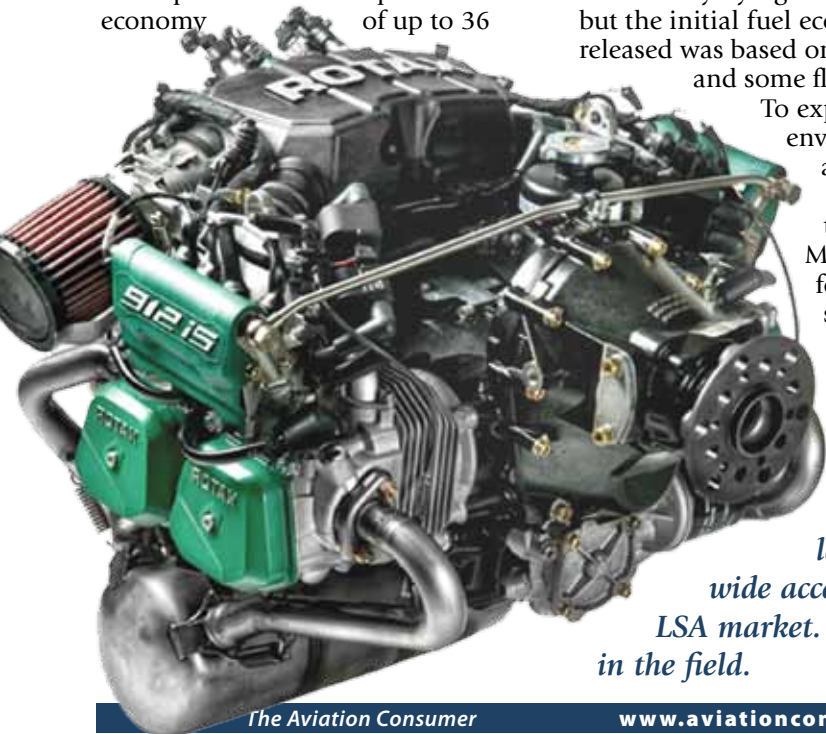
Mitter said the test protocol called for trials on days of similar temperatures and density altitudes and defined run periods. For both engines, the aircraft was climbed to a specific altitude, leveled and allowed to stabilize on one fuel tank. Then the fuel source was switched to a second tank and the consumption precisely measured on the ground after exactly an hour of flight. This was done at multiple altitudes. In addition, Mitter collected broader data that showed that the 912 iS is slightly more efficient in climb than is the ULS.

According to the Rotax test data, the 912 ULS burned an average of 4.65 GPH in the test profile, while the 912 iS burned 3.25 GPH for the equivalent power output, an efficiency improvement of 30.1 percent. Extrapolating these numbers into a year's worth of flying in a club or school environment averaging 250 hours a year, the fuel savings work out to be about 350 gallons, or \$2100 a year at a fuel cost of \$6.

Over the eventual 2000-hour TBO of the 912 iS, the engine will use a whopping 2800 gallons less than the ULS, for a savings of \$16,800. Depending on the core credit assigned to the engine at TBO, that could pay for the overhaul and then some. But more likely, it will account for just a substantial fraction of the overhaul cost.

We expect the 912 iS overhaul costs to be higher than the ULS, but we don't yet know how much higher. Typically, ULS overhauls costs are about \$13,500 to \$15,000, but can be higher if valve or cylinder work is needed. The iS has more components, including the fuel injection system, ECUs and dual, high-pressure fuel pumps. We don't yet know if these will be required replacement items.

Obviously, the cost savings for owners using mogas in the Rotax engines—and many do—will be



less. According to www.airnav.com, mogas averages about \$4.68 as of June 2013. Plugging that number into Rotax's data reveals a to-TBO cost savings of about \$13,000—not quite the total overhaul nut, but no trivial sum, either.

ECO MODE

One reason the 912 iS is performing better than claimed, according to Rotax, is that the engine runs more efficiently in so-called eco mode than was originally thought and it's also more efficient in power mode than Rotax originally calculated.

The 912 iS ECU is programmed to run in eco mode at 77 percent power or less, at which point the engine will operate at what European engineers know as Lambda 1, or a stoichiometric air-to-fuel ratio of 14 to 1. Without providing much detail, Rotax said the 912 iS is also capable Lambda 1.3 or lean-of-peak operation. In power mode, it runs at about Lambda 0.8 or 0.9.

The 912 iS is approved for 91 AKI mogas, but in equipping the engine with future knock-sensing capability, Rotax seems to be anticipating approvals for lower-octane fuels. The iS, by the way, has dual-injector electronic port fuel injection in place of the ULS's dual Bing carburetors. Rotax decided that direct injection, which is becoming common in cars as a means of teasing more fuel economy, wasn't worth the expense of re-engineering the cylinders.

If Mitter's test data is confirmed by real-world results, they may well be proven right. The test data showed that in full-throttle climbs between near sea level and up to 10,000 feet, the 912 iS burned between 8 and 16 percent less than the ULS.

Similarly, in cruise, the iS did better at low altitudes than Rotax originally calculated, but at higher altitudes—8000 feet and above—it did much better, showing as much as a 36 percent improvement over the ULS fuel burns.

GAS VS. DIESEL

Rotax's tests validate a trend that's been apparent in the automotive industry for two de-

912 ULS vs. 912 iS



ALTITUDE	912ULS POWER MODE	912 ULS CRUISE	912iS POWER MODE	912iS ECO MODE	FUEL FLOW DELTA (BEST)
2000 FT.	7.8 GPH	5.38 GPH	7.2 GPH	3.9 GPH	-26%
4000 FT.	7.6	5.38	6.8	3.77	-30%
6000 FT.	7.52	5.47	6.6	3.82	-30%
8000 FT.	7.24	5.65	6.12	3.61	-36%
10,000 FT.	7.16	5.92	5.89	3.78	-36%
12,000 FT.	N/A	5.5	N/A	3.53	-36%

Rotax's side-by-side tests were done over a year's time, using the identical Tecnam P92, similar to the aircraft at right. Initial dyno data, top photo, suggested a fuel economy improvement of about 20 percent, but those trials didn't account for better efficiency at high power settings.



acades. Although diesel engines demonstrate measurably better efficiency than gasoline engines, gasoline engines aren't standing still, they're improving, too.

Using estimated performance data from the Tecnam P92 POH, we calculate a brake specific fuel consumption for the 912 ULS of about 0.44 pounds per horsepower/hour. This compares favorably to typical Lycoming engines, although Continental's large dis-

placement six-cylinder engines can approach 0.39 BSFC when running lean of peak.

By comparison, the 912 iS appears to be running at about 0.36 to 0.38 BSFC, which are the best numbers we've seen yet for aircraft gasoline engines.

Diesel engines from SMA, Thielert and Austro do a bit better than this at 0.35, but when mogas versus Jet-A or diesel prices are factored, the fuel operating costs for these engines are more comparable. Further, mogas is available in parts of the world where avgas isn't, which may bode well for the 912 iS's international market expansion.

TV ROTAX VIDEO

AVweb
www.avweb.com



Avionics Warranties: Worth The Investment

Extended-warranty plans for integrated avionics could pay off in a single repair. Read the fine print before you sign the contract.

by Larry Anglisano

If you've paid for repairs on modern avionics—especially glass cockpit components—you might have wished you bought the manufacturer's extended warranty plan. That's because in many cases, the cost of the plan could pay for itself during one trip to the shop. It can also reduce downtime and entitle you to no-charge loaner equipment.

Now that the fleet of glass cockpit aircraft is aging (some models are older than 10 years), we're seeing more frequent failures of expensive avionics components. That makes it easier for us to recommend buying an extended warranty. Here's a report on what's available from three major avionics manufacturers.

GARMIN FLITELEVEL

Garmin offers extended coverage for the components of the G1000 integrated avionics suite and for

some aftermarket retrofit products (FliteLevel Select plan). This includes all current production and WAAS-upgraded GNS units.

Garmin told us they are still including the GNS500W and GNS400W-series navigators. That's a good thing, since the FliteLevel Select plan could add an additional two to four years of coverage, at 400 hours per year. The original factory warranty on a new product is two years. You'll pay over \$1000 for a flat-rate repair on an out-of-warranty GNS530W. In contrast, two years of FliteLevel Select coverage on a pair of GNS units will cost \$1995.

A plan for a loaded retrofit panel with a G600, GTN 750 and GTN650, GDL69 XM receiver, GTS800 traffic system, GTX33 transponder and GMA35 audio system is approximately \$6085, for two years of coverage. Garmin dealers can pro-

Not only is this a bad day in the clouds, it's an expensive failure of a Garmin G1000 AHARS. The total invoice for repair was over \$1600. This included a factory-exchanged GRS77 LRU, shop labor for replacement and reconfiguring the software, plus freight charges.

vide custom pricing options, depending on the equipment that's installed.


What's not covered? Service bulletins (unless mandatory), failures due to abuse, misuse, accident, natural disasters, unauthorized alteration or repairs, damage caused by other equipment installed on the aircraft, software data and data cards that hold supplemental data (FliteCharts, Jeppesen data, etc).

FliteLevel Select doesn't cover freight charges to return the failed unit to the factory. It does cover two-day freight service from the factory to the shop.

With Garmin's coverage, units are either repaired or exchanged and no-charge loaners may be supplied at the customer's request. However, shop labor for installing the loaner unit isn't covered and you'll be assessed a late charge if the loaner isn't returned within 60 days.

The FliteLevel warranty isn't available for fractional or charter operations, aircraft outside of the United States or Canada (there is an international coverage plan), or for non-individual ownership—such as flight training schools. It can't be added for aircraft that are out of their original warranty end date by more than

CHECKLIST

-  The rising costs of factory repairs make avionics warranty plans worth it.
-  Most plans are transferable, potentially adding to the aircraft's resale value.
-  Some extended plans won't cover shop labor or freight costs.

one year. G1000 suites are initially covered for two years after delivery. FliteLevel extends coverage for up to an additional three years.

The Garmin extended warranty is transferable with the sale of the aircraft. Warranty coverage can add to the value of an aircraft. Some owners told us that the coverage for their glass cockpit helped to sell the aircraft, easing the fears for potentially high maintenance.

FliteLevel covers nearly all components within the G1000 suite, called Line Replaceable Units or LRUs. These include remote transponders, audio systems, heading sensors and those big displays, to name a few. You can purchase coverage on equipment only, or equipment and labor. On average, the price Delta between covering the labor or not is \$2000. We would opt to buy the labor coverage given the intense troubleshooting and disassembly effort that's often required for G1000 repairs. There's also time-consuming software configuration.

Garmin has an extensive LRU exchange program in place, and our experience has proven that there's always a generous supply of exchange units on hand. The coverage includes paid air freight outbound and call-tag service for return of the failed unit to the Garmin factory in Olathe, Kansas. You'll need to have this warranty work accomplished at an authorized Garmin service center, of course, but you're bound to find one in nearly every region you fly. There's even AOG emergency service available 24/7.

AVIDYNE

The Avidyne FlexCare extended warranty product has been discontinued and replaced with the company's new AeroPlan, which covers Entegra multi-screen systems, the R9 integrated cockpit plus the DFC90 and DFC100 autopilot systems.

Owners currently covered under a FlexCare plan can transfer into AeroPlan and gain an extension on their current remaining warranty by 33 percent. For example, if you currently have 12 months remaining on a FlexCare plan, you will receive an additional four months of coverage after converting to AeroPlan. But as we explain in the sidebar on page 20, converting to AeroPlan also has

EXTENDED-WARRANTY PRICE SAMPLES

AVIDYNE AEROPLAN			
PRODUCT	ONE YEAR	TWO YEARS	THREE YEARS
TWO-SCREEN ENTEGRA	\$2000	\$2900	\$3700
WITH DISPLAY REPAIR COVERAGE	\$3775	\$4665	\$5475
GARMIN FLITELEVEL G1000 (THREE YEARS), FLITELEVEL SELECT RETROFIT (TWO YEARS)			
AIRCRAFT	LRU ONLY	LRU/LABOR	
CIRRUS SR20/22 PERSPECTIVE	\$7495	\$9495	
DIAMOND DA40 WITH GFC700 A/P	\$5995	\$7995	
GNS530W, GNS430W COMBO	\$1995	N/A	
ASPEN AVIONICS—TWO-YEAR COVERAGE			
SINGLE DISPLAY	\$795, ALSO COVERS ACU, RSM, CONFIGURATION MODULE		
MULTIPLE DISPLAY	\$1095, COVERS ALL ABOVE PLUS A THIRD SCREEN, IF EQUIPPED		

means you must sign off on a waiver, release and indemnification.

Avidyne has also increased the flat-rate repair costs for units not covered under their warranty. For example, the flat-rate cost for an Entegra MFD is now \$5900—up from a previous \$2150. An Entegra PFD repair that used to be \$3250 is now \$5900. The DFC90 autopilot is \$4900, which used to be \$2150.

For new customers, there's a 30-day grace period before any coverage takes effect. This new coverage starts at \$2000 for a one-year plan, \$2900 for two years and \$3700 for three years of coverage.

What doesn't it cover? Bezel and

glass hardware. Avidyne charges an additional \$1300 for Entegra units (\$2000 for R9 products) requiring these repairs and exchange replacements. Units with aftermarket screen protectors, scratches, excessive wear, or damage to the glass and/or bezel



We think Aspen's extended warranty is the most reasonable. \$1095 covers three screens and the supporting hardware, top photo, for two years. Shop labor for troubleshooting, removal and reinstallation, bottom, may not be covered in all plans.



AVIDYNE AEROPLAN: THE JURY'S OUT

That's what some owners of Avidyne equipment are asking after reading the bold print on the company's new AeroPlan extended warranty coverage agreement.

The good news is that Avidyne reduced the cost of AeroPlan coverage compared to the old FlexCare, which is discontinued, effective immediately. Existing FlexCare customers are covered under the plan until the end of their coverage agreement. Once it expires, they won't have the option to renew it. If they chose, they can transition to AeroPlan at a deeper discount.

Now the bad news. Signing on to AeroPlan requires the aircraft owner(s) to sign a waiver, release and indemnification that takes Avidyne off the legal hook should the aircraft crash. The owner also has to cover all legal expenses to defend Avidyne in a lawsuit.

You or anyone flying will be off the hook should the NTSB determine that a defect in Avidyne's equipment was the probable cause of the accident or incident (note that NTSB information is not admis-

sible in tort cases.) According to our insurance expert, Jon Doolittle, signing the waiver could affect some aircraft insurance policies.

If you're reluctant to sign this agreement—which seems to be the case for all owners we spoke with—you risk paying substantially higher flat-rate repair pricing that's in effect, should a unit fail out of warranty.

Avidyne told us they worked hard to better its broken customer service, and we agree—Avidyne service and support is quite good. Part of the improvement was keeping flat-rate repair pricing low. Now that they're forced to increase repair pricing, Avidyne feels that their liability waiver is a way to offer their customers affordable extended warranty coverage, while still maintaining a high level of customer service and product reliability.



The warranty plan covers other components in the system, including the ACU (analog converter unit), the configuration module and the RSM (remote sensor module). Labor costs for removal and replacement of these components are not covered under the warranty. Other exclusions include batteries, software upgrades and Aspen's EWR-series weather receivers. Further, Aspen warrants repaired, rebuilt or replacement items only for the unexpired portion of the extended warranty period.

To be eligible, the original warranty application must have been completed by the installing dealer, and the system must be under the unexpired original factory warranty or prior extended warranty. For units out of warranty, the \$1995 flat-rate exchange comes with a one-year warranty.

HEDGING BETS

Some owners are reluctant to buy extended warranties, but when it comes to avionics, many don't realize the potential costs of component replacement and flat-rate factory repairs. On top of that, there's shop labor. The going hourly rate at most avionics shops is over \$100 and won't include shipping costs for sourcing replacement parts.

Our advice to glass cockpit owners is to include avionics warranty coverage in yearly maintenance costs. You have to accept the fact that you might not use the coverage but given the potential costs of repairs, we think it makes sense.

will automatically be subject to this additional fee. You can purchase a plan that covers glass protection, for an additional \$1775 for a year, which covers a PFD and an MFD.

There's also a no-trouble-found (NTF) fee of \$750, should Avidyne not confirm the reported discrepancy. That's why it's important to work with a shop that knows the product line, and how to troubleshoot.

All in-warranty repairs are part of Avidyne's Platinum Exchange program, where they'll send you a replacement unit within two business days of Avidyne's receipt of a broken one. It also covers 'reasonable' dealer removal, installation and calibration costs, plus two-day shipping costs.

If you need a replacement component faster, your shop can supply Avidyne with a credit card and Avidyne will ship a replacement component prior to them receiving the failed unit, eliminating potential downtime. They call this Platinum

Advanced Exchange, and charge a flat-rate fee of \$400 per claim.

ASPEN AVIONICS

Now that many of Aspen's Evolution PFD and MFD systems are out of warranty, the \$795 extended warranty buy-in beats the \$1995 flat-rate repair or exchange cost of a failed display.

Aspen's warranty plan lengthens the original two-year warranty for an additional two years from the expiration of the factory warranty. It's available to purchase from any Aspen dealer, and there's the option to purchase the plan any time before the existing warranty expires.

Aspen's warranty covers the Evolution system for repair, rebuild or replacement with a rebuilt unit. There are also special pricing options for multiple displays. For example, \$1095 covers a dual-screen suite, while a third screen is covered at no additional charge.

CONTACTS

Aspen Avionics
888-992-7736
www.aspenavionics.com

Avidyne Corporation
800-284-3963
www.avidyne.com

Garmin
800-800-1020
www.garmin.com

Aircraft Finance: Getting the Right Loan

Before you select the airplane, get the loan approved so you can close the deal fast when you find what you want. An aircraft finance broker can smooth the way.

by Rick Durden

You've decided that it's time to buy an airplane, or you own one and you want to upgrade it with a glass panel or a larger engine. The "how will I pay for it?" refrain has gone through your head more than once. Now you have to listen to that voice. It's time to get the money and do the deal. We'll tell you your options and how things work in the aircraft finance world.

WAYS TO PAY

You can always pay cash. As we researched this article, we were more than a little surprised to discover that cash purchases were more common than we expected. According to aircraft brokers we spoke with, the combination of depressed prices for airplanes and generally lousy rates of return on savings and investments have caused people to be more willing to use money they would otherwise be investing to buy an airplane.

However, for the majority of us, the real world means you're going to have to get a loan.

An option used by many buyers of piston singles and twins is a home equity loan. Rates have been running as low as three percent, and the interest is often deductible. Plus, the collateral is your home, not the airplane, so there is no lien on the airplane to deal with when it comes time to sell.

If the home equity route won't work, it's time to find a lender who finances airplanes. They exist and the

You found it. You're crazy about it. You want to buy it. Now what?

rates charged aren't bad. As of mid-June 2013, rates for piston singles were starting at five percent—the number varying with the size of the loan, term length, and age and type of airplane. Loans of less than \$100,000 or on airplanes older than 20 years are higher. It costs the bank the same to process a loan for \$25,000 as it does for \$250,000, so the interest rate for the \$25,000 loan will be higher.

Aircraft loan terms are usually, not always, for 20 years. Fixed and fixed-for-five-years-then-variable rates are generally offered—the fixed rate being slightly more expensive. We were told by aircraft finance broker Dan Garzelsoni (www.milehighmoney.com) that the average owner holds an airplane for 33 months, so a variable rate loan may be the more economical strategy.

FINDING A BANK

The chances are that your local bank

won't know how to handle a loan on a general aviation aircraft. If it does, that's great; otherwise, the next step is local, regional and national banks that do aviation lending. The challenge is finding one that specializes in the type of airplane in which you are interested. According to aircraft broker Tom Kelly (www.shamrockaircraft.com), most banks will not loan less than \$100,000 and won't touch homebuilts; some won't loan money for singles more than 30 years old or any piston twins.

One way to find a bank that likes the type of airplane you do is through a type club—Cardinal Flyers or the Short Wing Piper Club, for example. If you're looking at a homebuilt, talk with members of your local EAA chapter.

In our opinion, the better way to find the right airplane financing is to go through an aircraft finance broker—more about them in the sidebar on the next page. It's analogous to a mortgage broker—the broker works with several banks and finds the best deal for you based on your finances, as well as the airplane you want to buy or upgrade you want to make.

APPLYING

The application process is almost identical, no matter which bank is going to do the lending. You'll provide your financials—that means tax returns for the last two years and probably something to show how you are doing year to date or your most current pay stub. The bank is looking for you to show your earnings are stable—we were told that many buyers are entrepreneurs



AIRCRAFT FINANCE BROKERS

Just as brokers have proven popular in finding the best deal for insurance for your home and car, or a for a home mortgage package, there are brokers who will work with you to put together aircraft financing.

Aviation finance brokers range from one-person shops to fairly good-sized companies, but all should do the same task for you—get you a loan at a competitive rate and make sure the closing goes smoothly. Assuming you are a good candidate for a loan and the airplane is not too old or rare, most brokers say they can qualify you for a loan in two to three business days and arrange closing as quickly as two days after that.

Most brokers are independent; the remainder are owned by banks that make aircraft loans—although an owned broker will place a loan with another bank if it's a better deal for the customer. NAFCO, for example, is owned by Pilot Bank, which is one of the few, if only, banks that will make loans on homebuilts and old piston twins.

Much of the brokerage business is word of mouth, but most do advertise. When looking at a broker cold, the first question to ask is how long he or she has been in the aircraft brokerage business. We think five years is a working minimum.

Follow up that question by finding out the extent of the broker's aviation experience and experience in the financial world. All of the brokers we interviewed for this article held advanced pilot certificates and had been in the finance world in some fashion before becoming an aircraft finance broker. Ask what banks the broker works with regularly—there should be at least four or five.

The broker will package your loan application and pull your credit so your scores are checked only once—and then shop the package to banks to find the best terms. A good broker will prepare that package as if it is going to be put in front

of a bank's loan committee, because it probably will. The broker's job is to effectively sell you to lenders so you get the best loan terms possible.

There should never be any sort of upfront or application fee. If a broker demands any sort of payment up front, hang up and call someone else—it's a red flag deal-breaker. If there is a fee, it should only be paid at closing and only if the deal goes through.

The agreement with a broker should always be in writing—no exceptions—with any fees to be paid fully disclosed.

Most, but not all, of the time, a broker is paid by the lender—the broker is finding and passing along business to the lender. There are some lenders who do not pay brokerage fees. In that case, an honest broker will disclose that to you, and the broker's fee will be added to the purchase price and paid at closing—once the deal is done, not before. If the deal falls through, you do not pay the broker.

AOPA got some press in the last month when it announced that its financial service program would change from simply guiding members to Bank of America for aircraft loans, and AOPA would become an aircraft finance broker in competition with the established brokers. We have previously indicated that we have a problem with the ethics of nonprofit AOPA competing with aircraft businesses; nevertheless, it is doing so. Time will show if, after years of relying on one bank that has dropped out of lending for piston aircraft, it can establish a beneficial working relationship with a group of banks that will make loans that cover the general aviation market.

AOPA Aviation Finance Company president Adam Meredith told us that "We are bringing on other banks that will be good partners with good customer services for our members."

whose earnings flow can vary—and that you are liquid. You'll need to show that after you make a 15 or 20 percent down payment (as much as 25-30 percent if you're doing a leaseback to an FBO or buying a new airplane that will depreciate quickly), you've still got a total of 24-30 months of loan payments in liquid assets, not including your 401(k) or IRA.

According to Dave Madden, marketing director of aircraft finance broker NAFCO (www.airloans.com), banks don't want to see you dipping into retirement funds to finance a recreational vehicle—and they do want to see that you have the liquid capital on hand to pay for maintenance and fuel. They've seen too many customers who think the real cost of owning an airplane is just buying it and then can't afford to maintain it or make payments—so the bank repos a piece of junk.

You'll fill out a standard loan application that gives the bank (or the broker) permission to "pull your credit," or get your credit reports. Figure on a minimum credit score of 700 to qualify for a loan. We were further advised by Dan Garzelloni, proprietor of Mile High Financial (www.milehighmoney.com), that every time your credit is checked, it dings your score two to five points—more if several checks are made in a short time. So if you apply to several banks for a loan and they all pull your credit, your rating will take a hit. That's one advantage to using a broker—the broker pulls the credit and each bank approached by the broker uses that set of reports, so your credit rating only takes one hit.

Lenders will usually lend only a percentage of the Bluebook or VRef price (or the sale price if it is lower). It can be challenging to get a big loan on a bird whose owner has decked it out so well that it's worth far more than book price. Plan on making a larger down payment on one of those.

You'll need to provide some form of government-issued photo ID.

Finally, the bank is going to want to know about the collateral—the aircraft you're buying or upgrading. The age and time on the airframe and engine matter—7500 hours is getting to be high time and it may make getting a loan more difficult or may up the interest rate you'll pay. For best terms, according to Dave Madden of NAFCO, go after an airplane with a

low-time engine. A title search must show a title with no liens or ones that will be removed before or at closing. The airplane should have all of its logs and no damage history—either one reduces the number of potential buyers should there be a repossession.

APPROVAL

We learned that the biggest delay in getting financing approved was not giving a lender everything it wanted up front. Once you provide everything, approval for a loan generally takes one to three business days, even if you are applying with a few others to buy the plane together and put it into a Sub S corporation or LLC. If the airplane is a bit unusual or old, it may take longer. Aircraft broker Tom Kelly told us that if approval goes into what he called “limbo,” that is, it doesn’t get approved in more than a week; his experience is that the aircraft sale isn’t going to go through.

For airplanes under \$250,000, most lenders do not need to see the prebuy inspection report, although most will insist on a prebuy. An appraisal is generally not needed for airplanes under \$1,000,000.

EARLY APPROVAL

In speaking with bankers, aircraft finance brokers and aircraft brokers, each and every one of them said that the best procedure to follow when you know you’ll have to get a loan to buy an airplane is to get “pre-approved” (yes, we know that’s a physical impossibility, you’re either approved or you’re not). That means you get approved for a loan before you settle on an airplane—you work with the broker or lender you’ve chosen, discuss the general type of airplane and price range, go through the application process and get approved for a loan of up to a given amount of money. The process takes two to three days. The approval is good for 60-90 days.

As aircraft finance broker Wally Zook (www.zookair.com) told us, early approval is a wise move—with approval in hand, you shop for the right airplane, negotiate the price, do the prebuy while keeping your lender in the loop and then close the deal fast.

CLOSING

Once your loan is approved, closing can happen in two days if everyone

A standard application form for an aircraft loan.

cooperates and overnights the paperwork. NAFCO’s Dave Madden walked us through the process:

The lender prepares and the seller signs the FAA Bill of Sale, FAA Form 8050-2. It is a carbon-copy form that must have an original signature, it cannot be signed electronically. The seller sends the signed original to the lender, title company or an escrow agent who holds it in preparation for closing and filing. (If the deal falls through, the Bill of Sale is either shredded or returned to the seller.)

The lender prepares and the buyer signs an application for registration of the airplane, FAA Form 8050-1, and sends it, minus the pink copy, to the lender, title company or escrow agent to hold for the closing and filing. The pink copy is held by the buyer and will serve as the temporary registration to be carried in the airplane until the white copy is received from the FAA following the closing and filing of the documents with the FAA.

The lender prepares and the buyer signs a promissory note for the loan and sends it to the lender.

The lender prepares and the buyer signs a security agreement giving the lender a security interest in the airplane—which allows the lender to repossess the airplane if the buyer doesn’t make the payments. The buyer sends it to the lender, title company or escrow agent, who holds it in preparation for the closing and filing—the security agreement is filed with the FAA to record a lien on the airplane in favor of the lender.

With the paperwork signed and in the possession of the lender, title company or escrow agent, the buyer and seller complete the transaction. The buyer confirms the airplane is satisfactory and gives the seller the remainder of the “money down” on the deal. The buyer emails the lender to confirm that the airplane is satisfactory, that he wants the closing to go forward, and the loan funds can be released. The seller emails the lender to confirm receipt of the “money down” from

the buyer and that the closing can go forward.

Upon receipt of the emails, the lender releases the loan money, usually via wire transfer, and advises the buyer and seller. The lender either physically files the Bill of Sale, application for registration and security agreement with the FAA or directs the title company or escrow agent to do so. Some lenders and all title companies and escrow agents have offices in a location in Oklahoma City, where they can immediately give the sale documents to the FAA for filing.

There is usually some fee due to the lender at closing—to cover the title search, FAA filing fees, personnel and brick-and-mortar costs at the lender. We found them to be on the order of \$500. The buyer pays that fee with a check held by the lender until the closing occurs. If an escrow service is used—not common for transactions under \$100,000, unless the seller is uncomfortable sending a signed Bill of Sale to a lender before closing and wants a third party to hold it—the escrow service fee is usually split between buyer and seller. It is often tied to the value of the transaction, but figure on \$500 or more.

That’s it. The airplane is yours (and the bank’s); now all you have to do is make the payments, insure it, fly it, fuel it, maintain it and then start wishing it were a little faster and carried a little more . . .

FINANCIAL STATEMENT AND APPLICATION – SECTION I	
Borrower: _____	
Co-Borrower: _____	
Address: _____ State: _____ Zip: _____	
City: _____	
Number Years this address: _____	
Previous Address if less than 3 Years at current address: _____	
Address: _____ State: _____ Zip: _____	
City: _____	
Phone Number: _____ Email: _____	
Social Security # and Tax ID if self employed: _____	
Employer: _____	
Employer Address: _____ State: _____ Zip: _____	
City: _____	
Phone Number: _____	
Position or Occupation: _____ Years In Position: _____	
Salary (Include Bonus and or Commissions): \$ _____	
Dividends: \$ _____	
Rental Income: \$ _____	
Other Income: (Specify) \$ _____	
Total Income: \$ _____	
Total Last Year Income: \$ _____	
Are you obligated to pay alimony or child support: <input type="checkbox"/> Yes <input type="checkbox"/> No Amount: \$ _____	
Income Tax Settled through: <input type="checkbox"/> Yes <input type="checkbox"/> No \$ _____	
Have You ever Declared Bankruptcy: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Are you a defendant in any legal actions: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Assets:	
Bank Accounts: \$ _____	Liabilities:
Government and marketable Securities: \$ _____	Notes payable to Banks and others: \$ _____
Privately Owned Companies: \$ _____	Mortgage(s) payable: \$ _____
Partial Interest in Real estate: \$ _____	Unpaid Income Tax State: \$ _____
Real estate Owned: \$ _____	Federal: \$ _____
Cash Surrender Value of Life Insurance: \$ _____	Credit Card or Charge accounts: \$ _____
Personal Property: \$ _____	Installment Debt: \$ _____
Other Assets: (List) _____	Other Debt: (List) _____
_____ \$ _____	_____ \$ _____
_____ \$ _____	_____ \$ _____
Total Assets: \$ _____	Total Liabilities: \$ _____
Total Assets less Liabilities: \$ _____	
Do you have any contingent liabilities or a co-maker on any loans: <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes explain: _____	



Piper Warrior

Affordable, reliable, docile—Piper's Skyhawk challenger has met the test of time.

The quest to come up with the perfect personal airplane, which would sell in droves, was probably the dominant force in the evolution of general aviation ever since the post-World War II boom and bust. It looked easy: it only needed to perfectly combine ease and cost of operation, ability to carry the right number of passengers and operate from most all airports in the country. Piece of cake.

Aeronca, Luscombe, ERCO, Piper and Cessna, among others, all eventually came to the conclusion that the future for mass-marketing airplanes was wrapped up in something that had four seats and on the order of 150 HP. ERCO (the Ercoupe folks) never went past a prototype. Aeronca and Luscombe gave up after limited success, while Cessna and Piper went on to fight it out for decades, and Beech and Grumman-American tried to make inroads.

That niche proved to be the beginning rung of a market ladder where airplanes can be very satisfactory trainers, but also practical transportation tools. They won't haul a lot of people or cargo, nor will they do it quickly, but they offer economical travel. They often serve as a pilot's first "real" airplane after primary training. The market demands that

they be reliable, inexpensive to operate and relatively easy to fly. They must excel as rental airplanes—thus be designed to be flown by any pilot, and withstand the consequent beating, while providing a reasonable income to the FBO.

Cessna won the war—the Skyhawk owns this market, and used-airplane prices reflect that dominance, but

The Warrior's new longer, semi-tapered wing improved handling and takeoff performance.

the Piper PA-28-151 or -161 Warrior came a respectable second. It, and the AGAC AA-5 Traveler/Cheetah, are good, solid airplanes that can be had for less. (Beech's entry, the Sport, is short on performance when compared to the Warrior and Cheetah.)

The AA-5 went the way of the dodo in the late 1970s, and attempts to resurrect it (in the form of the Tiger) failed. Beginning in the mid-1980s, Piper, too, fell on hard times and was forced into bankruptcy, finally emerging several years (and a few abortive buyout attempts) later as the New Piper. In 2006, "new"

was dropped from the company's name.

Unlike the Skyhawk, and with only one or two exceptions, the Warrior was been in production throughout, even if the number of airframes manufactured in the last several model years could be counted on the fingers of one hand. In the "Warrior III" configuration, the model was marketed mainly as a trainer before quietly disappearing from Piper's lineup this year.

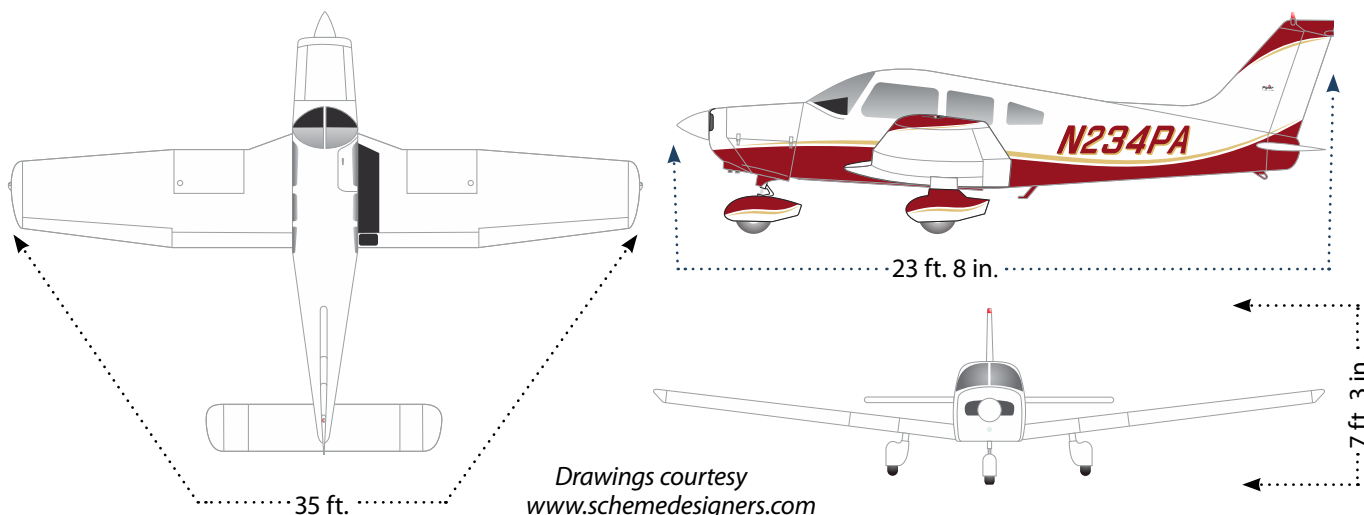
A glance at current prices of mid-1980s Skyhawks and Warriors shows that PA-28-151/161 prices have closed some of the historical gap with the Skyhawk, but are still a relative bargain:

The 1984 Cessna averages \$10,000 more than an '84 Warrior, according to the *Aircraft Bluebook Price Digest*.

HISTORY

As general aviation was entering its heyday of the 1970s, Piper's line was beginning to look dated. The basic PA-28 had come out in 1962, and hadn't changed all that much. Piper's PA-28 and -32 singles all had the characteristic, constant-chord "Hershey bar" wing, and the company was about to lower the boom on the sleek Comanche. It was time to update the line.

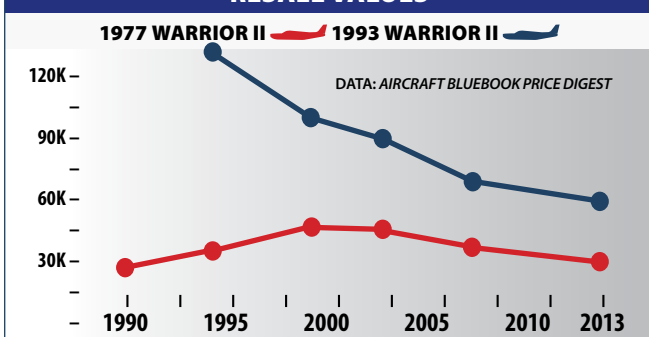
PIPER WARRIOR



CESSNA 120-140 SELECT MODEL HISTORY

MODEL YEAR	ENGINE	TBO	OVERHAUL	FUEL	USEFUL LOAD	CRUISE	TYPICAL RETAIL
1974 PA-28-151 WARRIOR	LYCOMING O-320-E3D	2000	\$20,000	48	989 LBS	110 KTS	±\$25,000
1977 PA-28-151 WARRIOR	LYCOMING O-320-E3D	2000	\$20,000	48	989 LBS	110 KTS	±\$28,000
1977 PA-28-161 WARRIOR II	LYCOMING O-320-D3G	2000	\$20,000	48	981 LBS	118 KTS	±\$29,000
1983 PA-28-161 WARRIOR II	LYCOMING O-320-D3G	2000	\$20,000	48	1096 LBS	118 KTS	±\$35,000
1988 PA-28-161 CADET	LYCOMING O-320-D3G	2000	\$20,000	48	1096 LBS	118 KTS	±\$19,000
1997 PA-28-161 WARRIOR III	LYCOMING O-320-D3G	2000	\$20,000	48	1096 LBS	118 KTS	± \$70,000
2000 PA-28-161 WARRIOR III	LYCOMING O-320-D3G	2000	\$20,000	48	1096 LBS	118 KTS	±\$90,000
2005 PA-28-161 WARRIOR III	LYCOMING O-320-D3G	2000	\$20,000	48	1096 LBS	118 KTS	±\$115,000
2011 PA-28-161 WARRIOR III	LYCOMING O-320-D3G	2000	\$20,000	48	1096 LBS	118 KTS	±\$255,000

RESALE VALUES

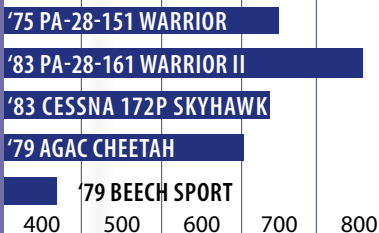


SELECT RECENT ADS

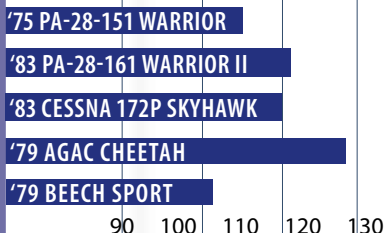
AD 2013-02-13	INSPECT STABILATOR CONTROL SYSTEM COMPONENTS
AD 2010-15-10	INSPECT/REPLACE CONTROL WHEEL SHAFTS
AD 98-01-06	INSPECT/REPLACE PRECISION AIRMOTIVE CORP. CARBURETORS
AD 96-10-03	INSPECT/MODIFY THE FLAP LEVER ASSEMBLY
AD 95-26-13	REPETITIVELY INSPECT OIL COOLER HOSES TO PREVENT FAILURE/RUPTURE

SELECT MODEL COMPARISONS

PAYLOAD/FULL FUEL



CRUISE SPEEDS



PRICE COMPARISONS

'75 PA-28-151 WARRIOR	(\$26,000)
'83 PA-28-161 WARRIOR II	(\$35,000)
'83 CESSNA 172P SKYHAWK	(\$45,000)
'79 AGAC CHEETAH	(\$37,500)
'79 BEECH SPORT	(\$26,000)



A new airplane was planned, one that would take aim squarely at the Skyhawk. Previously, Piper didn't really have a strong competitor for the Cessna 172, even though it offered Cherokees with 150 or 160 horses through most of the 1960s. The Cherokee 140 was more cramped, being more of a 2+2 airplane than a true four place, and it didn't perform as well as the Skyhawk.

The first Warrior was introduced in 1974, powered by a 150-HP Lycoming O-320-E3D engine. It didn't

replace the Cherokee 140, though the 140 did succumb to poor sales after the 1977 model year.

The Warrior boasted one big difference: a new, longer, semi-tapered wing with a higher aspect ratio. This new wing helped the handling, with lighter roll control forces, and also boosted the climb rate. It also helped the airplane's looks. The new wing design first appeared on the Warrior, but eventually found its way into all of the PA-28 series as well as onto the PA-32.

Warriors have traveled the world; this one lives in New Zealand (left). The well-sized baggage area will hold 200 pounds, and contents can be accessed in flight (below).

Interestingly, the new design represented a deviation from the production efficiencies originally touted as a virtue of the constant-chord wing. And it's fun to recall some Piper engineers, back when it was introduced boasting that the fat, new, stubby wing was actually every bit as good as the sexier-looking tapered Comanche wing, aerodynamically. Piper's most significant upgrade to the Warrior came in 1977 when a slightly different O-320 engine—the -D3G—was bolted on, offering a 10-HP boost in output. The results were dubbed "Warrior II."

A couple of other evolutionary changes occurred in 1978, when Warriors received more streamlined wheel fairings, and in 1983, when the battery was removed from under the rear seat and placed in front of the firewall. The new fairings—after-market versions of which are available under STC—yielded some seven knots in cruise speed, according to the book (optimistic numbers, users tell us), while the battery change shortened the run to the starter and helped combat starting problems (though these had been largely overcome, according to users, by swapping copper for aluminum cables).

Thanks to the change in weight and balance, shifting the battery location allowed the gross weight and useful load to be hiked by 115 pounds, and extended the aft CG to allow more of a load in the baggage compartment. (The boost is available via STC for older 160-HP Warriors.)

An attempt to create some interest in a moribund new-airplane market was made in 1988, when Piper released a version of the Warrior, targeting flight schools, called the Cadet. A stripped-down Warrior, it was available in VFR and IFR versions. The experiment continued through the 1994 model year. Another spruce-up resulted in the Warrior III in 1995, which remained in production through 2012.

Long, low panel can run short of space; fuel selector is on lower, left sidewall (top). Upper latch of two on the cabin door (middle). Handle for manual flaps is between the front seats—shown with flaps extended (bottom).

Today, a 2012 Warrior III with standard equipment will set you back \$289,900. An average 1974 Warrior model brings about \$25,000.

PERFORMANCE

The 10-HP boost in power raised the published 75-percent cruise speed from 116 knots to 121 knots. And the new speed fairings nudged that up to a claimed 127 knots—not exactly blinding, but squarely in league with the Skyhawk, even if easily eclipsed by the Cheetah. Owners told us in no uncertain terms that real-world performance is well less than the book figures: Owners of the 160-HP model reported cruise speeds from 110 to 120 knots. On the good side, the fuel burn at 100 knots can be as low as 8 GPH.

One big gripe by owners of the 150-HP model is a miserable climb rate. “It’s taken me to 292 airports in 35 states. As a Jack of all Trades (master of none), it does not climb rapidly, carry a lot of weight or go fast,” wrote one owner of a 150-HP model.

One of the nice features is a generous 50-gallon fuel load (with 48 gallons usable). Burning 7.5 to 10 GPH at cruise, these birds yield a fairly good range with four to six hours of flying. One pilot said he flight planned for 4.45 hours with a 45-minute reserve, and one appreciated the endurance when IFR.

Another owner wasn’t happy, saying, “There are times when 50 gallons has been limiting, and I would have liked to have had at least 72 gallons, as did some of the Arrows.”

Runway performance is adequate, with an owner of a 160-HP model reporting his being flown from a grass runway. He says the airplane is “adequate for the 2600-foot strip. I’m careful with four passengers on high density altitude days,” however, especially if the grass hasn’t been mowed.



COMFORT/LOADING

While past respondents rated comfort only as average, the current consensus is it’s quite good. Later Pipers benefit from having some of the best seats in general aviation, from both a comfort and crashworthiness standpoint. These seats are designed with an S-tube frame similar to the legendary JAARS seat, which progressively deforms during impact, absorbing energy before it reaches the occupant. For greater pilot comfort, there is an optional vertical seat adjustment which some say is great but others say is prone to malfunctioning.

The fuel selector is located out of sight alongside the pilot’s left knee. The need to switch tanks left and right results in more fuel mismanagement accidents than with the “both tanks” system on the high-wing Cessnas, judging from the accident reports. Naturally, it’s also easy to develop an imbalance unless the pilot remembers to switch regularly and there is no aileron trim for the airplane. This makes at least a wing-leveler autopilot a nice option, in our opinion.

The Warrior’s parking brake is a robust handle sticking out from the bottom of the panel. It’s simple and strong, and it works. The same goes for the flap system. It’s manual, positive, blessedly simple and it just doesn’t break.

Like most low-wing aircraft, however, entry and exit is awkward. The Warrior has only one door, so three of the four occupants have to



do some contortions to get in place. Emergency egress is problematical, since the rear windows cannot be opened in an emergency (like those of some Bonanzas, for example). The baggage door is fairly large, however.

Naturally, with a full load of 50 gallons, the Warrior won’t carry four adults, but some owners report fueling up only to the tabs (34 gallons), accepting the reduced range and legally flying off to their destina-

ACCIDENT SCAN: R-LOC AND OTHER

Warriors are used as trainers and by pilots of all experience levels who operate them from all sorts of runways throughout a wide range of elevations, according to our survey of the 100 most recent Warrior accidents. It was no surprise that the majority of the accidents were due to runway loss of control, although the rate was about half that of a tailwheel airplane.

A number of the R-LOC accidents were due to the standard problem of pilots simply flying final too fast and then being unable to manage the airplane's energy once the wheels were on the ground. In the group were the usual problems with not handling a crosswind on landing or takeoff.

Because about a third of the accidents involved students, we think that the R-LOC rate would be higher except for the fact the wide-track Warrior gear does a good job of forgiving pilots whose skills aren't as sharp as they might be.

The "other" category was truly a mix of creative ways to tear up airplanes, including: one Warrior hitting another on the runup pad; taxiing into an open manhole in a parking area; hitting a deer on the runway, and a pilot falling asleep while hand flying and the airplane eventually descending and hitting the ground—he walked away.

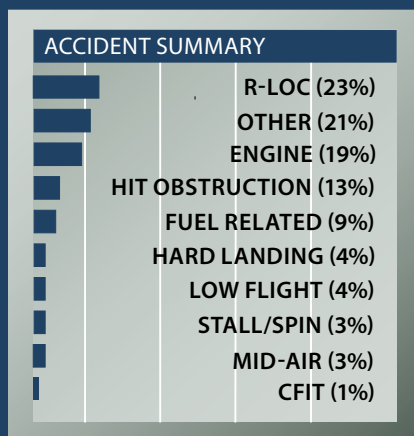
The percentage of engine-related accidents was higher than expected. A third were due to something going wrong with the engine, usually a result of lack of maintenance or, in one case, maintenance-induced failure. For an engine that has a reputation for not being subject to carburetor icing, we were surprised to see that another third

of the times the engine took the day off were attributed to carburetor ice. Save for one pilot who switched on the cabin heat, not one of the pilots involved tried to apply carb heat when things got quiet up front. Fully a third of the accidents were engine failure for undetermined reasons, although, reading between the lines, we couldn't help but wonder if a few were simply hitting the ground during a buzz job.

Thirteen accidents involved hitting obstructions on landing, takeoff or a blown go around. On landing, it was usually at night and the pilot just got too low. On takeoff, the cause was a mix of not maintaining directional control and hitting something off to the side of the runway or overgross airplanes getting into the air but hitting something off the end.

Two of the stall/spin accidents were on takeoff—the airplanes were suspected of being overgross.

Half of the fuel exhaustion accidents involved airplanes that still had plenty of fuel in the other tank; support for the studies that show the safest fuel system is one with the fewest options for the pilot.



tion. The baggage compartment will take a full 200 pounds structurally, the same as more powerful PA-28s. That's a lot more than the Skyhawk and Cheetah's maximum of 120 pounds, by comparison.

Most owners say nice things about cabin ventilation, thanks to an abun-

dance of outlets, both overhead and underneath. Unfortunately, there were complaints that in winter the overhead vents were too much of a good thing and could not be completely shut off, giving passengers the chills. Pilots have solved this problem by simply taping up the exterior

air inlet on the tail in the winter. We also received reports of the heater baking the ankles of those in front while rear passengers froze.

A few owners had the air conditioning systems available as options on the Cherokee line. Those who did felt the cool air yield in summer was not worth the sacrifice in already-limited payload and performance.

HANDLING

The Warrior shares with the other Cherokees a gentle nature, pleasant handling and such a reluctance to stall aggressively that some pilots rate it a poor teacher. Several respondents said that with both rudder and stabilator trim, the airplane does not need an autopilot.

We'd rate runway handling as good, despite the number of accidents on both takeoff and landing—especially landing—we uncovered in past checks of FAA accident and incident reports. Further investigation revealed that many were student training accidents.

Pilots report they like the way the aircraft handles in a crosswind landing and feel more secure taxiing in windy conditions with the wide gear stance, as opposed to operating in the high-wing Cessnas.

COMPETITION

The Cessna Skyhawk and the AGAC Traveler/Cheetah are the most logical competitors to the Warrior for the attention of buyers who want four-seaters that won't break the bank and who are willing to settle for modest performance.

The Cessna has by far the best overall safety record. In a cross-country race, the Cheetah would edge out a 160-HP Warrior with the later wheelpants (the Traveler is slower), and leave the Cessna and the older Warriors in its propwash. And while the Traveler/Cheetah has the most pleasant, facile handling, in our book, it is not as adept at handling short fields. The Cessna gets our nod for getting in and out of little runways.

MAINTENANCE

Here's where the Warrior should shine, since it's the opposite of high-tech sophistication. It's got fixed gear, a fixed-pitch prop, mechanical flaps and a small-bore carbureted engine.



Upper cowling halves open wide, providing excellent, rapid access to engine and accessories.

It also comes with a cowling providing the best engine access in its class: Doors on either side of the cowling are hinged at the top and secured with double latches. By contrast, gaining similar access to a Skyhawk's engine requires removing several screws and then lifting off the cowling's upper half, a two-person job when done correctly.

As expected, owners report relatively low maintenance costs and modest annual inspection fees. But it's a good thing they have that cowling: the engine compartment is the source of most upkeep problems. Our checks of Service Difficulty Reports (SDRs) showed a host of problems with carburetors and a number of magneto failures. The powerplant itself was tagged with several failure modes, valves being at the top of the list, following up with camshaft/lifter/pushrod problems, cylinder cracks and rocker arm breakage.

Potential buyers should check to see if there is roughness following engine start, since according to Lycoming that's one sign the exhaust valves are beginning to stick. (The roughness usually goes away after the engine warms up, incidentally.)

High-time Warriors usually got

that way as a result of being in a training environment. As one result, landing gear components and attach points, along with their fasteners, are subject to numerous cracks and corrosion.

If you're looking at a Warrior equipped with air conditioning, take a look at the bracket that attaches the alternator and compressor. We noted reports that the mounting bolts had broken or worked loose. And in one case the submitter found the bracket was installed backwards, subjecting the rear tab of the alternator to stress and misalignment of the pulleys.

MODS/USER GROUPS

One series of mods available from Art Mattson's R&D (www.piper-mods.com) for earlier PA-28 models also can be installed on Warriors. These include a set of vortex generators, modifications to the standard Sensenich prop blade designed to reduce drag, a new, more-efficient cowling and—for -151 Warriors—an upgrade to 160 HP. We have no direct information on these mods' effectiveness, but Mattson has regularly set speed records in his Cherokee 140.

Owners of 1977 through 1982 Warrior IIs also can get a gross weight increase, from 2325 up to a whopping 2440 pounds. Mostly a paperwork exercise requiring only installing a placard and carrying a later Piper information manual, the



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STC gives early -161 owners the same gross weight 1983 and later models enjoy. Ventura Aero (www.ventura.aero) offers this mod.

Another interesting STC involves installing a supplemental storage area under the baggage compartment floor, capable of storing up to 25 pounds. The mod, available from Aircrafters, Inc. (www.aircrafters.com), includes all parts and paperwork necessary for the conversion.

Other mods include the usual from LoPresti Speed Merchants (www.speedmods.com), Met-Co-Aire (www.metcoaire.com) and Knots-2-U (www.knots2u.com). The offerings include gap seals, new wingtips—including tips with landing/recognition lights.

As with any personal airplane, we strongly recommend joining its type club. Their expertise can save real money when tracking down common parts and problems. Warrior owners are fortunate in that they have an excellent organization, the

Piper Owner Society (www.piper-owner.org), which merged with the Cherokee Pilot's Association. There is also a Piper Forum (www.piperforum.com) where Piper pilots exchange thoughts.

OWNER COMMENTS

In a partnership, I have owned and operated a Warrior in New Zealand for 26 years. It began life as a PA-28-151 and served with a number of aero clubs before we bought it in 1987. It was tired but structurally sound. We restored it in 1992 and in 1997 upgraded to a 160-HP engine via STC.

We have flown the Warrior all over New Zealand. Even though we keep the airplane to a very high standard, it certainly doesn't break the bank to own it. It is a robust aircraft, simply constructed with well-proven systems.

It is not the flashiest performer; 100 knots is as good as it gets at 75 percent power, but it's honest and reliable. It easily carries three persons, a good overnight bag and four hours fuel. We have the Frise aileron model—in turns, the airplane is delightfully stable. Stalls are benign and come after good warning. It handles crosswinds well, an advantage in this country as many smaller airfields only have a single vector.

Once trimmed for straight and level flight, it is very smooth, which is good for passengers with little or no flight experience. With New Zealand being narrow and relatively mountainous, strong winds aloft and leeway are always a factor. The Warrior has proven to be a stable and

Owners report the overhead vents (left, above) are effective. About half of the Warrior fuel exhaustion accident airplanes still had fuel in one tank. Warrior's left/right/off fuel selector (left, below).

comfortable machine for our kind of flying.

We have had few maintenance surprises. One big job a few years ago was the replacement of the wing walkway skins. With the single door, the skins do take a load over time. It seems that one can expect them to show distress at around 6000 hours. Flap corrosion due to the open-to-the-air nature of the design is another area to watch. We have rebuilt our flaps and have a second set, corrosion treated and painted.

We have had little other trouble with corrosion. When we restored the airplane, we corrosion-proofed it throughout, which has made a huge difference in our maritime environment.

Dr. Ross St. George
School of Aviation
Massey University

My family adopted our 1976 bicentennial, red, white and blue Warrior when it was 18 months of age. Now, 35 years later, it is still a magical adventure. The original paint has been touched up and still looks glossy. The interior is 1970s Bahama Blue—a color you can't get anymore.

Over the years our Warrior has been modified with panel upgrades, a 180-HP engine, upswept wingtips with landing lights, strobes and flap seals. The mods improved handling and, we think, made it easier to land well.

Seven family members from three generations have earned their private pilot certificates in our family Warrior.

What do we like about the Warrior? It glides like nobody's business, and handling is calm and collected at all speeds. The graceful wing has no surprises in the stall and maintains good directional control. With the 180-HP engine, it climbs better and will cruise at 120 knots. Even though



Generous, effective flaps help with short field performance (above). More aerodynamic wheel pants on later models improved performance but made servicing tires difficult (right).



it now has Archer performance, the Warrior airframe has advantages. The full-opening cowlings allow easy inspection of the engine compartment before each flight and the wheels are an inch smaller, which presents less drag in cruise.

For us, it costs less to own and operate than anything except maybe an LSA. On top of that, the pleasure factor is sensational.

Thomas Reindl
Via email

I owned a 1976 Warrior for three years and absolutely loved the airplane. It was my first airplane after I got my private, and I used it to get my instrument rating. It was a great learning platform and provided the performance and stability needed for IFR while retaining an operational simplicity that allowed me to focus on the more challenging aspects of the rating.

I bought the plane with nearly all of the Knots2U speed mods in place—gap seals and wing root fairings. It also had the RAM STC'd 160-

HP engine upgrade, effectively making it a Warrior II. All this combined to produce airspeeds most people wouldn't believe. I had just a single-probe engine monitor, so I leaned to roughness and then enriched until the engine smoothed out. Doing this, I routinely managed 115 knots in cruise at 8.5 GPH.

I upgraded the panel with a Garmin 430 coupled to a simple, Century I autopilot, which added safety and security. It had no altitude hold, but it really wasn't necessary except in rough air. When trimmed correctly, the airplane will hold altitude nicely.

I also had the Laminar Flow System Speed Pants installed, which added five knots to the cruising speed, giving me an honest 120 knots on 8.5 GPH.

Jeff Schlueter
Via email

After training in Cessnas, a buddy

continued on page 32

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First Word

(continued from page 2)

initially sounded like a good thing. What caused us to spit the coffee on the computer screen was something clearly stated on the first line—Avidyne cannot be accused of hiding the ball—of the terms and conditions of AeroPlan: all of the owners of the airplane “must sign the attached WAIVER, RELEASE AND INDEMNIFICATION.”

That attached document is two-fold. The owner agrees not to sue Avidyne if s/he has an accident unless the NTSB finds, in its probable cause, that the Avidyne box was defective and caused the accident. That’s interesting—it usually takes the NTSB 18 months to issue the probable cause. Plus, by statute, the probable cause is not admissible as evidence in a lawsuit involving the accident—Catch-22, anyone?

Further, the owner must agree that if s/he crashes (and the NTSB probable cause says it was due to any sort of pilot error) and then someone else—any third party—sues Avidyne, the owner will pay for Avidyne’s defense of the lawsuit and any damages it is ordered to pay. We think that’s nuts.

We can’t imagine any Avidyne owner signing this agreement without serious consultation with a lawyer and the owner’s insurance carrier. We don’t know if there is insurance coverage for an owner that signs an agreement to indemnify and defend a manufacturer. The insurer didn’t contract for such a risk. We were assured by Avidyne’s Harper

that owners are signing up, although the ones we spoke with said there was no way they could sign such an agreement—the downside risks are simply too high.

We cannot find any precedent for a manufacturer demanding that its customer indemnify and defend it against third-party lawsuits—something that could easily bankrupt the customer—as a condition of an extended warranty, while also nearly doubling the repair prices for customers who don’t knuckle under and sign up. That’s not customer service.

We don’t know how many lawsuits Avidyne is defending, or if it is facing unusually high insurance costs not seen by its competitors, or if it is seizing straws trying to cut costs.

We don’t know if the difficulty in delivering a new product along with draconian conditions for the extended warranty are symptoms of trouble, but owner feedback indicates that Avidyne’s actions are not endearing it to its current customers or encouraging new customers to buy. —Larry Anglisano, Rick Durden

Piper Warrior

(continued from page 31)

and I went airplane shopping with an open mind. In 2006, we bought a 1979 Warrior II. I later got my instrument rating in it.

The O-320 is rightfully recognized as a reliable workhorse. The stretched fuselage increases rear legroom. The plane is quite easy to fly and land—I’m actually glad I trained in the more squirrely Cessna 152 to build skills. The Warrior rewards on-speed

FEEDBACK WANTED

ERCOUPE/AIRCOUPE



For the November 2013 issue of *Aviation Consumer*, our Used Aircraft Guide will be on the Ercoupe/Aircoupe/Cadet series, the stall-resistant, two-place, low-wing, two-control (originally) airplane. If you’ve owned or flown these planes, we want to know what they’re like to own, 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 Ercoupe/Aircoupe series by September 1, 2013, to:

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approaches; it will float if landed too fast. It seems to have no handling vices. I remember reading somewhere that Cherokees “just refuse to do anything weird,” and I think that’s exactly right. In the winter, the heater is capable of sneaker-melting temperatures in front, but seems best suited to cryogenic experiments in the back seat.

Outside the normal range of stupid pilot tricks, I think the only way a Warrior can bite you is if you don’t respect density altitude when loaded. I use an iPhone app and a healthy fudge factor on warm days.

Doug Garrou
Via email