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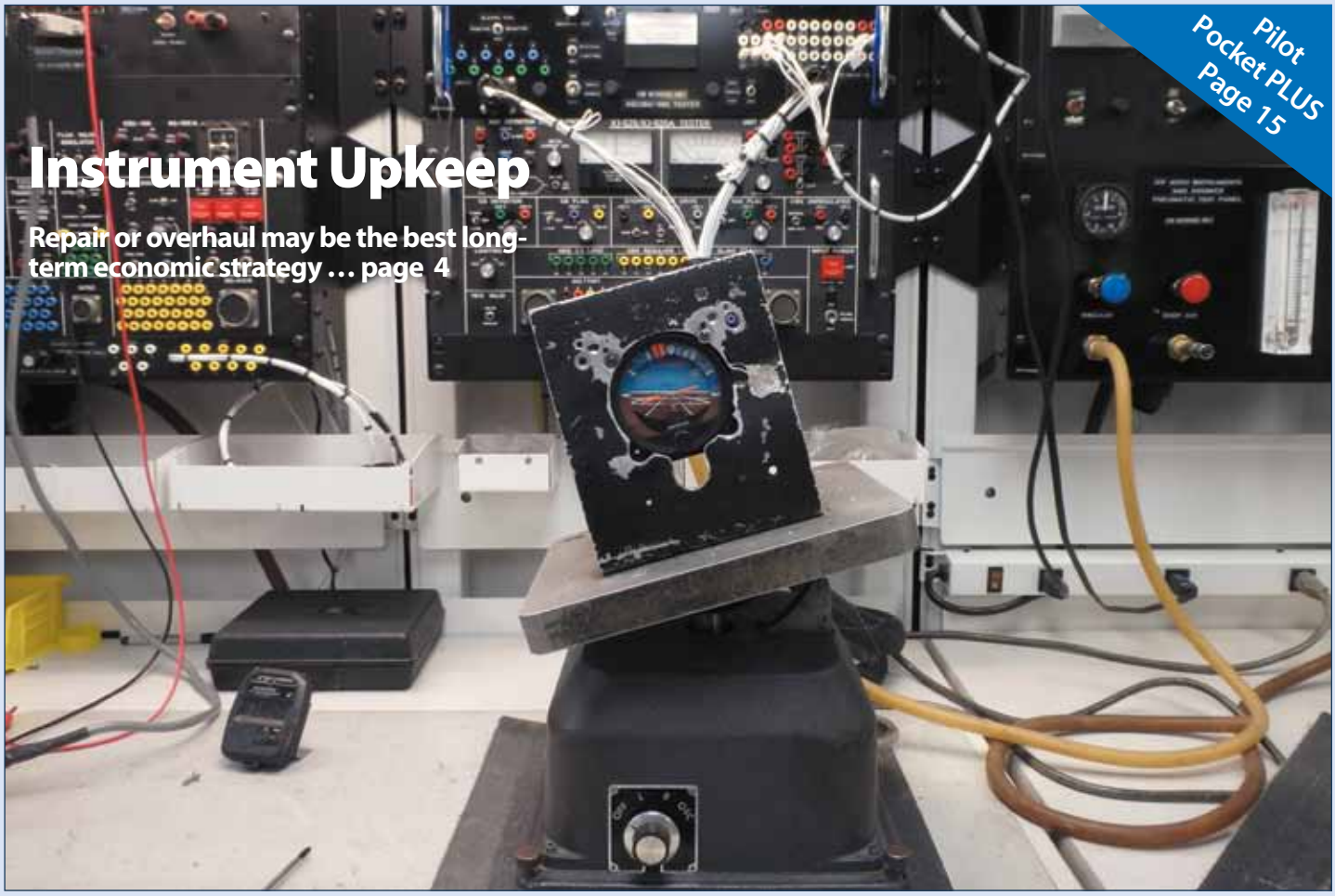
Pilot Pocket PLUS Page 15



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The Rules

New airplane owners lament to me that they were taught nothing about the process of buying, owning and maintaining an aircraft when they learned to fly. Accordingly, their aircraft ownership education came through the back alleys, as it were. The quality and thoroughness of that tuition made for some expensive mistakes—now they are constantly looking for good information to keep from making bad purchases. They want to know the rules.

So, at the start of a new year, it's time for a big-picture list of some of the hard-learned rules for an aviation consumer. Ignore them at your peril.

When the cost of flying is high, the first thing owners scrimp on is maintenance—then they realize they can't afford the airplane and put it on the market. Despite the fact that pilots are generally pretty nice people, there is a painfully high level of misrepresentation of the condition of used airplanes.

Never, ever, *ever* buy an airplane without having your mechanic do a pre-purchase examination.

"Fresh Annual" and "Fresh Overhaul" are traps for suckers. Almost invariably, the work done on that annual or overhaul was the least the owner could convince the mechanic to sign off. If you're going to dump an airplane, how much would you spend on an annual?

When deciding how much you can spend to buy an airplane, set aside 25 percent of the money for the stuff that will break in the first year and the upgrades you'll discover you need to make. It will just barely be enough.

Engine overhauls are a crapshoot. The best engine shops have been known to collapse suddenly or have a period where they have problems. Use *Aviation Consumer's* most recent engine shop survey, get the names of recent shop customers and talk with them. Under no conditions pay more than 50 percent of the cost up front and stay in constant touch with the shop for progress reports. If the delivery schedule slips by more than two weeks, there is likely to be something wrong enough that it warrants your full attention.

I like what I'm seeing in the rapidly growing aircraft refurb world. However, you are not going to get the cost of a refurb back when you sell the airplane. Do a refurb for yourself to make the airplane the way you want it for the way you fly it because you are planning to hold on to the airplane for a few years.

Putting down a deposit on a new airplane or component during the developmental stage is a high-risk gamble—high enough that it is foolish, in my opinion. If you do feel compelled to make such a deposit, it should go into an escrow account that has guarantees that allow you to get your money back if delivery goals aren't met and that the manufacturer can't get at it unless and until it delivers an acceptable product. A one-year delay on a new airplane design is not unusual, but at 18 months it's becoming red flag warning time. For components or avionics, a one-year delay is, I feel, pushing the envelope of acceptability.

If you really want to gamble at lousy odds, put down a deposit on a new airplane design that is also using a new engine design.

Show appreciation to the ethical sellers in the tough aviation market. I'll do it right now: As the magazine went to press last month, Larry Anglisano and I were trying to figure out whether Zaon had gone out of business. I expressed concern that retailers of its fine traffic alert product were not disclosing to buyers, about to spend $1000, that there would be no warranty or customer support. Later, it was confirmed that Zaon was out of business. I also learned that two of the biggest retailers, Sporty's and Aircraft Spruce, had acted in what I feel are ways that reflect a high standard of ethics: Sporty's stopped selling the product, and Aircraft Spruce put up a notice to prospective buyers that Zaon was out of business. Well done. —*Rick Durden*

Zaon and the iPad Effect

As an owner of a Zaon XRX, I am saddened to see the company go (December 2013 *Aviation Consumer*), but I'm not surprised. It is another casualty of the iPad Effect.

Pilots have stopped buying XRXs because, for considerably less money, they can buy an iPad with one of the major aviation apps, plug in an ADS-B receiver and believe they are getting the same or better results.

That may be true, but if you are out of range of ADS-B or don't have ADS-B Out, what you give up might be fatal. I have ADS-B Out and In, TIS and the XRX, so I have some idea of the advantages and disadvantages of the various technologies.

Zaon isn't the first victim of the iPad Effect—paper charts are increasingly rare. Air Charts succumbed a year ago. More recently, and even more devastatingly, the iPad Effect contributed to the closing of RMS Technology, which made the excellent Flitesoft flight planner for a quarter century.

When I moan to other pilots about the loss of Flitesoft, the usual answer is, "Just use ForeFlight." The problem is that, by comparison, ForeFlight is almost a toy. There are many significant features found in Flitesoft that simply don't exist in ForeFlight. Probably the most important is fuel planning.

I realize that iPad flight planners are still developing and will presumably become robust enough to do most of the things as well as the products they supplanted. Other than handling approach plates, they aren't there, yet.

Art Friedman
Via email

Used Twin Market

I need to correct the record on one factual point and challenge two conclusions, at least as they apply to the Twin Comanche, in the December issue. I have flown three different Twin Comanches for over 1000 hours over the last 25 years and have yet to fly one that is as slow as you published for the cruising speed; 168-170 knots is more realistic.

First, a Twin Comanche is not three times the cost to operate as a big single. I doubt it is any more expensive to own and operate than a Bonanza.

The value of a big single versus a light, light twin depends more on the mission. I went with the twin for the redundancy of the systems and the fact that out here in the west there are not as many attractive places to make a forced landing. The second engine provides options unavailable in a single, especially as I fly night IFR. Plus, with turbos, the Twin Comanche will hold more of the MEAs out west on one engine.

Kristin Winter
Via email

Above and Beyond

I recently experienced a couple of very positive experiences with aviation manufacturers and wanted to pass along what happened.

I had a couple of issues with my Lightspeed Zulu headset. When I called the service department, I actually got to talk to a real human—who was also pleasant and helpful. I arranged for repairs. Lightspeed fixed some aging plastic parts and a broken battery box. Despite owning and using my headset for years, there was no charge.

I have a JPI EDM 700 that I bought new for my airplane 18 years ago. It developed a problem in the circuit for dimming the display. After talking to the company president, Mr. Polizzotto, I sent it in for repair. The problem was fixed and the software updated for no charge.

I'll be buying JPI and Lightspeed products in the future.

Steve Reeves
Via email

The Refurb Game

I read your article on refurbishing in the December issue and disagree with a point in the sidebar. I think it badly undervalues those airplanes that have advanced avionics. A GNC530W in a Bonanza will command more than a $4000-$5000 increase over a similar Bonanza with its original Collins 251/351 package.

I think some buyers have made very low-ball buys from distressed sellers or estates, and that has become the accepted norm. However, have you noticed how few nice, clean, well-equipped 1980-1995 high-speed singles are on the market? The owners have rebelled and pulled their aircraft from the market. I have done just that. I won't contribute to the downward frenzy to illogical pricing. Ultimately, the prospective purchaser will have to pony up the bucks to get advanced technology or enjoy their old Collins/King VORs until January 2020 and then see what happens to the cost/time equation for upgrade.

Burns Moore
Via email

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Not all shops have instrument overhaul capability. The shop and technicians require specific ratings, plus appropriate test equipment, left. When a basic gyro like this Edo-Aire horizon roll over and die, it makes sense to have it overhauled.

AVIONICS MAINTENANCE

Instrument Upkeep: Repairing Saves Money

But a teardown overhaul from a reputable shop is often the best long-term strategy. For ancient models, upgrading makes the most sense.

by Larry Anglisano

Here's a common scenario: You bring your airplane to the avionics shop for its 24-month IFR pitot and static system certification and the tech says you'll be wheels up in a couple of hours. Thirty minutes later while you're cooling your heels in the pilot lounge, the technician tracks you down with news you don't want to hear: Your encoding altimeter flunked the test because it has too much friction.

With dollar signs dancing in your brain, the technician rattles off your options and none of them are easy or cheap. What's an owner to do? Send the altimeter out for overhaul? Order an exchange replacement? Attempt a repair? You could of course do nothing and limit your flying to VFR, with an altimeter that can potentially kill you (we strongly suggest avoiding that option).

Despite the popularity of retrofit and OEM glass panels, we still need to deal with conventional mechanical flight instruments and their imminent failure. Unfortunately, repair and overhaul pricing is on the rise. Here's a look at the market and some tips on dealing with round-gauge instrument maintenance.

REBUILT OR OVERHAULED?

There is a difference. FAR 43.2 says, in part, that no person may describe in any required maintenance entry or form a component being rebuilt unless it has been disassembled, cleaned, inspected, repaired as necessary, reassembled and tested to the same tolerances and limits as a new item, using either new parts or used parts that either conform to new part tolerances and limits. To sign a component off as being overhauled, nearly all of the above applies, except testing it to new part tolerances.

For clarification and for an explanation on how the regulations apply to instruments, we spoke with the Mid Continent Instrument and Avionics Van Nuys, California, branch manager Bryan Miner. Mid Continent, which employs nearly 200 people in two locations, operates one of the largest instrument overhaul and exchange programs in the world (overhauling or exchanging over 15,000 units each year). When signing off most instruments, it appropriately uses the term "overhaul."

"Whether it's a gyro or an altimeter, we generally don't represent work performed on them as "rebuilt." We do tear the unit all the way down and clean everything inside, while

CHECKLIST

- Exchanges keep downtime to a minimum, but inquire about freight costs.
- Repairing instruments is cheaper than overhauling if major parts are healthy.
- Gyro failures help justify PFD upgrades, but you'll still need backups.

replacing any component that needs to be replaced," Miner said. Miner also pointed out that "rebuilding" is a term used by a manufacturer. That's because it has the capabilities to bring a unit to new standards. Mid Continent does have these capabilities because it produces its own line of electric gyros and other instruments and accessories.

Properly overhauling a gyro includes replacing the bearings and any worn mechanical parts. It also includes disassembling the rotor assembly, while replacing any worn parts in it. It should also include calibrating the electronic outputs, if the instrument drives an autopilot. In some cases, it's worthwhile to have the shop align the newly overhauled gyro with the autopilot flight computer it interfaces with. These are fine adjustments that command proper autopilot bank angles, roll rates and flight director command bar presentation. Performing this alignment could be the difference between an autopilot that flies perfectly or one that's sloppy. You'll likely pay additional bench labor for this service, but it could save you a trip back to the shop to have the alignment done if you discover the autopilot doesn't fly properly.

REPAIR OPTION

As an alternative to a full teardown overhaul, some shops might offer a repair option. During our research, we got mixed signals from different shops on whether repairing an instrument makes better sense than an overhaul.

Ed Rowley, a principal and instrument technician at VIP Instrument and Avionics in Hartford, Conn., has seen enough ailing gyros in his 35-year career to believe that performing repairs, instead of overhauls, could make economical sense for some instruments. When we visited the shop, we saw several specialty instrument benches overflowing with work, a trend Rowley said is steady, despite retrofit PFDs.

"There are still an awful lot of gyros and aneroid engine gauges out there that need to be serviced. The reality is that the economics of fixing these basic instruments is much more digestible than upgrading to even a basic PFD, like the Aspen Evolution system," Rowley said.

A United KEA130A encoding altimeter undergoes bench test, right. Luckily for its owner, it passes. A full teardown overhaul or exchange could approach $1700.

Rowley might perform a repair to an instrument on a case-by-case basis. First, he'll inspect it.

"There are things that can go wrong with an otherwise high-quality instrument, like the Sigma Tek 4000B-series directional gyro, that don't warrant a complete overhaul. In some cases, simply replacing the caging springs with more durable ones is all that may be required," Rowley told us.

The key here is to find a shop that has the knowledge and experience to accurately evaluate the instrument in hopes of spotting future failures. If a gyroscope has worn rotor and gimble bearings, for example, an overhaul makes the most sense.

The other consideration is warranty. Typically, a repair is covered for 90 days and only includes the work performed during the repair. The standard instrument overhaul

HSI TECH FOR DUMMIES

Troubleshooting basic gyro instruments is easy—if it tumbles, it's probably time for overhaul. But diagnosing complex instruments like the multi-piece Bendix King KCS55A slaved HSI system isn't. A hasty shotgun approach to component replacement could cost you thousands, potentially not even fixing the problem. Start the repair process by understanding your particular system and doing some basic troubleshooting of your own before you show up at the repair shop.

The venerable KCS55A is generally a reliable system, but as the fleet of KCS systems age, shops are seeing more subtle failures that can be difficult to accurately diagnose. It's a challenge because there are four major remote components in this system, including the KI525A HSI, the KG102 remote heading gyro, the KMT112 magnetic flux sensor and KA51 slaving accessory.

A common failure mode might include heading error, where the system doesn't accurately keep up, despite the built-in slaving circuitry that's designed to correct for natural gyro precession. It's natural to assume the problem exists in the remote gyro, and it often does, but there could be a problem in the HSI itself, perhaps binding in the gears that drive the heading card. An experienced shop should ask you some basic operational questions. Does the system fail while in free-gyro mode or only in slaved mode? To find out, select the free gyro mode on the panel-mounted slaving control. You'll need to correct for some gyro precession by slewing the system to the proper heading, just as you would with a conventional directional gyro. When the system is showing a heading error, is the heading flag in view?

Show up at the wrong shop without basic knowledge and you could end up buying a $4000 gyro that you don't need.

TYPICAL OVERHAUL COSTS AND RECOMMENDATIONS

TYPE	MODEL	COST	COMMENTS	SUGGESTION
ALTIMETER	5934-A74	$500-$750	UNITED 20K FEET	OVERHAUL OR EXCHANGE
ALTIMETER	102200	$1600	ALTITUDE ENCODING	INSTALL ENCODER,STD ALT
ATTITUDE GYRO	5000B-36	$800	STANDARD SIGMA TEK	OVERHAUL OR EXCHANGE
ATTITUDE GYRO	52D66	$1200	CENTURY AUTOPILOT	OVERHAUL OR EXCHANGE
TURN COORD.	1394T100-7Z	$750	STANDARD ELECTRIC	NEW EXCHANGE
TURN COORD	1394T100-14RB	$1500	S-TEC AUTOPILOT	EVALUATE FOR REPAIR
DIRECTIONAL GYRO	KG102A	$2300	B/K REMOTE ELECTRIC	EVALUATE FOR REPAIR
DIRECTIONAL GYRO	4000B-30	$1000	A/P HEADING OUTPUT	OVERHAUL OR EXCHANGE
HSI	KI525A-01	$2600	KING WITH SYNCHRO	EVALUATE FOR REPAIR
HSI	NSD360A	$3300	CENTURY SLAVED	EVALUATE FOR REPAIR
VSI	7000C.	$450	UNITED 0-2000	IF PFD-EQUIPPED, REMOVE
AIRSPEED	8000-XX	$1100	CUSTOM MARKINGS	NEW EXCHANGE

warranty is generally one year. You could spend $150 on a basic repair today, but might ultimately have to pay for a $500 overhaul next week, for example. That's why for basic instruments, we think an overhaul makes the most sense—especially while the instrument is opened up. Mid Continent's Miner agrees.

"For an air-driven gyro, it's usually not economical to simply replace a couple of the gimble bearings, given the level of teardown that's required to gain access. We feel we're not providing the customer a good service by charging them for half of an overhaul when we just don't know how long the rotor might last," he explained.

VIP's Rowley noted that upgrading to electronic-based solutions instead of spending a lot of money to overhaul complex and expensive traditional gyroscopes can be more appealing than a repair or pricey overhaul. An example of this is Aspen's EA100 and Garmin's GAD43 autopilot gyro emulators. These digital converters completely eliminate select spinning autopilot gyros, taking a digital feed from the AHARS and inputting pitch and roll commands to the autopilot—with far more precision than an aging gyroscope—and with far less upkeep than a spinning gyro will require.

Still, these are major avionics upgrades. A single-screen Aspen Evolution with EA100 gyro emulator can approach $20,000 and as the sidebar on page 7 explains, you'll still need backup instruments, including an attitude gyro.

Try as they might, Aspen has been unsuccessful in getting their system approved for installation without a backup attitude gyro. It all comes down to a common mode source issue. Aspen's PFD and reversionary MFD operate off an air data computer that's plumbed into the aircraft pitot and static system, so in order to have an independent backup, that system needs to have a different source of operation. That would send Aspen back to the drawing board—a task that would yield little return.

As we reported in the January 2013 issue of *Aviation Consumer*, there are EFIS backups that might be eligible for backing up to retrofit PFD, including the L-3 Avionics Trilogy EFIS. There's also the RC Allen RCA2600-series digital attitude indicator, made by Kelly Manufacturing. We'll look at the redesigned version of this instrument in a future article.

OUT WITH THE OLD

If you're lucky, the instrument in your panel is eligible for an exchange or overhaul. In most cases, this is dependant on the availability of parts to perform even simple repairs. We can't come close to nam-

ing all of the various models that have become extinct, due to the lack of replacement parts. In these cases, you'll be faced with purchasing a new outright replacement, since the unsupported instrument has no core value.

It's important to note that even if your instrument is still supported, it might not be eligible for an overhaul or exchange. If the instrument is missing a data identification tag (listing the original part number and serial number), you could get stuck with buying a new instrument. Similarly, if the removed core is found to have excessive corrosion or damage, it will likely be rejected as an acceptable core.

Nearly every shop we talked with recommended new Sigma Tek models for replacing attitude and directional gyros, and models from United Instruments, for replacing altimeters and airspeed instruments.

If you're faced with replacing an airspeed indicator (a source of pitot system leakage), you'll likely have to order a new United model and rest the old one on your bar shelf as a conversation piece. Several shops told us there's no support for some original-equipment Piper and Beech models. The shop needs the airspeed range marking data from aircraft flight manual to set up the new instrument appropriately.

Sigma Tek offers a variety of replacement gyros, including models with vacuum warning flags, internal lighting and heading reminder bugs, for directional gyros. They also make models that will drive the heading command function on autopilots.

This might also be a good time to think about your long-term instrument layout and the source that drives it. Doing away with the vacuum system could be an option in some PFD installations. Doing so means buying an electric attitude indicator to back up the PFD. Which model you choose could depend on the STC requirements of the PFD. For example, Aspen's Evolution STC requires a standby attitude indicator with a separate power source, which is a backup battery. But that doesn't mean the Aspen STC gives you the green light for removing the pneumatic system, either. The STC makes it clear that removing it isn't covered. You'll need to consult your shop to see how they plan to sign off a vacuumless installation.

If you have an encoding altimeter (this is an altimeter that also has an altitude encoder built in), you might consider installing a separate altitude encoder and a standard altimeter. That's because the cost of overhauling or replacing a standard altimeter could be half the price of a combination unit. To reduce these maintenance costs, you'll have to spend some money up front. The installation of a new altitude encoder might cost $500, in addition to the cost of a new United altimeter that averages around $1000.

LABOR AND FREIGHT

Since many avionics shops farm out instrument work, there will likely be freight costs associated with the work. Fragile gyroscopes need to be shipped in larger containers to keep them safe during transport. The resulting costs can add hundreds of dollars to even basic instrument maintenance. If you're in a hurry to get the instrument out and back, freight costs can be shocking. There are also labor costs.

While some aircraft panels are easier to work with than others, it could take sizable disassembly to remove and replace a single instrument. This means downtime and labor costs that could approach the cost of the instrument. That's reason alone not to skimp on instrument maintenance. The money you save on a shoddy repair could get eaten when you have to pay to have it removed sooner than you expected.

WHY ROUND GAUGES WON'T GO AWAY

Even if you're ready to write a big check for a glass panel upgrade you'll still be stuck with at least some mechanical flight instruments. That's because either the FAA says you need them, other systems in the panel need them, or both.

FAR 23.1311 (5) defines the backup requirements for glass panels. The regulation requires an independent secondary mechanical altimeter, airspeed indicator,attitude instrument and a magnetic heading instrument (a compass will suffice). Want to displace these instruments to the copilot panel? No can do. That's because the instruments must be located where they meet the pilot's visibility requirements stated in 23.1321 (a). We'll leave it to you to find a loophole in these regulations, but the installing shop can't sign off the installation unless the layout complies and meets the requirements stated in the equipment's STC.

A three-screen Aspen Evolution PFD suite—with reversionary display and backup external battery—offers almost enough redundancy to legally fly without any backup instruments. A full-up Aspen suite still, however, requires an approved attitude gyro. This can be vacuum or electrically driven.

FAA regulation aside, the round gauge instruments you want to ditch could be required to drive other systems. Some autopilot altitude preselect systems, including models from S-TEC, Bendix King and Sperry, rely on the encoding altimeter for a baro source input. Even the turn coordinator could still be required, since it drives most Cobham S-TEC rate-based autopilots. For most buyers, this isn't a deal breaker, but it complicates the layout and won't alleviate the high cost of instrument maintenance—a driving factor for upgrading in the first place.

LIGHT SPORT MARKET TRENDS

Skycatcher's Demise: Cessna Says No Future

But it will sell off airplanes still in the pipeline and continue to support those in the field. Overall effect on the LSA market seems to be utter indifference.

by Paul Bertorelli

If ever we needed more proof that yesterday's conventional wisdom is today's grim reality, the Cessna Skycatcher may be Exhibit A. Five years ago, it was destined to sweep its way to the top of the light sport aircraft market, mowing down most of the competition in a relentless drive to market dominance. Today, the Skycatcher is just another dead-end GA product, leaving owners, if not stranded, definitely baffled.

In a move that stunned reporters at the NBAA show in Las Vegas last fall, Cessna CEO Scott Ernest abruptly announced that the Skycatcher program had no future and with some 200-plus aircraft in the field, dealers and Cessna Pilot Centers have been told nothing to suggest Cessna doesn't mean what Ernest said.

> *Cessna's impact on the LSA market was probably overstated; its exit may have minimal impact.*

So where to from here? Cessna will continue to support the airplane and sell off the airframes in the pipeline, but after that, no more new Skycatchers. The immediate effect may be a softening of Skycatcher used prices, which may have been inflated to begin with. In the longer term, dealers, flight school operators and instructors tell us that just as Cessna's impact on the LSA market was probably overstated, its exit from the business may have minimal impact, given the overwhelming choice of aircraft in the light sport segment and the fact that Cessna may not have been taken all that seriously as an LSA player.

FAILED PROMISE

Cessna has always cast a long shadow at every level of the piston aircraft market, no more so than in training. When it revealed details of what would eventually be called the 162 at AirVenture in 2007—including a price of $109,500—buyers (many of them dealers) erupted in what then passed for a buying frenzy. At its AirVenture booth, a digital display tracking orders reached 720 by week's end and the company claimed more than 1000 orders a year later.

But when Cessna announced that the aircraft would be built in China by Shenyang Aircraft Corporation and shipped to the U.S. for assembly by a Wichita subcontractor, it caught significant blowback for moving jobs out of the U.S. and to China. But Cessna was unapologetic, explaining that its parent company, Textron, insisted that the 162 had to be profitable and although Cessna targeted a $100,000 entry price, that proved undoable.

Cessna committed to deliveries by mid-2009, but design issues with the aircraft and production snags delayed deliveries until 2010 and early that year, Cessna said volume deliveries would be delayed six to 10 months because of production and design issues related to the Skycatcher's spin characteristics. Cessna lost two 162s in flight testing due to unrecoverable spins.

Although industry observers expected Skycatcher deliveries to rapidly ramp up and make Cessna the top seller of LSAs ahead of the German-based Flight Design, it never happened. Deliveries continued to lag as the cost of the airplane escalated, first in small increments and then, in 2011, to a whopping $149,000-plus, making the Skycatcher not everyman's LSA, but a premium-priced trainer.

Following the 2011 price increase, position holders were allowed to cancel their orders and hundreds did just that. By November 2013, Cessna said it had delivered 202

Skycatchers and that it had a number in unassembled inventory at its Independence, Kansas, plant. Cessna wouldn't confirm the number, but it's believed to be between 70 and 80. Cessna spokesman Andy Woodward told us these aircraft would be actively sold by the Cessna dealer network. But Cessna isn't saying production is halted, just that there's no future for the airplane.

FUTURE SALES

The $149,500 question dogging dealers is, does anyone want these airplanes or will they be marked down just to unload them, tanking used values in the process? In interviews with dealers and Cessna Pilot Centers, we were told that the market is uncertain at best, but even though Cessna hasn't informed the dealer network of its short- or long-term strategy, everyone expects aircraft already in the field to be fully supported. Cessna's Woodward confirmed this. But the price is a problem for sustained sales.

"At $149,500, it's a problem," says Tom Wood of Tom Wood Aviation in Indianapolis, who's both a dealer and a CPC. "When the price starts creeping up, you definitely cut people out of the market," he adds. None of the more than a dozen sources we spoke to thought the Skycatcher price was sustainable, even though they recognize that Cessna had to reach that price to make the aircraft profitable.

Wood thinks there's some chance the value of used Skycatchers will actually increase because with fewer available, they are—and might remain—a desirable airframe, thus driving prices. But another dealer/CPC we spoke to believes the opposite: "It's going to affect the market a little bit and we're already seeing it. On the current pre-owned airplane I have here, it's probably going to take it down about 10 percent in value," he said.

Further complicating the sales equation for dealers is that the Skycatcher always was a low-margin airplane and Cessna made this worse by chipping away at dealer margins on all aircraft. One dealer told us he makes about $5000 on a Skycatcher sale and it's a tougher sell than other models because potential buyers are more price sensitive. Many

When the Skycatcher debuted in detail at AirVenture in 2007, Cessna's order counter, top, eventually reached 720. Mercifully, the purple color, lower photo, was but a passing moment of artistic fancy.

niggle over options the airplane can't even have, forcing the dealer into an extended educational process about the limitations of light sport aircraft.

Judging values of used Skycatchers is like nailing Jello to the wall. The *Aircraft Bluebook Price Digest* gives the value of 2009 Skycatcher as $90,000 on an original price of $110,000, for a depreciation of 18 percent. By our estimation, if that value is reasonably accurate, that's typical depreciation for a new aircraft and perhaps even a little less. A new Skyhawk of the same vintage depreciated 24 to 26 percent during the same period.

As for inventory, there are plenty of new and used 162s to pick from. *The Controller* and *Trade-A-Plane* recently had more than a dozen listings of various vintages, with 2010 models showing asking prices in the mid-80s. We suspect it's a buyer's market and likely to remain that way.

OWNER/OPERATOR REPORTS

For all its travails getting to market and minor warts in service, the Skycatcher has proven to be a satisfactory if not stellar performer in the field. Operators, students and instructors like the airplane and renting it at a few bucks either side of $100 turns a profit. According to our survey, it has shortcomings no more serious than other LSAs. The two big ones are door openings in flight and a structural fix to the wing where the struts attach. Cessna found some cracking and released a mandatory service bulletin to address this.

"The door opening is kind of a big deal," says Chris Dillis of Aspen Flying Club near Denver, which operated a Skycatcher for a short time.

One Skycatcher sales hook was the Garmin avionics package, left. Operators say customers like it. The under-panel stick, center, takes some adaptation, but flight schools tell us you get used to it. Continental O-200, lower photo, has been a reliable engine, but heavier and less efficient than the Rotax 912.

The doors open from top-mounted hinges to allow easier ingress/egress, and if they open in flight, they can be damaged enough to require replacement. We know of at least one incident in which the door separated from the airframe, but there could be others. Cessna addressed this by requiring the installation of a secondary door latch.

Enthusiasm for the Skycatcher as a primary trainer varies with operator, but none of the instructors, schools or owners we interviewed said the airplane wasn't suitable for the typical flightline or that it couldn't be flown profitably at a reasonable rental rate.

"I actually like them better than the Cessna 152," says Jim Whitt, director of J.A. Air Center's busy flight school in Aurora, Illinois, near Chicago. "It flies great, it's fun to fly and customers really like them. We've gotten to the point where they are very good flight trainers," he says.

But that's not necessarily true everywhere. Some schools report that while the Skycatchers attract some business, customers also gravitate toward older airframes including the 152 and 172 and they aren't necessarily sensitive to whether an airplane is new or old or even how it's equipped.

"Probably more people want to migrate to the 150, that way they can migrate to the 172 and the 182 and move on from there," says Mark Strafuss, a co-owner of Downtown Aviation in Memphis, which has been operating Skycatcher serial number 11 for a couple of years. But don't students and renters care that the Skycatcher is new and shiny and the 150 isn't?

"No, not at all. In a flight school you have very well-maintained aircraft. It's hard to beat a 150," Strafuss says. He estimates that about half his students obtain the light sport certificate and half train for the PPL. All of the schools we interviewed said that LSAs are an economical, practical way to train initially for the private certificate.

While we've heard from operators in general that light sport aircraft aren't up to the rigors of U.S.-style flight training and thus break often, we heard little of that aimed at the Skycatcher this time around, other than it being a handful in crosswinds and gusts because of its light wing loading. Brakes and tires don't hold up as well on the Skycatcher as on the 152 or 172, but operators simply budget for that. None of the operators we interviewed reported significant AOG events.

But when asked if the Skycatcher will be as long-term durable as the 150/152 has been, operators have few illusions. "I don't think these will last like that. I think they're going to be 6000-hour airframes at this point. But who cares? It's a reasonable cost airplane. What more can you ask for?" says J.A. Air Center's Jim Whitt.

WRAPPING IT UP

If Cessna's surprise—and discouraging—announcement that the 162 has no future shook the LSA world, we're not able to see the ripples. There are several reasons for this, we think. One is that owners and operators are confident that Cessna will continue to support the Skycatcher, so the 162 becomes the new 152. Airframe values may erode a little, but there's no initial evidence that they're going to tank. We'll see what happens during the spring selling season.

Second, the LSA market continues to be broad, fragmented, competitive and with many more choices in aircraft than it seems able to support. While Cessna was expected to validate the market and ignite the long-awaited shakeout, neither of those things happened. When Cessna entered light sport, the market was dominated by small

manufacturers, mostly of European origin, and as Cessna withdraws, that hasn't changed. What is obvious is that three major airframe makers—Cessna, Cirrus and Piper—have ventured into light sport in varying degrees only to pull out, suggesting that the low-volume, low-margin business model just doesn't work for big companies.

"There's not too much rumbling going on about this," says Dan Johnson, chairman of the Light Aircraft Manufacturers Association. "Within the industry, many had already dismissed Cessna some time ago for the reason that the airplane never seemed to really meet what the market wanted," he adds. The buying frenzy was strongly dealer driven and many bought sight unseen. When they did see it, many backed out of orders when given the chance at the 2011 price increase. "So I don't think there's any great rush to say, oh great, now there's an opportunity, or, oh dear, we don't have the validation of Cessna being in the market anymore," Johnson says.

One other factor, Johnson adds, is that Cessna's prices on 172s are projected to be well north of $400,000 for 2014 and some buyers are questioning whether the company is serious about staying in the piston market at all. Bailing on LSA only adds to the speculation and at his contentious press conference in Las Vegas, Scott Ernest did little to spread the love toward the piston division.

This uncertain chain of events may represent an opportunity of sorts for buyers with stout hearts and healthy wallets who don't particularly worry about whether the company will stand behind the Skycatcher model. Cessna says it will and everyone we talked to said they take the company at its word. In the broad world of light sport airplanes, the Skycatcher is credible; neither a standout nor a laggard. Given the premium price, we can't really recommend the purchase of a new Skycatcher by an individual owner. We think there are better airframes for less money.

But if used prices tumble, there could be a good buy or two out there and we see the risk of Cessna truly orphaning the Skycatcher as no more or less than with any other LSA company.

LSA: NOT THE GREAT WINGED HOPE

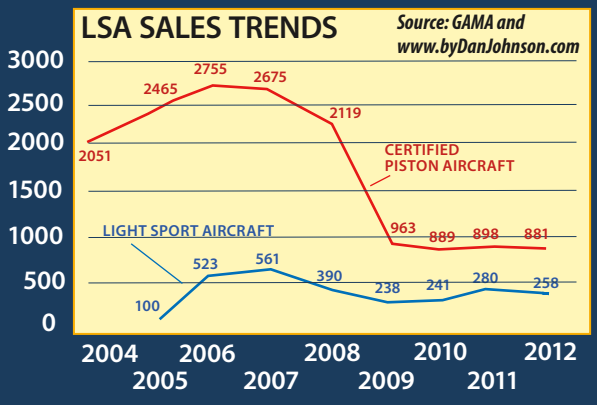
As Cessna stumbles backward away from light sport production, the rest of the industry shambles forward with steady if not robust sales. The industry itself is proving to be a mixed bag, but one that hasn't delivered the aviation growth many expected of it.

General aviation has been losing between 10,000 and 12,000 pilots a year to demographic attrition and an economy that doesn't encourage aircraft ownership or even flight training.

According to the EAA and FAA, there are, at last count, about 4724 active sport pilots; that is, pilots holding sport certificates, but not counting private, commercial or ATPs who fly as sport pilots, having decided to drop medical renewals. No one really knows how many of them there are, but some LSA manufacturers say these so-called full-circle pilots represent the bulk of their new aircraft sales. Keeping them in light sport airplanes may minimize erosion of the pilot population, but it doesn't spark growth.

Aircraft production—as tracked by U.S. registrations—is similarly murky. FAA data shows 2070 S-LSA aircraft and, according to EAA, an additional 700 or so E-LSAs or former S-LSAs put into experimental status. In addition, there are more than 6000 so-called "fat ultralights" that aren't really LSAs but do exist in the registry.

Summarizing, since the light sport rule went into effect in the U.S. in 2004, the industry has averaged between 200 and 300 new airframes a year, including E-LSA. While that doesn't sound like much, it looks more impressive when compared to the number of certified piston aircraft delivered in recent years. In 2012, the industry delivered 881 piston aircraft, according to GAMA. The 250 or so LSAs delivered represent nearly 30 percent of that and may represent at least some industry expansion, since those LSA buyers probably wouldn't have been tempted to buy a certified aircraft.



Interestingly, although LSA sales may not have reached the stratospheric levels many had hoped for, the segment may be stimulating sales of certified aircraft by serving as a gateway to the PPL, just as some people predicted. Several of the schools we interviewed told us the majority of their LSA trainees sidestep into certified aircraft and obtain the private or higher ratings.

"For us, that's been about 70 percent of the students," says J.A. Air Center's Jim Whitt. "I think the light sport rating is strictly a niche and a little niche. They find out the effort in getting the light sport is so great, they go for the private," Whitt adds.

Name recognition plays a role, too, according to Tim Chase at Premier Flight Center in Hartford, Connecticut. Premier has a Flight Design CTLS, but it doesn't get flown as much as other aircraft do. "People Google around and they see 172 this and 172 that, and that's what they end up flying," he says. The school has done a few LSA completions, but like J.A. Air Center, it tilts toward private certificates.

Life Insurance for Pilots: Available, Affordable

A pilot certificate does not automatically mean high prices or limited coverage for life insurance—if you do your homework and see a specialist broker.

by Rick Durden

Many of us have gone through the drill: the life insurance sales person extols the benefits of a policy and the attractive price. We consider it and recognize that the coverage is appropriate for us, so we say we'll buy. Then comes the application, which asks if we engage in any "hazardous" activity. "No," we think, "we declined the course in sword swallowing in college and quit juggling chain saws once we got out of our teens."

Then we see that the definition of "hazardous" lumps flying oneself in an airplane in there with rock climbing and scuba diving.

Suddenly the price soars. Then we do one of four things: start the process of researching life insurance policies anew; mutter some foul language and pay the higher price or, worse, accept the policy with an exclusion so we're not covered if we're killed in a general aviation airplane; or, even worse—don't buy any coverage at all and do a disservice to our loved ones.

REASONABLE PRICES EXIST

How does a low-risk pilot buy life insurance with adequate coverage at a reasonable price? By learning at least the basics about life insurance and then going through a life insurance broker who understands aviation risks and specializes in providing life insurance to pilots.

There are two brokerages that advertise as fitting that mold: Travers & Associates (www.traversaviation.com) and the Pilot Insurance Center (www.piclife.com). We interviewed Bill Fanning, pilot, long-time insurance broker and founder of the Pilot Insurance Center, who gave us extensive information for this article. Travers & Associates did not return our call to request an interview.

CHECKLIST

- A broker who specializes in life insurance for pilots can find the best rates.
- Having an instrument rating can help save a bundle on life insurance.
- Life insurance from an Internet quote site means high prices for a pilot.

THE BASICS

Insurance is purchased to mitigate risk. We buy hull and liability coverage for our airplanes to allow us to buy another machine if we wreck the existing one and to defend us should we get sued following the accident. We're protecting our financial assets.

Basic, or "term," life insurance is purchased for the same purpose—a person evaluates what he or she wants to protect should he or she die. Most of the time it's to provide monetary support for the family of the insured.

A term life insurance policy is in effect for a period of years, the term—so long as the premiums are paid—and then it's done. Think of the insurance on your airplane—it is in effect for a specified term and that's it.

There are other life insurance products that combine some sort of investment or annuity with the insurance portion, so there can be money that is returned to the insured at the conclusion of the policy term. No matter what kind of life insurance product you buy, it's priced at rates set by underwriters—the techno nerds at each insurance company—based on how they evaluate the risk of the insured dying during the term that the policy is in force. We'll talk about term life insurance here because it's where everything starts.

UNDERWRITERS

Bill Fanning told us that insurance underwriters' knowledge of aviation is usually limited to the ability to find the local airline terminal, board when their section is called and find seat 17D. They perceive general aviation as a hazard to its practitioners and consider them high-risk insureds. That

leads to either aviation exclusions in life insurance policies or bumping pilots into more expensive premium classifications. We'll explain each.

AVIATION EXCLUSION

If you go online and purchase a life insurance policy, or if you are on a group life insurance policy of some sort—often at your work—the odds are nearly unity that the policy includes an aviation exclusion. Most aviation exclusions say the policy will not pay should you be killed in the crash of an airplane other than a scheduled airliner.

Having made the financial calculation that your family needs protection should you die, it doesn't make sense to have a hole in your insurance coverage. Especially if you don't want to be remembered by those near and dear to you as a tightwad who left them living in penury. If one of your employment benefits is a life insurance policy, read it. If there is an aviation exclusion, either negotiate to try to have it removed or purchase coverage without it.

PREMIUM CLASSES

Underwriters pigeon-hole every person who applies for life insurance into one of seven risk groups, the last being "uninsurable." They set the price for premiums so that persons with higher risks of dying during the policy term pay more for coverage. For those who are insurable, there are six premium classes, four for non-smokers and two for smokers.

They are, from least to most expensive: Preferred Plus (sometimes Preferred Best), Preferred, Standard Plus, Standard, Preferred Smoker and Standard Smoker. The sidebar at left shows a sample of rates for the six premium levels for a 52-year old male (we'll use a 52-year-old male throughout this article) obtainable through the Pilot Insurance Agency. (Females, being less foolish than men, live longer and pay lower rates.)

General aviation pilots are usually excluded from the Preferred Plus and Preferred classes unless they go through a broker who specializes in pilot life insurance.

THERE'S MORE

On top of the premium classes, the underwriters may also apply one of 16 table ratings to a particular premium or bump the premium by a "flat extra." The tables are based on specific health issues faced by the insured and bump the premium, initially, by 50 percent, increasing by 25 percent per table. If the insured's health issue cannot be accommodated by one of the tables, he or she is considered uninsurable.

The flat extras are dollars per thousand dollars of coverage, and are based on the insured's avocations—for example, flight instructors who give primary instruction are often charged a $2.50 per thousand flat extra. For a million-dollar policy, the insured would pay an additional $2500 per year.

We learned in researching this article that even though individual insurance companies may recognize that certain groups of pilots are no higher risk than the population as a whole, they may be powerless to change how they are rated. That's because most insurers write a policy and then sell 90 percent of the risk to reinsurers—which is how insurance companies spread risk. That way if one policy goes bad, they aren't on the hook for the entire loss.

The problem is that the reinsurers are huge companies and, since they buy 90 percent of the risk from the many companies that sell the underlying policies, reinsurers are the 800-pound gorillas in the market. They can and do set the terms of underlying policies. It's the reinsurers who bump pilots down a premium class or two—and the insurer who sells the policy can't argue.

We observed this when we went on the Internet to get life insurance quotes for a 52-year-old male, non-smoking pilot. Examples are on the table on the facing page. The rate we got at the first cut changed once the application process proceeded and the fact the applicant was a pilot was disclosed. For example, for MetLife, the annual premium for an insured, in "very good" (not "excellent") health was $2951.88—for that person who was also a pilot, the rate shot to $3671.88.

The good news is that there are insurance companies who have a practice of keeping 100 percent of policies up to some level, as high as $2 million, rather than selling a percentage to reinsurers. Those are the companies an agent can approach and convince underwriters to deal more realistically with pilot risk.

LIFE INSURANCE PREMIUM CLASSES AND SAMPLE PRICES

52-year-old male insured, 20-year, $1 million fixed term policy

Data provided by the Pilot Insurance Center

CLASS	PRICE
PREFERRED PLUS	$2133
PREFERRED	$2590
STANDARD PLUS	$3495
STANDARD	$4231
PREFERRED SMOKER	$9796
STANDARD SMOKER	$12,039

SEE A SPECIALIST

That's where a broker who does enough pilot life insurance for it to be worth the time to lobby underwriters comes in. Because life insurance is sold almost as a commodity, it takes a specialist who wishes to target a particular market to make it worthwhile to spend the time to arrange discounts for that market. Otherwise, a life insurance broker who tries to get a discount for just one pilot first has to know which insurers have a retention policy, and then negotiate with each to get a better premium classification for that pilot—which means that if the broker is successful, the commission on the sale is less. So, there's little motivation for the average broker to shop insurance for a pilot.

That means going to a broker who specializes in life insurance for pilots, one of which is the Pilot Insurance Center. PIC was founded by Bill Fanning, an active pilot, estate planner and life insurance salesman. When he tried to buy life insurance for himself and found that he was "rated"—shoved up to a higher price premium class simply because he was a pilot. He decided to add pilot life insurance as a specialty and target the niche pilot market. While getting a deal for one pilot would cut an agent's com-

SAMPLE LIFE INSURANCE PREMIUM INTERNET PRICE QUOTES

52-year-old male insured, 20-year, $1 million fixed term policy. "A" rated, or better, companies—annual premium, before adjustment for a pilot

COMPANY	PRICE
PROTECTIVE LIFE INSURANCE COMPANY	$2220.48
BANNER LIFE/LEGAL AND GENERAL AMERICA	$2226.00
NORTH AMERICAN CO. FOR LIFE AND HEALTH INS.	$2262.72
METLIFE	$2591.88
GENWORTH LIFE AND ANNUITY INSURANCE COMPANY	$2698.56
LINCOLN NATIONAL LIFE INSURANCE COMPANY	$2744.76
AMERICAN NATIONAL INSURANCE COMPANY	$2799.36
TRANSAMERICA LIFE INSURANCE COMPANY	$2835.00
UNITED OF OMAHA/MUTUAL OF OMAHA	$4936.32

mission, getting deals with some life insurers for pilot premiums and then putting the word out to pilots would mean more customers.

Fanning told us that his agency has reached agreements with specific insurers so that he can place most pilots into less expensive premium classes than they could otherwise attain.

PILOT QUALIFICATIONS

Fanning did this by providing credible, objective data on risk levels for pilots to the underwriters. Because of his footwork, his agency can usually get a Preferred rating for a pilot with at least a private ticket, who has been a pilot for at least five years, has at least 250 hours total time, flies between 50 and 300 hours per year, has no DWIs, no caused aircraft accidents and no FAA violations involving what would be considered reckless aircraft operation (violations involving paperwork or record-keeping probably won't be held against a pilot).

Ordinarily the best that pilot could get would be Standard or Standard Plus rating. For our hypothetical 52 year old buying a million-dollar policy on a 20-year term, the annual premium saving from Standard Plus to Preferred would be $905, or $18,100 over the 20-year term.

Fanning advised us that the same pilot with an instrument rating can probably get Preferred Plus classification, the very best rate. That's an annual saving, for an instrument rating, of $467, or $9340 over 20 years—which would put a nice dent in the cost of an instrument rating.

CFIs who are instructing may face a $2.50 flat extra on the premium. Fanning told us that sometimes he's able to get rid of that for CFIs who are not doing primary instruction.

Professional pilots are looked at by the type of flying they do—corporate pilots are low risk, where on-demand freight dogs in piston equipment shouldn't count on any deals.

Pilots who regularly fly homebuilts are hard to place, but Fanning has obtained breaks for specific types of homebuilts, notably the Van's RV line.

Interestingly, most airline pilots are covered by group life insurance policies provided by their employers as a part of their contract. However, a number of those have the aviation exclusion we talked about above. A lot of airline pilots have, therefore, bought life insurance from PIC.

A PHYSICAL?

Not being particularly fond of physicals, we asked if a pilot who wants to buy life insurance at the best rate is going to have to take one. Fanning said yes. He pointed out that those policies heavily advertised as requiring no physical rely on healthy people to subsidize those who aren't, and the premiums are far higher than on policies that require a physical.

After all, if no physical is required, those who are most likely to buy the policy are either in lousy health or just don't want to take a physical. That's a great policy for the overweight couch potato. So, if you're healthy and don't want to take a physical, you get to pay heavily for your reluctance.

Having taken life insurance physicals, our experience is that they are not nearly as thorough as an FAA third-class medical.

What's the process for buying life pilot life insurance through a specialist? Fanning told us that the application can be filled out online on PIC's website. After you do so, PIC will contact you to get a copy of your medical records and set up your physical. In three to six weeks you'll receive the policy. Once you pay the first premium, you're covered.

CONCLUSION

As pilots, we evaluate risk every time we fly. We are also spring-loaded to look at the costs. Once we have decided that it's time to buy life insurance, the way to go about it, in our opinion, is to go to a broker who specializes in placing life insurance for pilots, discuss your needs, explain the type of flying you do and let that broker find the best rate for you. And, by the way, it doesn't hurt to be instrument rated.

CONTACTS

The Pilot Insurance Center
972-267-5222
www.piclife.com

Travers & Associates
800-888-9859
www.traversaviation.com

Pocket Pilot PLUS: Cockpit Organizer

What looked to be just another trinket for pilots proved useful in service and was unfazed by turbulence.

by Rick Durden

I'm not a cockpit gadget freak. Maybe it was because I spent some time hauling freight and there simply wasn't time to mess around in the cockpit with stuff. You got in, started up and went. Maybe it was because from the time I started taking dual, I looked at any purchase in how much flying time I was giving up rather than in dollars. Buy a flight bag? Are you nuts? An old briefcase would work fine.

At the same time, I learned that being organized when flying could mean the difference between life and death. A freight dog flying out of my airport died one IMC night when he had an electrical system failure during climbout, couldn't quickly lay his hands on either of his flashlights and spiraled in.

I've used a loop of string around my neck as a place to hang a pen and I've wondered where to put my sunglasses after descending into a cloud deck and setting up for an instrument approach.

Accordingly, my initial reaction to International Air Crew's $22.95 Pilot Pocket PLUS was negative. It seemed to be a contraption that cost money that could better have gone toward actually flying or simply another piece of gear to lug back and forth to the airplane and add to the set-up time once in the pilot's seat.

However, in the course of some long flights I found the gadget handy and came to like it.

THE BOX

The Pilot Pocket PLUS is an acrylic box large enough to hold most smartphones and two pens. It has a slot on the end that allows stashing a pair glasses or hanging the lanyard of a small flashlight. A Fahrenheit/Celsius conversion scale is on the face. Three suction cups attach it to a smooth surface—each has a tab for quick removal. The main section has inside dimensions of 3.03 inches wide, 0.75 inches deep and 2.75 inches tall.

The suction cups worked well—and fast. Cockpit setup time matters to me. It easily passed the test—in 10 seconds, my phone and pen were parked where I could get at them quickly and I could go on to other cockpit setup chores. I wondered how the Pocket would hold up in turbulence. No problems—when getting the bejabbers kicked out of me over the Rockies, it stayed attached and didn't eject the contents.

Empty, it fell off the window when I was parked overnight and the temperature dropped below freezing. Even though it was still cold, it easily reattached to the window and remained in place.

There is an opening in the base, allowing the power cord to be plugged into the cell phone in flight—handy, although it means another cord across the pilot's lap. I thought the temperature conversion chart was just another meaningless "feature" often applied to gadgets more for marketing than actual use. However, I found that I used it several times as I listened to ATIS and wanted to translate the Celsius temperature into units more meaningful to me.

On one flight, I didn't put the Pilot Pocket on the window right away. I didn't get to use it at all—my wife put it on her window and put various items in it throughout the more than three-hour flight.

It's not a must-have piece of equipment, but it certainly beats searching around on the floor trying to find a pen as ATC calls to amend your clearance. It's available through Sporty's (www.sportys.com) or International Air Crew (www.internationalaircrew.com).

The Pocket Pilot PLUS holds two pens and a smartphone. They stayed put in turbulence. A slot in the base allows plugging in the power cord.

CHECKLIST

- The Pocket holds often-used items in a convenient location.
- Even in instrument panel-blurring turbulence, everything stayed put.
- A slot in the base allows plugging in the cell phone power cord.

The pride of the current Aircraft Sales Inc. used inventory is this Cessna turbo 310R, left. The company says a new equivalent would cost over $1 million. It's on the market for $300,000, refurbished.

Pristine Airplanes: Not Like New, But Close

A Pristine Airplanes refurbishment from Aircraft Sales Inc. puts older aircraft at the top of the food chain. The economics won't work for all buyers.

by Larry Anglisano

No matter how extensive the refurbishment process, there's no feasible way to rebuild an existing aircraft back to new condition. To do that, every component down to the last rivet and strand of wire would need to be removed and replaced. But an extensive refurbishment process could be the next best option. It's also an alternative to buying a so-called wash-and-wax resale.

Moreover, the emerging aircraft refurbishment market is gaining momentum because it offers buyers a substantial cost savings over factory-new models, while offering generous customizing and modification.

One company that's capitalizing on the concept is Aircraft Sales Inc., with the Pristine Airplanes refurbishment program. We recently visited the company that's based at the Wayne County Airport in Smithville, Ohio, to get a firsthand look at the refurbishment process and the finished product.

PLAN-A-PLANE

The concept of refurbishing older aircraft to close-to-new standards isn't new. There are several industry specialists, including Mike Jones Aircraft with the Lock and Key Navajo, Nextair Avionics with the Nextair glass cockpit Saratoga and Redbird's Redhawk Cessna 172. While they focus on a single model, Aircraft Sales Inc. has a different approach.

According to company principal Matt Kozub, nearly any piston single, twin or turboprop can be transformed into a Pristine Airplane—the name given to every refurbished aircraft the company completes. They aren't tied to one make and model of aircraft. As long as it's a certified aircraft, they'll refurbish it.

A major part of the process (and partly what sets the Pristine Airplanes refurbishment apart from others) is what Kozub calls the plan-a-plane concept. Plan-a-plane is a lot like ordering a factory-new aircraft, but it has an advantage because buyers have far more options when it comes to paint schemes, modifications and avionics packages. As long as it's FAA-approved, the company can make most any modification you want. Kozub told us that a customer can order any used aircraft any way they want it.

While Aircraft Sales Inc. farms out the major portions of the refurbishment and modifications, including avionics, paint and interior work, they also have a half-dozen licensed mechanics and IAs on staff. Many of these technicians do specialty work, including modifying and obtaining field approval for passenger cabin club seating—a mod that can cost more than $12,000.

FLEXIBLE INVENTORY

The company maintains an extensive inventory of aircraft, many in various stages of refurbishment. For example, if you're looking for a Piper Saratoga or Cherokee Six, chances are there will be several in the inventory because Kozub knows these

CHECKLIST

- ⊕ Turnkey refurbishment process offers convenience and dispatch reliability.
- ⊕ Plan-a-plane rebuild concept customizes nearly any used airplane.
- ~ You'll pay. These are likely the most expensive used aircraft on the market.

One benefit of a Pristine Airplanes refurbishment process is the ability to design a custom avionics package with a new flat panel, top photo. Aircraft Sales Inc. includes a two-year or 500-hour warranty on a freshly overhauled engine, middle photo, plus all aircraft get new glass, bottom.

aircraft are in demand. The company is selective when shopping the used market.

One of the lead technicians told us he's often amazed at how clean the older airframes are when he tears them open. Part of that is because Kozub won't buy an aircraft that's based near the ocean, due to the potential for corrosion. Further, if a refurbished aircraft is sold to an owner who plans to base it near the ocean, it receives an anti-corrosion treatment.

Many of the aircraft in the inventory are purchased and refurbished on speculation. Still, that doesn't mean a buyer is tied to any model within the inventory. If you like everything about a particular airplane except the paint scheme, for example, the company is flexible and can either change the paint or might simply start from scratch and refurbish one exactly to your specifications. Similarly, most avionics equipment can be changed. Most every aircraft comes standard with at least one used Garmin GNS530W or 430W WAAS GPS, plus a Garmin GMA340 audio system, but if you want a new GTN750 with integrated audio, they'll make the change, while you write the check for the difference. When asked why the aircraft aren't automatically equipped with the latest GTN navigators, Kozub said it doesn't make financial sense.

"If one of our refurbished planes is ready to go at $150,000 and we put in pricier avionics and raise the price to $170,000 accordingly, buyers won't even call us. Instead, we give the buyer the choice of upselling the avionics," Kozub noted. He also noted that once buyers commit to the aircraft, they'll usually spend the extra money for more.

BLUEBOOK/VREF

Throw yours away before shopping the Pristine Airplanes inventory because its value data won't apply. While the starting point for most aircraft appraisals is *Aircraft Bluebook Price Digest* and *Vref Aircraft Value Reference,* these references list conditions that won't apply to a completely refurbished aircraft. Kozub makes it clear that any Pristine Airplane will be more expensive than what's stated in these publications—a point he makes up front. Bottom-feeders and bargain-hunters take note—Kozub puts a Pristine Airplane in the top 5 percent of the used aircraft market—essentially the best used aircraft you can buy, he says. Remember, these aircraft are intended to be the next best option to buying a new one. For that reason, they command top dollar. While it's unclear where the used aircraft market will be in a few years, the company sells their aircraft partly on the premise that the aircraft will hold its value better than non-refurbished models, as long as the new owner properly maintains it.

While Kozub says many clients pay cash, he told us that some lenders might only finance 85 percent of the aircraft selling price, referencing the market value of an "average" model. While few banks have certified aircraft appraisers, it might pay to have the aircraft appraised by one that knows what they are looking at.

On the other hand, banks may look more carefully at a buyer's ability to pay on the loan than the market value of the aircraft. More money lent means more profit Speaking of value, while we were on location at the company's Ohio sales office, it had just finished refurbishing a Cessna turbo 310R.

It has two freshly overhauled engines, new paint, new glass and a modern leather interior, plus a new custom instrument panel with Garmin G500 avionics. *Aircraft Bluebook Digest* suggests an average retail price of around $180,000. Aircraft Sales Inc. is asking $300,000 and notes that if this aircraft were factory new, it might be valued at over $1 million (that's what a factory-new Beechcraft G58 Baron costs, by the way).

An 1985 straight-leg Saratoga that's Bluebooked at $180,000 is currently undergoing refurbishment

and will hit the market for $210,000. This price delta between average and refurbished aircraft is consistent.

HOW PRISTINE?

If you still wrestle with spending premium dollars on a 1970s-1980s-vintage aircraft—no matter how pristine—you might find solace in knowing what you'll get for your money.

A Pristine Airplane starts with a thorough prebuy to ensure there are no outstanding liens and that the aircraft has always been based in the United States. If the aircraft is worthy of refurbishment, the airframe is completely gutted.

We witnessed several teardown processes that were in progress and can say that most mechanics wouldn't attempt this level of disassembly during the most thorough annual inspection. The process also includes removing control surfaces and replacing anything on the airframe that can't be restored to like-new condition. Any corrosion that's found is dealt with.

Most aircraft get an engine with zero time since a major overhaul to factory new limits, with factory-new cylinders, overhauled magnetos and new ignition harnesses. All fluid-carrying hoses, scat hoses and Lord engine mounts are replaced with new ones. While a customer can specify an engine overhauler of their choice, most engines are overhauled by Signature Engines in Cincinnati, Ohio, and come with a two-year or 500-hour warranty. If the existing engine has approximately 750 hours since a major overhaul by a shop deemed reputable by Kozub, it remains in the aircraft. It's fully inspected, and if anything is found unairworthy, it's fixed or replaced. If the propeller has approximately 1000 hours since overhaul, it's removed and sent to a certified propeller repair shop. It has a one-year warranty.

Every aircraft gets new glass, custom interior, new carpeting, placarding, refurbished window trim and rewebbed seat belts. New Jet-Glo paint work includes stripping the entire airframe to bare aluminum, replacing all external hardware and rubber seals, plus rebalancing the control surfaces. The paint work includes a one-year warranty.

Every flight and engine instrument is inspected for cosmetic and mechanical performance. If any instrument lenses are foggy, discolored or not working properly, it is sent out for rebuilding.

Finally, each aircraft is test-flown for approximately five hours before delivery, plus the company can help with initial training upon delivery.

TURNKEY ADVANTAGE

Does it make sense to pay higher than current market value for an old aircraft? For the right buyer, we think it does, especially for the owner who has no plans to sell the aircraft. Even for the owner who might step up (or down), the emerging refurbishment market hints at a reasonable return on a higher investment.

If you've coordinated major upgrade projects, you'll know they can be frustrating and time-consuming. The cost premium might be less of a sting when you realize you are buying a turnkey service as much as you are buying a solid aircraft. Just don't be in a hurry—a comprehensive and custom refurbishment process could take seven to nine months.

As for Pristine Airplanes, we think it has a distinct advantage in the current market because unlike other refurbishers, it maintains a large inventory and has the ability to source a wide variety of aircraft. There's also a proven track record of high customer satisfaction and reliability. That alone could justify the costs.

CONTACT

Aircraft Sales Inc.
330-669-0000
www.aircraftsalesinc.net

WHO ARE THESE GUYS?

Hank and Matt Kozub, the father-and-son team that started Aircraft Sales Inc. 10 years ago, aren't apologetic about making a decent living from selling high-end used aircraft to well-qualified buyers. The way they see it, the Pristine Airplanes refurbishment process fills a vacant market.

"A lot of traditional aircraft brokers tell us they can do what we do, but our process wasn't built in a day. We went through numerous paint shops, numerous avionics shops and many employees before we figured out our system," said the younger Kozub, who began his career in 1999 by doing what many brokers do—flipping so-called wash-and-wax-airplanes from a tiny office in a T-hangar.

The team's first refurbishment project was on a Cessna 182 bought on the cheap, and on speculation, because it had original paint, interior and avionics. The elder Kozub admitted that the refurb process took far too long (nearly a year), but it sold in under 10 minutes to the first buyer who looked at it.

"When our second refurbished 182 sold in the same manner, we knew we were on to something here," he said.

Ten years and hundreds of aircraft later, the Kozubs take pride in their high-end clientele. Many have traded airplanes back in to the inventory for step-up aircraft.

"The people that come to us aren't looking for a bargain aircraft. Instead, they know they're buying a service and are willing to pay a premium for it. Our customers are used to getting what they want, when they want it. We just smile and give it to them," said Kozub.

He has plenty to smile about. In an otherwise lethargic used aircraft market, business remains brisk.

EQ-Link Headset: Wireless Freedom

For ease of moving around the cabin untethered from audio jacks, the EQ-1 wireless headset works well. Just don't expect industry-leading comfort.

by Larry Anglisano

CHECKLIST

- The ANR headset is industrial-grade, falling short on modern ergos and comfort.
- EQ-Link won't make audio installs cheaper since it requires mic and phone jacks.
- Ideal for aerobatics and for passengers roaming larger cabins.

In a world that's gone wireless-everything, it's surprising that cockpit audio communication has lagged behind. That's why the EQ-1 Link wireless ANR headset network-from EQ1 Wireless Communications is so intriguing.

Whether it's dealing with audio jacks that are installed in inconvenient locations, passengers awkwardly tethered to audio stations, or the wear, tear and failure that's common with the audio cords on wired headsets, it's easy to see the appeal of a wireless aviation headset.

We tried the EQ-1 headset and the new EQ-Reverse Link system—an interface module that allows you to link traditional headsets into the wireless network—and found that while the concept isn't a slam dunk, it can serve a purpose for some specialty missions and for passengers.

THE HARDWARE

The heart of the system is the EQ-Link module, a transmitter and receiver that links the headset to the aircraft audio system. EQ-Link doesn't use Bluetooth for communicating, but instead operates on a frequency of 2.4 GHz in the ISM band. The company claims that using 2.4 GHz frequency-hopping provides for more reliable and clearer communications.

In the radio world, frequency-hopping is a proven method of transmitting signals by mixing or switching a carrier signal among different frequency channels. ISM (industrial, scientific and medical radio bands) comprises of the radio spectrum reserved for industrial uses of radio frequencies (walkie-talkies and microwave ovens, to name a couple). Like a walkie-talkie, the EQ-1 headset has a range of roughly 30 feet. That's plenty for most GA cabins.

While it's compact, the EQ-Link wireless module isn't entirely wireless because it plugs into standard microphone and headphone jacks, using audio cables that extend 12 inches from the module.

We wonder when a true wireless audio interface will evolve, eliminating audio jacks entirely. This is the pricey part of audio system installations that usually require removing the interior to route the wires.

When the EQ-Link module is installed in the aircraft, it can be clipped to a map pocket or attached to a surface with Velcro. The headset and the module are powered by NiMh low-loss rechargeable batteries, providing up to 35 hours of in-

The two-piece EQ-1 consists of a 2.4 GHz wireless ANR headset and a receiver/transmitter that plugs into the aircraft audio jacks, left photo. The EQ-R Reverse Link module, top photo, links any traditional headset to the wireless network.

Cabin dwellers might enjoy the freedom of being unplugged but not the clamping pressure of the EQ-1 ear cups, top photo. The EQ-Link wireless module, middle, performed well and never lost connection with the headset. An optional Bluetooth module, bottom, connects to the EQ-Link with a patch cable.

flight use. NiMh battery technology is well-suited for this application because the batteries will only lose 1 percent of the stored charge per month when not in use. The EQ-Link and EQ-1 Headsets will turn off automatically when the aircraft power is off. The headset and the link module can be charged from a USB port, AC wall outlet or from the aircraft DC power receptacle.

The link module is simple to manage because it has minimal controls—including two mode status lamps, a status button and an audio input jack for entertainment and phone sources. There's also an optional Bluetooth module, but even it's not entirely wireless because it connects to the EQ-Link module with a patch cable, requiring yet another piece of hardware to manage. The interface would be much better, in our view, if the EQ-Link had a Bluetooth receiver built in. The EQ-Link user interface consists of a voice annunciation system that prompts the user through the various system settings, while the user interfaces with the system via a press-and-rotate multifunction knob, located on the left side of the headset. To turn the headset on, press and hold the knob for a couple of seconds, and a British female voice announces the hours of battery life remaining and whether the system is paired. Voice guides help navigate through the menu system. In our trials, we found the setup menu awkward and we don't suggest passengers immerse any deeper than adjusting the volume.

PERFORMANCE

We evaluated the EQ-Link system in a Cirrus and in a Piper Arrow, both equipped with a Garmin GMA340 audio system. The EQ-Link system will accommodate multiple EQ-1 headsets paired to the same module, a configuration that's intended only for passenger use. That's because the RF link operates in a semi duplex mode and doesn't have the ability to distinguish between pilot and passenger audio, creating a situation where passenger chatter will interrupt pilot audio.

We found the EQ-1 headset audio quality to be excellent and experienced no clipping of modulation thanks to the SOFTVOX feature. The system also has a personal intercom mode that generates sidetone (the sound of your voice in the ears as it's transmitted to the link module). This can be useful when using the system in stark applications; perhaps in an aircraft without an audio system or when using a portable radio.

Since the system uses digital transmissions of audio data packets, there could be a slight delay of the sidetone audio stream from one end of the system to another, creating an annoying echo in the ear and something we experienced in the Arrow. To combat this, there's an echo cancelling mode that bypasses the sidetone in the aircraft intercom system. Since voice modulation is digitized and compressed before it's transmitted across the wireless interface, the sidetone quality has a digitally processed sound. Keying the aircraft push-to-talk switch creates a "beep" in the headset and a "BOP" when released. There's also a yellow LED PTT indicator on the module.

LIMITED APPLICATION

We remember hanging inverted in the straps during akro in a CAP 10B while unsecured headset cords were nearly tangled in the control stick. The EQ-Link system solves that dilemma (it's endorsed by Red Bull Air Race pilot Matt Hall). Need to bail out of an aircraft in a hurry, or wear a flight helmet? For these times, there are obvious advantages to wearing a wireless headset.

Still, we don't see the point for everyday cockpit use. For many of us, once we're plugged in, wired headsets are forget-it items. For passenger use, however, we think the system is useful. For the freedom to move around larger cabins or for simplifying the overall flying experience, the basic EQ-Link system delivers for the cost of a higher-end wired ANR model. It sells for $699 with one headset, link module and chargers.

While the $570 EQ-1 ANR headset performs well, it won't win awards for comfort with its moderate clamping pressure. But the EQ-Reverse Link system—allowing plug-in of any aviation headset (it worked well with a Lightspeed Sierra model)—solves that dilemma. It sells for $699 and the Bluetooth module is $217.

CONTACT

EQ1 Wireless Communications
509-731-3153
www.wirelessaviationheadsets.com

PilotWorkshops.com: Excellent for Proficiency

The courses, GPS manuals and scenario-based workshops on PilotWorkshops.com provide a good way for pilots to keep their skills sharp.

by Rick Durden

Life keeps getting in the way of flying. We know that the best way to keep our skills and judgment level high is to fly frequently and take recurrent training every six months—just like the pros. But with seven-dollar avgas, we certainly aren't flying nearly as frequently as we would like, and few of us schedule recurrent training more often than required by the FARs.

We know we should do more to keep our hands in—to fight the growth of aeronautical verdigris on our abilities. And, we've got our training manuals and DVDs we used to get our last rating, but those are not targeted at proficiency, are presented in lengthy segments and a lot of them can cure the worst case of insomnia.

What we do have are times when we can spare 20 minutes or a half hour to look at our tablet, iPhone or computer for brush-up sessions that are fast-paced, informative and interesting. That's what Mark Robidoux and his team at PilotWorkshops.com realized when they developed the company's line of products aimed at the pilot who wants to stay proficient but can't set aside large chucks of time with regularity.

Starting in 2005, PilotWorkshops.com initially grew into a resource library of proficiency materials in audio and video formats that were presented by pilots with significant, specialized experience and the ability to communicate well. More recently it added two new products: a more interactive workshop series entitled IFR Mastery as well as a line of electronic and hard copy GPS manuals for Garmin and Bendix/King units.

We took a hard look at the PilotWorkshops.com product line and, overall, we liked what we saw. We think the offerings, especially the flagship IFR Mastery workshops, are a good way for a pilot to bolster his or her skill set between flights as well as get more out of the time in the airplane.

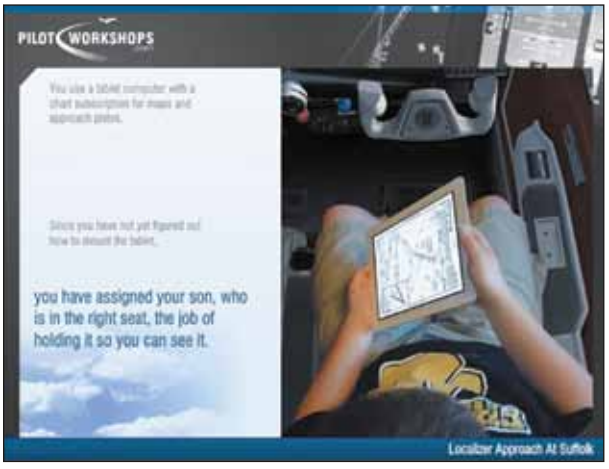
IFR MASTERY

Each month, subscribers to IFR Mastery get a new scenario involving a challenge on an IFR flight. We noted that the videos that set up the problems to be solved in each scenario were fast-paced and realistic. The user is given specific information regarding the type of airplane, pilot experience, route and weather, as well as real-life conditions of weather, emotions and such things as where the cars are parked that affect pilot decision-making but are often ignored in more formulaic training courses.

In one, the experienced pilot has a relatively new IFR GPS and is using an iPad for charts, but doesn't have a mount for it. She has her son, in the right seat, hold it. The links that can build into an accident chain are realistically snapped into place—ATC assigns a turn around a hold unexpectedly, the pilot misses one button push on the new GPS during the interruption on the approach, and then the son nudges the wrong spot on the iPad touchscreen and loses the approach plate. Inbound in the hold, the GPS display suddenly doesn't make sense and you're trying to get the plate back. Positional awareness at risk. Now what?

CHECKLIST

- ⊕ IFR Mastery series is a worthwhile proficiency tool for $19 a month.
- ⊕ Aviation weather videos give recurrent training in reasonably sized bites.
- ~ The new library of GPS manuals are user-friendly but on the pricey side.



Each IFR Mastery course begins with a realistic scenario outlining the trip to be made (top) and introduces details that will affect the flight (second from top). At the end of the scenario, choose one of four actions to resolve the dilemma you are facing (third from top). A PilotWorkshops.com instructor then goes through the alternatives and why one action is better than the others (bottom).

In the December 2013 scenario, based on a fatal accident, you are flying a FIKI-equipped Cessna 210 into the mountains of Oregon, part of the way into the GPS approach and getting a little bit of ice when you receive word on Unicom that there are snowplows on the runway and are asked to hold for a few minutes. Can you? Where? There be rocks nearby.

Still another scenario plausibly set us up to fly into the ground on a clear night when on a visual approach on an IFR flight plan.

We were surprised at how fast the creators of the scenarios can set up a very realistic, thought-provoking situation—the ones we viewed only took four to five minutes.

The end of each scenario offers four options to solve the problem presented. We've seen a lot of bad examples of multiple-choice exams over the years. The IFR Mastery series isn't one of them. Most of the time the alternatives made plausible sense.

After viewing the scenario an options, your next step is to choose an option and vote. Once you choose, you see how every other viewer voted—we generally saw over a thousand votes cast by the time we'd looked at a scenario.

At this point you've probably only spent about six minutes and you've already pushed the boundaries of your IFR knowledge and judgment. Next, you watch a video by the creator of the scenario as he breaks down the flight, the options and why one is the best of the bunch. Again, the video is short, less than 10 minutes. Most were right on point, with no wasted time.

In 15 minutes you've gotten a good session on real-world IFR operations. You then have the option of going into a forum where you can exchange thoughts with PilotWorkshops.com instructors and customers, take a quiz on the underlying subject, and listen to a small group roundtable of the PilotWorkshops.com instructors dissect the scenario and admit that not all made the correct decision and why.

We generally liked the roundtables, although there were times that one of the instructors would start to pontificate or wander away from the subject. The roundtables run on the order of 15 minutes.

Once you've completed the workshop, another click takes you to the screen to obtain WINGS program credit for it—a nice little benefit, in our mind. Full time elapsed is about an hour—and the workshop is broken up so that you can do that hour in sections that are a maximum of about 15 minutes.

We like the scenario training—there wasn't any of the goody-two-shoes-always cancel-if-there's-a-cloud-in-the-sky approach taken by a lot of the training we've seen. The scenarios clearly recognize the financial and emotional issues faced by a pilot in the real world. "I can see the airport, I'm this close, I'll land. It'll be OK."

Price is $19 per month and you can cancel at any time. The website says that the "$199 new member fee is waived." As it stands, once you

subscribe at $19, you get access to all back scenarios—a great deal, in our opinion. If we had to pay $199 to get in, we're not sure we'd do so. However, at $19 per month, automatically billed, we suspect we'll stay with it for at least a year, and have spent more than $199.

GPS MANUALS

Another recent addition to the PilotWorkshops.com website is a collection of GPS manuals written for pilots by John Dittmer. The library covers most of the Garmin and Bendix/King line, both panel mount and handheld. Prices range from just below $40 to $55. While that seemed a little steep to us, it bought a hard copy and electronic version. We found that an electronic version on an iPad was a handy cockpit reference.

The manuals we looked at were well written and broken up in a fashion that made sense for a pilot using the particular GPS. Most terms were clearly defined, something we appreciate. Because they are written in a how-to, or task-oriented style, we thought they were easier to use than the manufacturer's manuals, although not always as thorough.

AVIATION WEATHER

The PilotWorkshops.com aviation weather product consists of 63 modules averaging about 13 minutes long—although a number go well over 20 minutes. They are in-depth and go into three overall subject areas: Beyond the Weather Brief, Terminal Forecasts—Reading Between the Lines, and More Weather Analysis and Online Tools.

Presented by Scott Dennstaedt, who has written for this magazine, the videos are paced well and make liberal use of good-quality images of available weather information with clear explanations as to the why and how of the stuff we face when we launch our airplanes. There are times that there was so much information, we were grateful for the ability to back up and re-run a section.

We appreciated the extensive reference to resources available for preflight planning as well as the effective use of XM weather while en route.

$139 gets you permanent online access to the modules, while $179 buys the online access as well as a thumb drive with all 63 videos loaded.

An Aviation Weather Series class on limitations of satellite weather shows an actual flight in which the radar filter used by the weather provider erased an area of severe weather (top), which suddenly appeared when the filter was removed (bottom).

AIRMANSHIP

The Airmanship series from PilotWorkshops.com consists of 26 video and 13 audio modules targeted at a pilot who wants to review fundamentals such as crosswind landings, ATC communications, stick-and-rudder skills, non-towered airport operations and emergency landings.

As with all of the PilotWorkshops.com instructional materials, the instructors teaching them are high time and communicate well. In our opinion, this is a good series for a pilot who wants a way to keep her or his VFR skills up.

Price is $159 for unlimited access and $199 for access plus a thumb drive loaded with all of the classes.

IFR PROFICIENCY

The IFR Proficiency series from PilotWorkshops.com is designed to help a pilot improve his or her skills in all aspects of instrument flight—not prepare for a rating. The list of instructors who put together the 30 videos and 10 audio lessons is impressive (and too long to repeat here). All run on Windows and Mac computers, iPad and Android tablets and iPhones.

We found that we looked over the topics and viewed those in areas where we felt we were rusty. There are transcripts of each of the lessons.

We think the price is a little steep compared to the Aviation Weather material—unlimited Internet access to the modules is $199—access plus a thumb drive with the videos and audio lessons is $239. For us, looking at price, value, time and keeping things lively, we were more interested in the IFR Mastery product, although we recognize that the two products are separately targeted.

All of the PilotWorkshops.com programs are eligible for WINGS program credits. We are fans of the WINGS program and are pleased to see that the PilotWorkshops.com materials qualify. PilotWorkshops.com just announced that the FAA has just issued the 10,000th WINGS course completion credit for its customers who had completed its courses.

CONCLUSION

We spent several hours looking at videos, listening to audio programs and picking which action we would take when things started to go bad when IFR and came away confident that a pilot who wants to use the courses offered by PilotWorkshops.com to help keep his or her edge will be making a good choice. The products are useful recurrent training tools as well as a long-term reference.

Lake Amphibian

A much-loved door to adventure flying that requires good training and care when operating on the water.

The bad news is that, no matter how cleverly you design it, putting a boat hull on an airplane does not make for efficient aerodynamics. You also wind up with a complex airplane that has all the costs of maintaining a retractable landing gear and constant speed prop, plus the expenses of keeping a boat alive and well. There are those who assert that you should combine those costs and then square the sum to get an accurate number for owning an amphibian. Oh yes, and you get to own an airplane that can sink.

The good news is that Lake Amphibian owners tell us that, almost without exception, they love their airplanes. They happily put up with cruise speeds well below book (we've used book numbers in the graphic on the opposite page—owner feedback says to take them with a healthy helping of salt), the challenges of maintaining an engine set way up in the air and insurance requirements for serious initial and recurrent training in return for the ability to land at some of the most scenic places on the planet—and where no land airplanes can alight.

After seeing some of the photos of Lakes in their natural environment sent in by owners, we're tempted to chuck it all and find a way to go be Lake Amphibian bums.

Lake owners have the ability to land at some of the most scenic places on the planet.

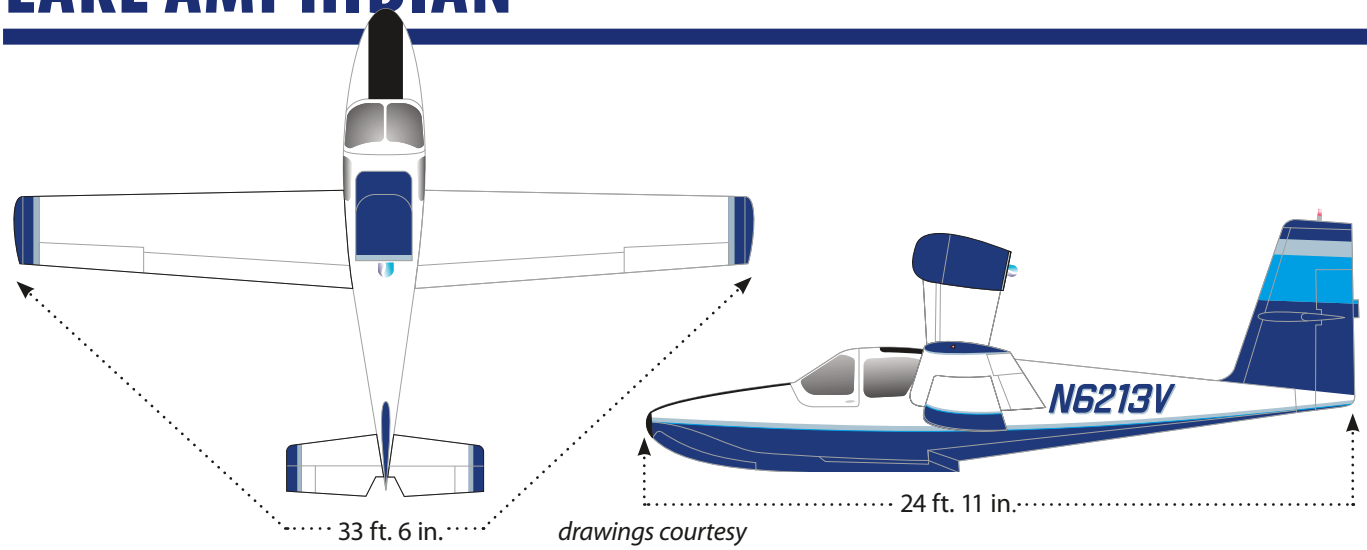
MODEL HISTORY

The Lake evolved from a design developed by Grumman, the maker of now classic multi-engine flying boats, as a potential entry in the civilian market after World War II. The company built a prototype but decided not to go any further, letting two of its engineers—Dave Thrust and Herb Lindblad—take the design, which Grumman called the Tadpole, and start building it in 1948 in Sanford, Maine, as the three-seat 150-HP Colonial C-1 Skimmer.

Ten years later, they made it a four-seater with a 180-HP engine and called it the C-2. In 1960, they extended the bow and wings and dubbed it the Lake LA-4. About 250 Skimmers and LA-4s were built before production ended in 1962. There were some company changes that saw the manufacturing side become a separate entity, called Aerofab, from the sales and service side, an arrangement that continued until production stopped. The type certificate was acquired by Consolidated Aeronautics (Conaer) in 1963, which moved its corporate headquarters to Texas but kept the factory in Maine.

The Lake Buccaneer (LA-4-200) was born in 1970 when Conaer put

LAKE AMPHIBIAN

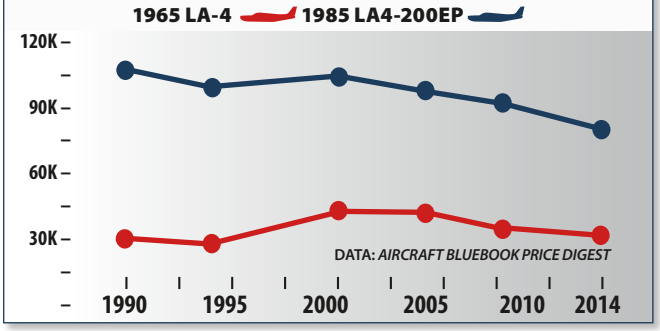


drawings courtesy
www.schemedesigners.com

LAKE AMPHIBIAN SELECT MODEL HISTORY

MODEL YEAR	ENGINE	TBO	OVERHAUL	FUEL	USEFUL LOAD	CRUISE	TYPICAL RETAIL
1957 C-1	150-HP LYCOMING O-320-A2A	2000	$20,000	30	700 LBS	197 KTS	±$15,000
1958 C2-IV	180-HP LYCOMING O-360-A1A	2000	$23,000	30	830 LBS	117 KTS	±$20,000
1965 LA-4	180-HP LYCOMING 0-360-A1A	2000	$23,000	40	845 LBS	114 KTS	±$30,000
1979 LA-4-200	200-HP LYCOMING O-360-A1B	2000	$24,000	40/55	1135 LBS	130 KTS	±$63,000
1985 LA-4-200EP	200-HP LYCOMING 0-360-A1B	2000	$24,000	48	1030 LBS	127 KTS	±$86,000
1995 LA-250	250-HP LYCOMING IO-540-CFB5	2000	$30,000	76/90	1290 LBS	122 KTS	± $255,000
1995 LA-270	270-HP LYCOMING TIO-540-AA1AD	1800	$60,000	76/90	1065 LBS	155 KTS	±$270,000
1997 LA-250 SEAFURY	250-HP LYCOMING IO-540-CFB5	2000	$30,000	76/90	1290 LBS	122 KTS	±$350,000
1997 LA-250 TURBO SEAFURY	270-HP LYCOMING TIO-540-AA1AD	1800	$60,000	76/90	1065 LBS	155 KTS	±$370,000

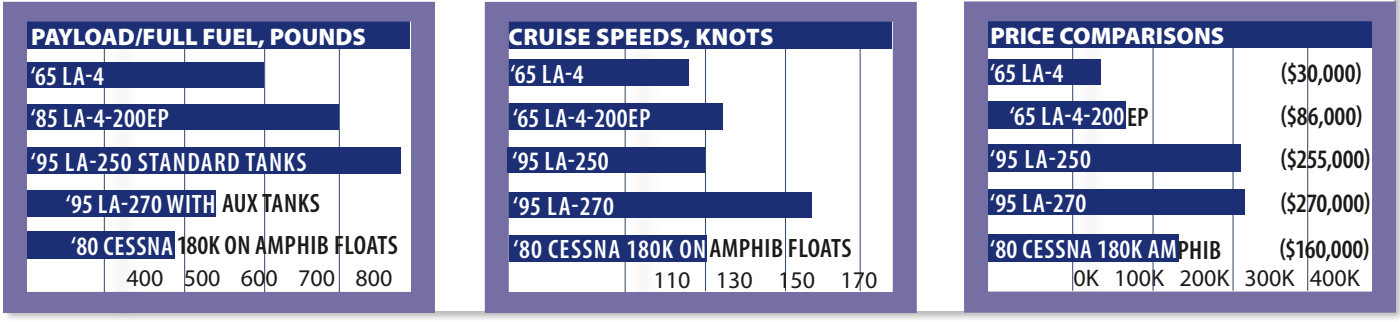
RESALE VALUES



SELECT RECENT ADs

AD 2013-08-14	HORIZONTAL STABILIZER ATTACHMENT FITTING INSPECTION
AD 2002-21-05	INSPECTION OF UPPER AND LOWER WING SPAR DOUBLERS
AD 2000-10-22	WING SPAR REINFORCEMENT KIT INSTALLATION
AD 86-23-05	MODIFICATION OF FUEL SHUTOFF VALVE MOUNTING PLATE
AD 76-12-11	INSPECTION OF FUEL FILTER HOUSING FOR CORROSION

SELECT MODEL COMPARISONS



Up and away from beside a tree-lined shore. Flaps have two positions, up and down. Full flaps are used for all takeoffs and landings.

a 200-HP fuel-injected Lycoming on the LA-4. Over the years, a few turbo models were made and at least one non-amphibian water-only model.

In 1979, Armand Rivard, an independent Lake distributor, bought the company and moved it to Kissimmee, Florida. He introduced the LA-4-200EP. To reduce cooling drag and noise, it had a new nacelle and its prop shaft extended five inches farther aft. It also had "batwing" fillets at the wing/fuselage junction to improve low-speed handling by eliminating eddies and turbulence that disrupted prop performance.

Rivard also introduced the Renegade in 1979, a six-seat version with a 250-HP IO-540, a beefed-up structure, a rear cabin door and larger tail. It easily outperforms its predecessors and is even more stable on the water.

Beginning in 1981, the Lakes all got more grease fittings, polychromate primer, an improved canopy and more rust-resistant cabin vents.

A turbo version of the Renegade became available in the late 1980s through an STC, so technically it is a mod done by the factory. Its Lycoming TIO-540 is rated at 270 HP.

In 1991, the company started making the Seafury, a Renegade with lift rings, survival equipment, a custom tool kit, aux power receptacle and stainless steel brake discs, plus extra corrosion-proofing in an extra coat of chromate primer inside and out and a ceramic coating on the steel parts.

Finally, the company developed the Seawolf. It's a Seafury modified for the military as a patrol, reconnaissance and special ops aircraft that has proved popular on the international market.

The company had a hiccup when Armand Rivard decided to try retirement. Bruce had no interest in taking over the factory so, in 2002, Armand sold his end to a Maryland FBO operator, Wadi Rahim, who called the company Global Amphibians and shut down the Maine factory.

Only two of its veterans moved to a new factory he opened in Florida, according to Bruce Rivard. Things did not work out and before long, his father got the company back. Bruce handled North American sales and service out of New Hampshire (go to www.teamlake.com), including finding good used Lakes and upgrading them for sale with a warranty. Production slowed to special orders only and, in the last few years, stopped.

When we spoke to Armand recently, he reported that he is in "mature" discussions with prospective buyers for the company. He anticipates that the airplane will go back into production. As for himself, Armand said that he's nearly 80 and has plans to take his Lake, head out and go fishing.

MARKET SCAN

Prices have a very wide range from $15,000 average retail for a good C-1 Skimmer (a rare find; fewer than 25 were built) to $370,000 for a 1997 LA-270 Turbo Seafury, according to the *Aircraft Bluebook*.

Prices have been trending down, as they have been for many airplanes, although the EP model has shown some price resiliency. It has been praised as the best compromise among Lakes between cost and performance. The *Bluebook* puts a 1983 LA-4-200EP at $81,000 average retail.

PERFORMANCE, HANDLING

"Instant vacation" is what one owner has called the Lake experience, and Lake fans say there is nothing else short of homebuilts and a couple of exotics (anybody know of a clean Seabee?) that lets them fly as easily into a remote lake or stretch of river as on or off a runway. But that flexibility comes at a price in cruise efficiency. The airplane, for its power, does not go fast.

A 200-HP Buccaneer performs on a par with a 150-HP landplane—one owner said that he flight plans his Lake at the same speed he does an older Cessna 172. Owners reported that book cruise numbers were not realistic. They reported cruise speeds in the 105-115-knot range with fuel consumption of about 10 GPH. A Renegade cruises at about 122 knots and one owner told us he burns 13.5 to 14 GPH. The turbo version shines up high with cruise speeds closer to 150 knots.

The EP does better than the Buccaneer, cruising at about 120 knots. It also has hull strakes that improve water handling and allow the hull to break free of the water at a lower speed—45 knots instead of 53 for a Buccaneer (50 knots with a batwing mod). A Renegade pilot told us, "The EP is the best of the lot … It's almost as fast as the Renegade. It has better short-field performance and it's more economical. A 90-gallon EP has a 9- to 10-hour range."

Company specs for the 250-HP Lake list cruise as 132 knots true at 6000 feet with 75-percent power with a 900-FPM best rate of climb at sea level. The turbo version, with its 270 HP, has the same performance except up high, where true airspeed

Panels have evolved over the years (top and middle right), but the throttle has remained up high (bottom right). The windshield is steeply raked—yes, that is a grab handle (top right).

is said to reach 155 knots. The EP's best rate of climb is 980 FPM, according to company specs, and the Buccaneer's rate is optimistically listed as 1200 FPM. An LA-4 with 180-HP is said by the book to climb at 1000 FPM.

Owners have complained that a heavily loaded Buccaneer (it can carry about 1000 pounds) is sluggish during climb. Some call it a two-place airplane with baggage or a four-place airplane with reduced fuel and bags. Lake's 180-HP models should be avoided by buyers looking to carry a lot. At gross weight, climb will be around 500 to 600 FPM and cruise will be about 105 knots, max.

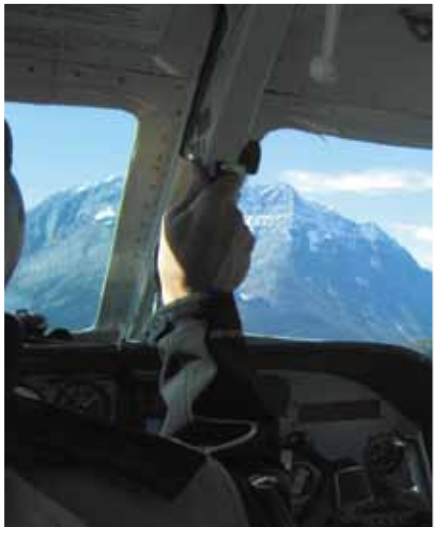
The Lake's tendency to nose down when power is added and to rise when power is reduced because the engine is mounted high above the CG requires a good initial checkout, in our opinion. Owners reported that it's wise to practice low-altitude go arounds because of the nose-down pitch with power—one said, "Cobb the power on a bounced landing, while low and slow, and you're going to break it—probably badly." The high rate of accidents following bounced water landings we saw in the NTSB reports seemed to confirm this owner's concern.

In flight, the airplane is agile by seaplane standards. The ailerons are light but the rudder is a bit heavy, and flying the Lake well requires good rudder skills in the air and on the water. Stalls occur just above 42 knots or so, indicated. Recovery is gentle and predictable.

Having a Lake is not so much about its cross-country flying abilities, which are fine for shorter flights up to 300 miles or so. It is all about getting yourself right into the countryside for whatever fun you have in mind. The airplane shines on the water, owners say, because its hull is inherently stable and strong and its CG is low. Marc Rodstein of the Lake Amphibian Flyers Club says a proficient pilot can make a step-turn takeoff, rising off the water in a circle in case of a tight fit.

On a hot day, it takes precise technique to get a heavily loaded Lake on step for takeoff, especially the older models without hull strakes, available as a mod to reinforce the hull and reduce water drag. They also add more stability in turns.

Nevertheless, the airplane does not have a deep-vee hull, as does a Seabee, so it does not handle rough water well. In addition, it is a short-bodied flying boat, making it at risk for porpoising. It is a descendant of the Grumman line of flying boats and shorter than the smallest of the marque, the Widgeon, which was not at all tolerant of errors in pitch attitude on landing—many Widgeons were lost to porpoising events.



The Lake accident records are loaded with water mishaps. Catching a sponson in the water landing in a

LAKE AMPHIBIAN WRECKS—WATER OPS

Our review of the 100 most recent accidents involving Lake Amphibians uncovered the sort of things we would expect when operating a seaplane—nearly half the accidents involved water operations—but also a surprising absence of runway loss of control (RLOC) accidents.

Despite raves by their owners, Lakes are not forgiving when it comes to water operations—one of the reasons insurers require pilots to get annual recurrent training to obtain insurance—and it was reflected in the fact that 46 of 100 accidents involved something going wrong on the water.

Only one accident involved landing on the water gear down. As expected, it was fatal—the airplane flipped. What concerned us more was that several fatal accidents started out with what should have been a prosaic, minor mistake—a bounced landing. They progressed to disaster when the pilot did not get the airplane to the correct pitch attitude and/or correct any yaw before touching down again.

On landing—or takeoff—the wrong pitch attitude can induce porpoising, which can lead to total loss of control. In one landing accident, the pitch excursions became so great that the airplane eventually got high enough on the nose-up cycle that the nose-down cycle went to the vertical before the airplane "pile drivered" into the water, as described by a witness.

Touching down yawed is also a recipe for bad news. Accident reports reflected everything from just ripping off a sponson through serious damage to the airplane to flipping and drowning the occupants.

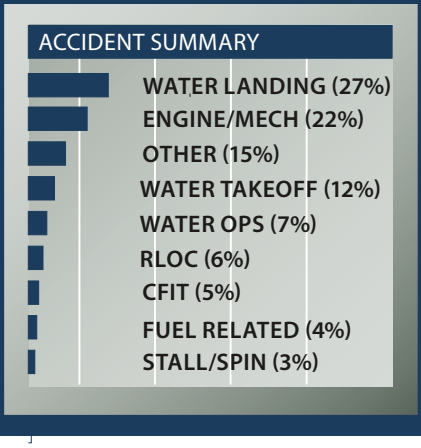
Hitting submerged objects while landing, taking off or taxiing sank a few Lakes. Boat wakes proved to be a serious consideration—leading to several crashes on landing and takeoff. Glassy water landings put paid to more than a few Lakes. There were two accidents that involved low-flying Lakes coming to grief upon hitting what was probably glassy water while at cruising speed.

A surprising number of accidents involved engine or mechanical issues—more than 15 engine power losses for either unknown reasons or due to an absence of, or bad, maintenance. Two airplanes suffered the collapse of a gear leg on rollout.

There were only three accidents in the stall/spin category. One also involved an engine power loss after takeoff under circumstances that had us wondering whether the inevitable water in the hull had not been drained prior to takeoff and migrated aft, preventing the pilot from getting the nose down as the airplane pitched further up as the pylon-mounted engine lost power.

Two Lakes simply disappeared—one over the Atlantic on a delivery flight and one in which the bodies of the occupants eventually washed up on the shores of Lake Superior.

Our conclusions? The Lake has unusually good manners on the ground. The engine is challenging to get at—which may explain some of the power loss accidents due to failure to maintain the engine or doing it wrong. High waves and boat wakes are not friendly to Lakes, and the airplane is intolerant of sloppy pilot technique on landing. We think intensive, Lake-specific, training and recurrent training is utterly essential for anyone who desires to fly a Lake Amphibian.



gusty crosswind can cause an upset and a lot of damage. Bad landings or rough water can end with the Lake trying to play submarine. In anything but calm air, docking is a major challenge because the mid-level wing and its sponson may not clear the deck.

On the ground, the Lake pilot needs a knack for steering with differential braking because the plane does not have a steerable nosewheel.

It's absolutely essential—and required for insurance coverage—to get Lake-specific training. The active and, in our opinion, effective Lake Amphibian Flyers Club can provide a list of highly qualified Lake CFIs (not to mention knowledgeable Lake shops, an absolute must for any pre-buy inspection).

Lake Aircraft's Team Lake in Gilford, New Hampshire, offers a one-day introductory ground school that opens the new Lake owner's eyes to what the airplane can do and what to be careful about, not the least of which is the lack of a gear-warning horn and the potential for landing gear up on a runway (not so bad) or gear down on the water (very bad). Also note there's no squat switch to prevent a gear collapse on the ground if you accidentally flip up the gear switch. Lake also offers a five-day ground and dual course. Be prepared to work.

LOADING, COMFORT

Useful load in real life averages about 800 pounds for a 180-HP Lake without an IFR panel. It's about 950 pounds for the 200-HP version and 1200 pounds for the Renegade.

Lakes tend to be nose heavy, a trait that is aggravated by the fact that the CG moves forward as the airplane is loaded. Marc Rodstein of the Lake club, however, says his forward CG problem goes away when passengers get in the back of his airplane, making ballast unnecessary. The point is it's not a load-and-go airplane. Having the CG beyond limits for a gross-weight takeoff with a lot of pine trees beyond the beach is asking for trouble.

Only mods and the Renegade airframe have a back seat/cargo hatch, so expect to utter a few expletives when it's time to get in all your fishing and camping gear through one of the two front clamshell doors.

Later-model Lakes are equipped with a cargo door (above), which greatly improved cabin access. It can be retrofitted. The fuel selector is on the aft cabin wall (right). Getting at the baggage tunnel requires removing the rear seat.

Fuel capacities range from 30 gallons in the Skimmers and 40 gallons in the old LA-4s. The Buccaneer had a 55-gallon option and the Renegade carries 90. There's a mod available for the older Lakes to put fuel in the sponsons, adding 14 gallons total.

There is elbow room up front, a bit less in the back. In older models, the hard seats adjust only fore and aft and the cabin is noisy. The EP model has more foam and customized features, and the Renegade has the nicest interior of all; its price reflects it.

There's no muffler cuff ahead of the firewall to collect heat for the cabin. Through 1973, Lakes used Janitrol gasoline heaters, for which an AD required complete overhauls every two years. Lake switched to Southwind heaters in 1974, but they had only on and off switches so the choice was cook or freeze. Lake went back to improved Janitrols in 1983.

SYSTEMS, MAINTENANCE

For a complex airplane that performs in a tough environment, the Lake has amazingly few ADs.

Hydraulics are used extensively on the Lake, running trim, flaps and gear all through one accumulator, pump and reservoir. All the actuator static and dynamic seals are plain "O" rings and the failure of one will incapacitate the whole system. "You may replenish the supply from your squirt bottle and position the gear, flaps and trim," an owner told us, "but the flaps and trim will bleed to the trail positions."

All seaplanes leak. It's a fact of life. The hull of the lake is broken into compartments with drains at the bottom of each—accessible when the airplane is on land. To purge the bilge water when on the water, there is an electric pump located near the step. So long as the airplane is sitting level, owners tell us that it will get rid of most of the water in about five minutes.

The problem comes if the airplane

Getting to the engine requires some effort. Once there the cowling sides open wide (above left) and the front folds up out of the way (below left).

is parked, on its gear, in the water with the tail low, as in the picture at the beginning of this article. The pump will not remove the water in the aft portion of the hull and can lead to an aft CG on takeoff. From owner feedback and a review of accident records, we think this has led to at least one accident. The bilge pump should be run after the airplane is sitting level in the water with the gear up.

A big issue, of course is corrosion. During the 1960s, the 180-HP Lakes had no zinc chromate treatment and some didn't have alodine. Check for a faint gold tint to the aluminum on the interior structure of any pre-1970s airplane. No tint, no alodine.

The absence of green zinc chromate primer makes the airplane susceptible to corrosion, especially if it flies into salt water, and a bad case of corrosion can render a Lake worthless. Starting in the 1970s, all Buccaneers were alodined and zinc chromated; starting in 1983, an additional polychromate primer was applied.

Corrosion isn't the only water worry. Lakes take a beating from waves and junk in the water that can lead to dings and dents. Gravel, rocks and sand strip paint and gouge the hull. Watch for it. Also check for internal damage at bulkhead station 97, a stress point for the hull. It was beefed up beginning with 1982 models.

There have been a few complaints about the turbo 270 model. Oil dripping from the crankcase breather tube makes a mess of the tail.

A search of Service Difficulty Reports going back a decade did not yield a lot of them. About a third involved cracks in structural components; there was no distinguishable pattern among the remainder.

Owners were unanimous in telling us that having a pre-purchase examination done by a shop that knows the ins and outs of Lakes is essential. One owner passed along his experience of taking his prospective purchase to a shop that had little Lake experience and that gave him a thumbs up on the airplane. He said that he bought the airplane for $80,000 and then spent $200,000 getting all of the undetected problems fixed.

MODS, OWNER GROUP

Bruce Rivard's Lake Aircraft is praised for good service and accessibility. The Lake Amphibian Flyers Club (www.lakeflyers.com) in Boca Raton, with about 450 members all over the country and a Canadian affiliate, has a newsletter and holds an annual "Lakeathon" fly in that was recommended by several owners. Marc Rodstein, the executive director, is highly knowledgeable and accessible by phone or email. He can give you a list of experienced Lake CFIs as well as shops for mods, repairs and inspections. He's at 561-483-6566; email him at contact@lakeflyers.com.

The website contains an impressive amount of technical data on the Lake, as well as providing a list of recommended shops that know Lakes and their systems. The club can also provide names of instructors qualified to give Lake checkouts.

Popular mods are wing fillets or "batwings" to smooth airflow into the pusher prop and improve low-speed performance. Vortex generators also make for better slow-speed handling. There's a "hydro-booster" kit to fit strakes on the hull to stiffen it and allow for easier water liftoffs. A cargo door is a boon for getting into the back seats and the cargo area. Adding hatch holders is a good idea and turning the sponsons into auxiliary tanks is another option.

OWNER FEEDBACK

Over the years I have owned three Lake models, a 180-HP LA-4, an LA-4-200 and an LA-250. The 180-HP version is OK for two people, but that's about it. The LA-4-200

Coming off the step near the end of the landing run provides a most satisfactory splash (above right). Trailing beam and wide track main landing gear (below right) help the Lake handle crosswinds well, on land, and contribute to its low rate of runway loss of control accidents.

can handle four people of average weight. All are especially noisy, so get noise attenuating headsets.

As the airplanes age, they develop more hydraulic problems, probably due to dry seals. Aerodynamically, it's a flying brick, but you get the versatility of land and water operations. The LA-250 is much more stable in fairly rough water than the smaller models. Docking is a problem with the outlying sponsons.

Warren C. Rolen
Via email

After 28 years of flying, including the last 17 owning a Maule on wheels, I bought a Lake Renegade two years ago and haven't been able to get the grin off my face since. The choice was between a Cessna 185 on amphibious floats or the Renegade because I needed to carry a reasonable load in and out of lakes at over 4000 feet MSL.

The Renegade has no trouble getting off the water, near gross, at lakes as high as 4600 feet elevation.

The main disadvantage of the lake is coming up to a dock. At remote sites, that is not a problem; the ability to put the rugged gear down and get the airplane partially out of the water is wonderful. It is a good rough airfield plane with its wide, trailing link gear and light weight on the nosewheel, not to mention having the prop out of the way.

I plan on 110-115 knots at 11.7 GPH LOP for cruise. The Janitrol heater, when working, is excellent. I cannot say enough about Elton Townsend and Lake Central in Gravenhurst, Ontario, for training and support of the aircraft.

Dave Ross
Via email

Elton Townsend at Lake Central deserves mention for both training and parts. He always answers questions and has an amazing amount of experience in flying and maintaining Lakes. It is no exaggeration that in five days of training with Elton, one will do between 150 and 300 water landings and takeoffs.

The Lake and Air amphibious gear warning is a must, in my opinion—and it's hilarious. If the gear is up and one hits a specific speed, a nice lady announces, "Gear up for water landing." If the gear is down, then the guy who does the Dodge truck commercials comes on with the voice of doom and says, "Gear down for runway landing." A gear-down landing on water is bad news. Passengers always laugh the first time they hear the guy.

David Ross
Via email

Visibility is fabulous—best of any fixed-wing I've flown. Flying characteristics are benign. The trim is hydraulic, which makes changes slow. The flaps are crucial for low-speed maneuvering—without them, the Lake seems to wallow about disconcertingly.

The Owner's Manual for the 1971 LA-4 is something of a joke. It is badly reproduced from a larger document, so the charts are muddy and the photos murky. Some of the numbers are sheer fantasy. It claims a 146 MPH max cruise—110 is more like it on a good day. It says 1200 FPM sea level climb—we never see better than 600-700 FPM.

On my first gross weight takeoff, a boat wake tossed the Lake into the air before it was ready to fly and it came down hard—scary hard. I quickly learned to avoid rough water at high speed and any wave action greater than 12 inches. Nevertheless,

the LA-4 is the greatest toy I have ever owned.

William Corwin
Via email

We owned a 1975 Lake Buccaneer LA-4-200 for five years and had loads of fun with it. If you think of an LA-4-200 as a Cessna 172 in terms of speed and useful load, but with a 10 GPH fuel burn, you're close on performance.

Fuel capacity is 40 gallons, with optional tanks in the sponsons that hold eight gallons each. (You can't use that fuel after a water landing, however, as it may be contaminated.) If you fly for one hour and then transfer sponson fuel to the main tank (that takes 30 minutes or so), you end up with a full main tank and have flown 150 NM. With only 40 gallons, we fly three hours and *land*. No messing around.

The pitch change with power change is just opposite to most aircraft, so be sure to get a thorough checkout from an experienced Lake instructor. The Lake Amphibian Flyers Club is a great asset.

Stan Dodge
Via email

I can say with perfect honesty that my only regret was that I did not get a Lake until late in life, in 2000 when I was 60. A prospective buyer should be cautioned that Lakes are so much fun that they are often ridden hard and put away wet. Beware of any Lake not maintained by one of the Lake Master shops listed with the Lake Amphibian Flyers Club.

When properly trained in a Lake, it is forgiving in all aspects. If not properly trained, well, there are too many sad examples of Lakes seriously damaged or destroyed with injuries and deaths when well-meaning smart-alecks do not take training from a Lake Master instructor.

Peter F. Hartmann
Via email

Maintenance costs are high compared to a land plane. Parts are easily available. Three shops deserve mention: Amphibians Plus, Bartow, Florida; Lake Central, Gravenhurst, Ontario; and Lake Hamilton Seaplanes, Lake Hamilton, Florida.

Lakes are easy to fly, but can be dangerous in the hands of a pilot with little or improper training.

I pay $3400 for $100,000 in hull coverage and $1 million smooth liability coverage—new pilots will pay more. The Lake Insurance Program through Phoenix Aviation Managers has specialized insurance for Lake owners and it requires annual proficiency training. The result is, according to Phoenix, a reduced rate of claims for owners in the program.

Marc Rodstein
Lake Amphibian Flyers Club

The Lake is a pretty docile airplane. It has a big rudder, making crosswind landings easy. The stall is gentle with plenty of warning due to the prop warbling prior to the stall. Practicing low-altitude go arounds, because of the nose-down pitch when adding power, is a good idea.

The airplane behaves differently than floatplanes on the water. It is quite sensitive to pitch. For a potential buyer, I suggest: Join the Lake Amphibian Flyers Club; read Steve Reep's *Go to Hull*; attend a Lakeathon fly-in and do research into the wide variations in the airplanes over the years.

Ben Mitchell
Via email

Persons purchasing a Lake should have a Lake Master advise them, and get flight instruction from a Lake Master. The airplane is forgiving, except when landing on water. It does porpoise and if you are not trained to deal with it, the airplane will wind up upside down.

David Walter
Walter Marine

FEEDBACK WANTED

CESSNA 177

For the April 2014 issue of *Aviation Consumer*, our Used Aircraft Guide will be on the fixed-gear Cessna 177 Cardinal, the four-place, high-wing airplane that came on the market in 1967 as a 1968 model. If you've flown or owned one, we want to know about your experience: 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 Cessna 177 Cardinal by February 1, 2014, to:

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