April 2012
Volume XLII
Number 4

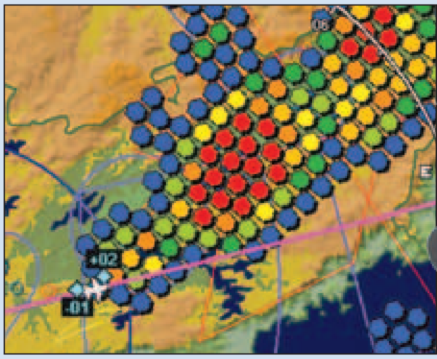
The consumer resource for pilots and aircraft owners

The Aviation Consumer®

Cylinder Survey

Owners give Lycoming factory cylinders high marks … page 4

Burning up the airways … page 9



New lightning sniffer … page 13

Industrial-strength Bluetooth … page 16

The Aviation Consumer

EDITOR
Paul Bertorelli

MANAGING EDITOR
Jeff Van West

CONTRIBUTING EDITORS
Jonathan Doolittle
Rick Durden
Larry Anglisano

SUBSCRIPTION DEPARTMENT
P.O. Box 8535
Big Sandy, TX 75755-8535
800-829-9081
www.aviationconsumer.com/cs

FOR CANADA
Subscription Services
Box 7820 STN Main
London, ON 5W1
Canada

Back Issues, Used Aircraft Guides
203-857-3100

REPRINTS: *Aviation Consumer* can provide you or your organization with reprints. Minimum order is 1000 copies. Contact Jennifer Jimolka, 203-857-3144

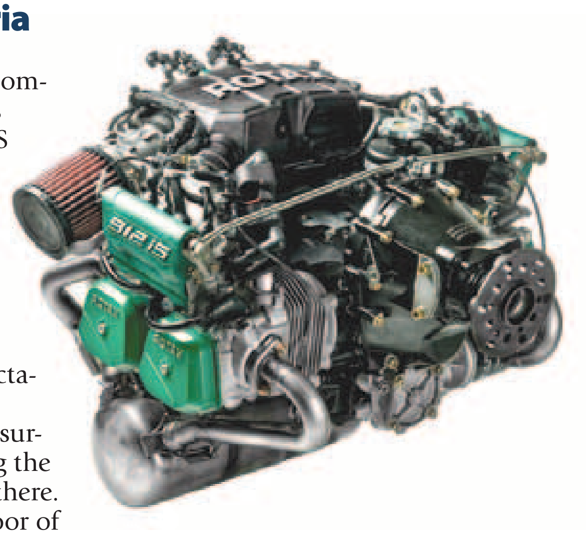
Belvoir MEDIA GROUP LLC

AVIATION CONSUMER (ISSN #0147-9911) is published monthly by Belvoir Aviation Group LLC, an affiliate of Belvoir Media Group, 800 Connecticut Avenue, Norwalk, CT 06854-1631. Robert Englander, Chairman and CEO; Timothy H. Cole, Executive Vice President, Editorial Director; Philip L. Penny, Chief Operating Officer; Greg King, Executive Vice President, Marketing Director; Ron Goldberg, Chief Financial Officer; Tom Canfield, Vice President, Circulation.

Periodicals postage paid at Norwalk, CT, and at additional mailing offices. Revenue Canada GST Account #128044658. Subscriptions: $84 annually; single copies, $10.00. Bulk rate subscriptions for organizations are available.

Postmaster: Send address corrections to AVIATION CONSUMER, P.O. Box 8535, Big Sandy, TX 75755-8535. In Canada, P.O. Box 39 Norwich, ON NOJ1PO, Canada. Publishing Agreement Number #40016479

The News From Austria



When the Rotax division of Bombardier Recreational Products (BRP) rolled out its new 912iS engine at its Gunskirchen, Austria, headquarters in early March, I wasn't too surprised. From talking to a couple of vendors, I had a pretty good idea of what was coming and the engine more or less lived up to those expectations.

Well, okay, there were two surprises. One was how far along the engine really is. It's basically there. You could hardly open the door of a FIAT 500 (nice handling, no motor) without bumping into an actual engine, a component or some BRPer rolling around in 912iS logo wear. Rotax has obviously been at this awhile and has put in place all the bits and pieces of support you normally don't expect until an engine is shipping to dealers.

Not only did they have 50 engines on the assembly line that will prove 912iS production, but they also had 10—count 'em, 10—LSAs in their product display tent with the engine already installed, including a Flight Designs airplane, a Pipestrel Sinus and several Eastern European designs I'd never heard of. The engine is essentially in production and will be shipping by May for LSAs. A certified version will follow.

The second surprise, of a sort, is how hard BRP/Rotax is pushing this engine as a green option. BRP makes its bacon on activities that involve burning a lot of hydrocarbons—airplanes, motorcycles, boats, snowmobiles—and it keenly understands how its very existence is threatened by worries over pollution and especially greenhouse gases. So part of the product intro day was given over to discussing the 912iS's efficiency, which is something you hear mentioned only in passing from Lycoming and Continental. American buyers aren't tuned into what's coming, but European buyers already are.

As part of its overall efficiency claims for the 912iS, Rotax says it's about 20 percent more efficient than equivalent engines—which would basically be the legacy 912 or the small Continental and Lycoming fours—and Rotax engines in general reduce CO emissions by as much as 70 percent. Since the engine is a lean runner in cruise, it will also exhaust less carbon dioxide. I haven't been able to get exact fuel efficiency on it yet, but the engineers were saying the engine basically runs at Lambda 1—more or less stoichiometric or a little leaner. I guess when the fuel flow numbers are in, that's going to be a BSFC in the low .40s, which is an improvement over the 912 and over other gasoline aviation engines, although maybe not better than a Continental IO-550 running smoothly lean of peak.

Nonetheless, if you're about to be smeared by a bunch of wild-eyed green crazies, you can at least say you're making progress and be telling the honest truth. Personally, I think that's a good thing.

How's Rotax doing this? Just as you would think they are. The 912iS is automotive-style fuel-injection design with a pair of redundant ECUs, dual alternators and knock sensing that will eventually allow lower octane gas if you want it, or just more detonation margin even if you don't. It also has direct injection, not the squirt-it-into-the-intake port used by conventional aircraft engines. It short, it's car and motorcycle technology on the fly, to which I say it's about time.

The engine will carry a 15- to 20-percent price premium over the legacy 912S/ULS, which will continue to be available. But I suspect within two years, the 912iS will be the engine of choice for the LSA market. —*Paul Bertorelli*

Paint Checklist

I greatly appreciate your informative article about aircraft paint shops. (See September 2011 *Aviation Consumer.*) It was informative and contemporary. Currently, I am doing a complete refurbishing on a 1978 Cherokee Six that I just purchased. So, I read and reread your article with interest.

I do have one criticism. *Aviation Consumer* is my favorite monthly magazine. I love reading it since you provide the uneducated, like me, with facts, statistics and hardcore data. This helps with making a purchase decision.

My only criticism of your article is that it would have been better from my perspective if you would have provided a checklist of what an aircraft paint project should include. This information would help me pick the right facility and ensure a complete job. There are so many variables for novices like me; I would like an easy-to-understand checklist. Painting 101 for Dummies. Is there such an article?

Chuck Skupin
Via e-mail

Actually, we published such a thing in the December 2006 issue. As a subscriber, you have access to this on the Aviation Consumer *Web site.*

Seneca Update

I still have the Seneca you mentioned in the recent Used Aircraft Guide on this model. It's still running great at 3705 hours with about 75 hours remaining to recommended TBO. Compressions, oil analysis and consumption have barely changed in five years.

In September 2010, I upgraded the panel with a Garmin GNS530W GPS, Garmin GTX-330 Mode-S transponder. Expenses are up just a bit and my hangar rent at Napa, California (KAPC) is now up to $267 per month.

Also, when the landing/taxi and cowl-mounted lights burn out, I've started replacing them with halogen Q4059 lights. Although more expensive, they're much brighter (at the same 100-watt rating) and last longer.

Gordon Evans
Napa, California

Turbine Upgrades

I enjoyed your turbine step-up article in the February 2012 issue. I think you missed a couple of key points, though. First, Jet-A is usually somewhat less expensive than 100LL — it's currently 7 percent less at my home airport—which helps offset the higher fuel burn of the turbine. Second, in my own step-up experience (and that of other owner-pilots I've spoken to), when compared on an apples-to-apples basis, turbines cost about the same to fly per mile as a pressurized piston with the equivalent number of engines. That's per mile, not per hour, but it's what matters most to an owner—the cost of flying a given trip.

Where transitioning owners get into trouble is that good maintenance and training is required in a turbine (maintenance by the FAA, training by the insurance companies), but is optional in a piston. So if you're currently flying a Malibu or 421 with half the panel placarded "inop" wondering whether your BFR has expired, turbines are not for you. But if you're a conscientious pilot with a commitment to top-notch maintenance and training and can afford the purchase price, a turbine is a no-brainer.

Jay Obernolte
Big Bear Lake, CA

You had a significant error on your reporting on the hourly costs on turbine aircraft in your February 2012. If you simply do that math, for example, on a King Air C90, which burns approximately 80 to 85 gallons per hour (average price of $6.50 dollars per gallon), just the fuel alone would cost $550 dollars per hour.

I have not seen operating costs for a twin turboprop under the $1000 dollar per hour mark and on aircraft such as the Twin Commander, they end up at around $1700 per hour because of the high maintenance costs.

I realize that you sourced planequest.com, however, I would recommend a more reliable source such as Conklin & de Decker. If you do not have access to this information, please let me know and I would be happy to work with you to obtain the best information for your articles.

On a side note, you might consider an article on those professionals that help buyers purchase aircraft. After all, most of us don't do our own taxes, would not even think of purchasing property by ourselves or be our own general contractor. It is why over 10 years ago, I made it a mission of mine to grow general aviation one owner at a time, by representing the buyers.

Roger Battistoni
MultiCorp Aviation

CORRECTION

In our March issue, we stated that AviationMaps by Avilution didn't support entering an entire flight plan and having it decoded. The feature was there, but with a non-standard syntax we missed. It's been changed to work akin to the majority of other apps. Several other nits we had have also been fixed with the latest release.

CONTACT US

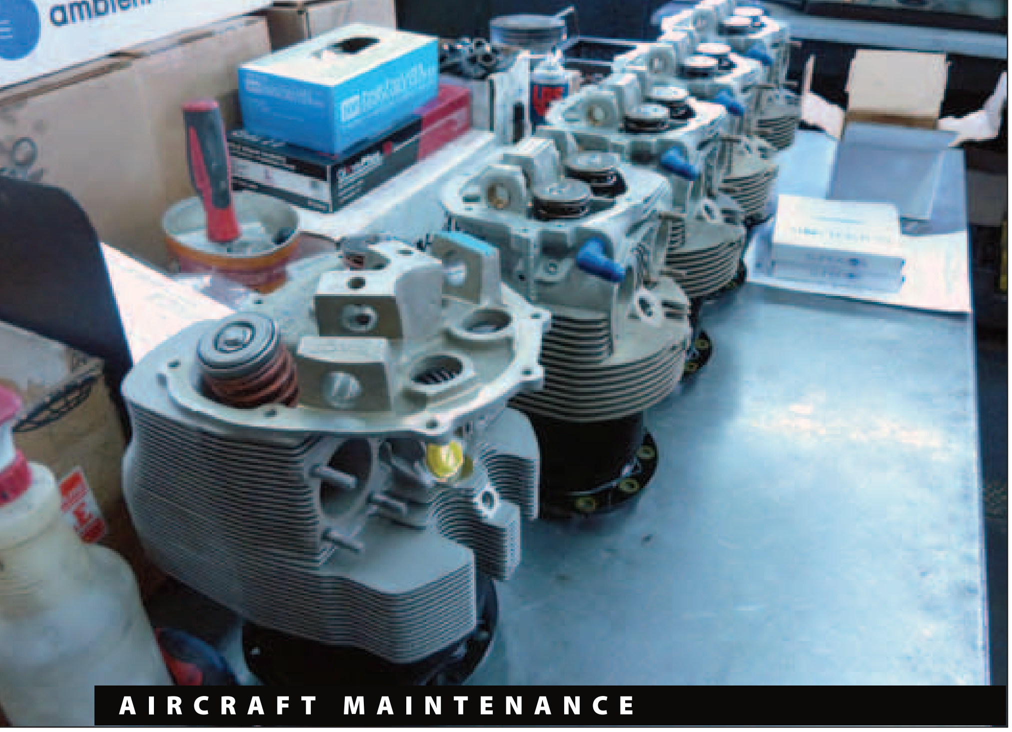
Editorial Office
941-929-1693
E-mail: avconsumer@comcast.net

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

Online Customer Service:
www.aviationconsumer.com/cs

Back Issues,
Used Aircraft Guides:
203-857-3100
E-mail: customer_service@belvoir.com

For weekly aviation news updates, see www.avweb.com



AIRCRAFT MAINTENANCE

Cylinder Survey: Top Marks for Lycoming

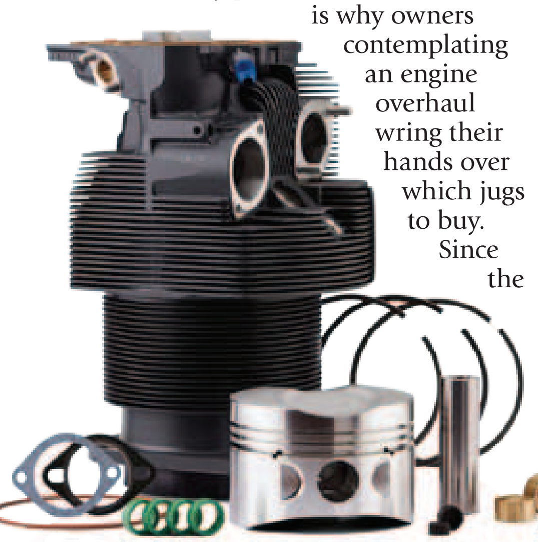
Lycoming's factory jugs engender the most loyalty and the fewest complaints. ECI also did well, but slips a little due to quality issues.

by Paul Bertorelli

Propped up on the assembly bench, aircraft cylinders—regardless of who made them—look almost alike. But they don't necessarily perform alike, which is why owners contemplating an engine overhaul wring their hands over which jugs to buy.

Since the mid-1990s, the cylinder market has waxed and waned with regard to prices, choice and competition. What's an owner to do? Ask other owners, that's what. So we recently did just that, surveying nearly 400 owners of piston-powered aircraft about their experiences with cylinders. We also contacted a few shops to query about their recommendations.

Curiously, the cylinder market has, shall we say, evened out since the last time we did this survey. We're not exactly hearing choruses of Kumbaya here, but the schizophrenic spikes in owner bile toward one company or another seemed to have been displaced by a it's-not-so-bad resignation toward cylinders that go bad now and then.



Full cylinder kits, such as the Lycoming at left, contain all the parts necessary to install on the engine. So-called stud assemblies include only the cylinder and piston.

Lycoming factory cylinders lead the league in customer satisfaction, but there are fewer complaints about Continental factory cylinders and the shops we spoke, if they make any recommendations at all, stick with the factory offerings. Eight years ago, shops were often recommending either of the two PMA houses, Superior Air Parts or ECI, either on price or performance history. Now, we hear less of that.

The shops, and, to a lesser extent, owners seem to think there are fewer complaints about Continental cylinders going soft prematurely.

WHAT WE ASKED

During February of 2012, we published our survey on avweb.com, asking aircraft owners to tell us several key things about their experiences with cylinders. We asked about the type of cylinders they had, how many hours were on the engine and what their overall experience with these cylinders had been.

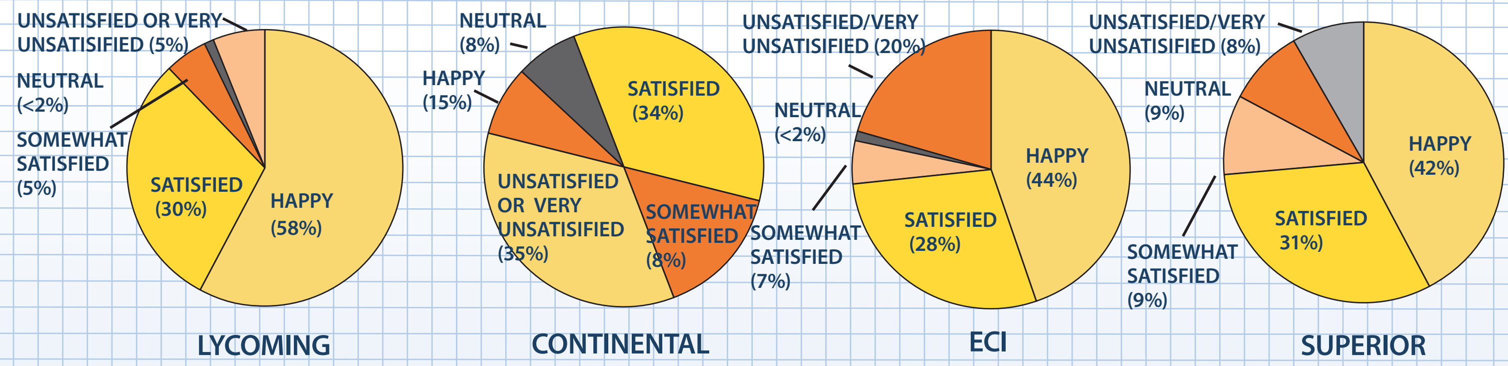
We also asked about specific shortcomings, such as loss of compression, valve guide wear and cracking and respondents were given the opportunity to comment generally on cylinder issues. Altogether, we heard from 502 owners and operators, mostly in the U.S. but from other countries as well. What follows is our summary of owner experiences, leavened by specific relevant comments.

LYCOMING

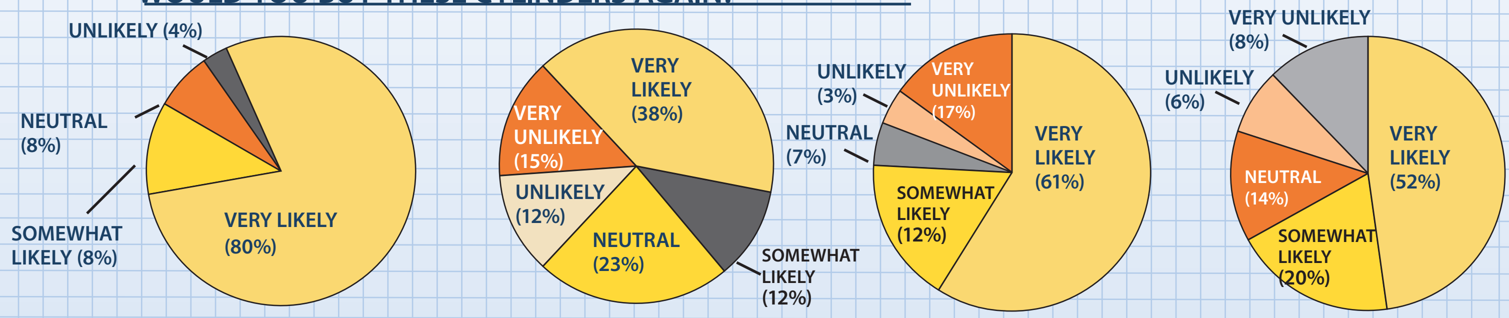
Both Lycoming and Continental faced stiff competition from Superior Air Parts and ECI during the mid-1990s, as both companies introduced competing lines of PMA cylinders for popular engines. Although it had its own quality issues with crankshafts, Lycoming didn't take the competition lying down. Its cylinders have traditionally had a good reputation for durability and on those engine models where Superior and ECI joined the fray, Lycoming reduced prices aggressively.

We're sure it has gained back market share as a result, although we don't know how much. But it has also gained the highest percentage

OVERALL, HOW SATISFIED ARE YOU WITH YOUR CYLINDER CHOICE?



WOULD YOU BUY THESE CYLINDERS AGAIN?



LYCOMING

- (+) High customer satisfaction.
- (+) Few quality control complaints.
- (−) High prices where no PMA competition exists.

CONTINENTAL

- (+) Shops, customers report improving quality...
- (−) ...but overall customer satisfaction is low.
- (~) ECI Nickle+Carbide can improve durability but at extra cost.

ECI

- (+) High customer satisfaction.
- (+) Wide PMA options; Nickle+Carbide a plus.
- (−) Owners steamed about head-separation AD

SUPERIOR

- (+) Millennium line still well regarded.
- (~) Bankruptcy absence hurt perceptions.
- (−) High negative experiences compared to Lycoming.

of customer loyalty, at least among our survey takers. An impressive 79 percent of Lycoming cylinder owners said they would buy these jugs again and if we add the somewhat-likely-to-buy-again buyers, the total is 90 percent. That's as high a customer approval rating as we've seen in any of our surveys. Moreover, Lycoming negative perceptions appear to be quite low. Only 3 percent said they wouldn't buy these cylinders again.

The reason for this high degree of satisfaction is revealed by the details of the survey. When we asked about specific problems with Lycoming cylinders, only small percentages reported such anomalies as premature loss of compression, valve guide wear or high oil consumption.

"I can't say enough about a factory engine [from Lycoming]. For a small percentage more, you get the best, period," said owner Claude von Plato. A handful of owners report owning Lycoming engines that have been in service for years without cylinder changes.

"My engine is an O-360-A2F. It's in a 1969 C177A. It has never had a cylinder off, according to a complete logbook," says Cardinal owner Monty Keim.

But none of this is to suggest that owners of Lycoming engines don't have complaints or problems and some of them relate to the well-known Lycoming "morning sickness" of sticking valves.

"Lycoming cylinders on an O-540. Pretty bulletproof at 235 HP output, but you do need to rope and ream the valve guides every 500 hours to avoid a hung valve. Most airplanes just don't fly regularly and suffer the consequences," said Jeff Chipetine.

Although complaints about Lycoming cylinders aren't what we would call frequent, those we do hear often relate to valve issues.

"I had one cylinder overhauled for valve-guide wear," said Peter Schmeelk. "I got tired of having the spark plug completely fouled with oil. The shop replaced the exhaust valve and springs as well as the valve guide. The cylinder and piston assemblies were factory-new when installed."

Lycoming factory cylinder bores are nitrided for hardness, which seems to work. We saw few complaints of premature loss of compression or cracking.

CONTINENTAL

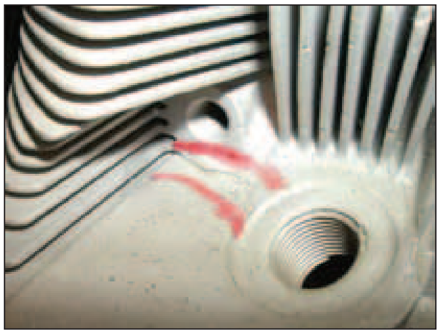
And on that count, Continental fared less well in our survey, with complaints about cylinders going soft just a few hundred hours after being installed. The good news—confirmed by engine shops—is that complaints about premature compression have abated somewhat, since reaching epidemic proportions in the early 2000s. "Now that Continental has put some choke back in the cylinders, that's pretty much over," says

SELECT ENGINE PRICE COMPARISON					
ENGINE	LYCOMING FACTORY	CONTINENTAL FACTORY	ECI*	SUPERIOR	ECI OVERHAUL W/ NICKLE+CARBIDE
Cont. O-200	N/A	$804-$919	$1176	$910	n/a
Cont IO-360	N/A	$1414	N/A	N/A	$1393
Cont. O-470	N/A	$1335	$1300	$1250	$932
Cont. IO-520	N/A	$1570	$1619	$1250	$933
Cont. IO-550	N/A	$1601	$2025	N/A	$1063
Lyc. O-235	$1721.66	N/A	N/A	$1200	$1080 (steel only)
Lyc. IO/O-320/360 (parallel valve)	$1176.12	N/A	$989	$1120	$989
Lyc. IO-360 (angle valve)	$2230.02	N/A	$1127	N/A	$1127
Lyc. IO-540***	$2572	N/A	$1127	N/A	$989
Lyc. TIO-540	$1771.14	N/A	$1096	N/A	$1096

Prices shown are suggested retail. Street prices are often $200-300 less. Ranges indicate differing prices for differing engine configurations.
*** Prices are for ECi Nickel+Carbide. Steel barrels are also available, usually for $100-200 less.**

Charlie Melot at Zephyr Engines in Zephyr Hills, Florida. Nonetheless, Continental factory cylinders don't engender near the owner loyalty that Lycoming enjoys, according to our survey. Only 40 percent of owners said they would buy Continental again and that rises to 51 percent if the somewhat-likely-to-buys are included. But fully a quarter—26 percent—told us they are unlikely or very unlikely to buy Continental cylinders again.

What's the problem here? The matrix of complaints about Continental cylinders is quite different than what we saw describing Lycoming products. A third of our survey respondents (33 percent) said they had to have a Continental cylinder removed for work for any reason compared to 21 percent for Lycoming owners.



Most shops, such as Certified Engines in Opa-Locka, Florida,left, don't seem to be making strong recommendations on cylinders, nudging customers toward factory options. Cracking around the spark plug hole used to be common on Continental cylinders, top photo, but our survey reviewed few instances of it. Premature loss of compression is a complaint, however.

The chief complaint continues to be unexpected loss of compression.

"Replaced a [Continental] factory reman with another factory reman. One cylinder showed very low compression (30/80) while still less than a year old. Cylinder replaced under warranty; factory analysis showed valve seat improperly installed—slightly askew and off-center," said Mooney owner Alan Marcum. Alan Chase had a similar experience: "My IO-550-B lost compression after about 350 hours. Continental replaced them all under warranty."

Although Continental owners seem to have more complaints about cylinder durability than Lycoming owners do, that's not to suggest our survey didn't turn up a lot of satisfied customers. "I fly a TCM reman. The engine has been reliable, sturdy and stable. I have had to repair two cylinders in 1700-plus hours of flying. I do not consider that to be unusual, considering the harsh environment that air-cooled engines live in. TCM did a fine job in remanufacturing my engine. The old adage is true: You must either fly the damn thing or you will have to fix the damn thing! Your choice," wrote John Voniski. A number of owners voiced similar observations and we think observations from shops that Continental quality has improved carry significant weight.

ECI

All of the cylinder manufacturers have, at one time or another, experienced quality control crises. For ECI, which has the most complete line of PMA cylinders for both types of engines, it was head-to-barrel separation issue that led to an AD. It requires 50-hour inspections/compression checks or replacement of the cylinders in the Titan line. Owners tangled up in this AD are obviously unhappy and although this didn't seem to dominate the survey comments, it didn't go unmentioned, either.

"After the big fiasco with ECI parallel-valve engine cylinders and ECI not stepping up with some sort of repair, I will never again purchase or recommend an ECI cylinder. I am essentially stuck with cylinders that do not have any approved repair, have to be thrown away after TBO or, worse yet, could come apart at anytime," said Curtis Jones, an A&P.

Our survey doesn't reveal if this episode specifically dented ECI's customer loyalty, but we did note a slight decline in customer preferences toward ECI. When we asked this question in 2008, 80 percent said they'd buy ECI cylinders again, but this time around, 58 percent said they would be likely to buy ECI cylinders again. Similarly, shops told us they are neither recommending nor avoiding ECI cylinders, but rather making the customer aware of the choice and letting them decide for themselves.

Of the 74 customers we heard from, 20 told us they had to remove cylinders unexpectedly, or 20 percent—about the same as for Lycoming. Common complaints seem to relate to cracking or the aforementioned AD.

"My partner in the airplane at that time talked me into using ECI cylinders at overhaul. I have had several problems with the cylinders over the years and do not plan on using them in the future. I am going to stay with OEM products, Lycoming or Continental," said Curt Aalund.

But ECI can claim plenty of success stories, too, like this one from owner Rich Giblin: "I topped this IO-550A in 2004 using ECI cylinders (because they were highly rated by *Aviation Consumer*). Flew them hard for 1573 hours without issues and very low oil consumption. Majored the engine in late 2011 (2725 hours on the bottom end) and discovered a small crack

HOW'S IT WORKING?

ECI OVERHAULS, NICKLE+CARBIDE: POSITIVE REPORTS

Unique among the primary cylinder providers is ECI's option of in-house overhauls that are sent out with its proprietary Nickle+Carbide surface treating process.

This is a $200 upcharge per cylinder for new cylinders and all of ECI's overhauls get the treatment. Nickle+Carbide is an outgrowth of Nikasil cylinder treatments used for years in the automotive industry but, except for ECI, unique to conventional aviation engines.

ECI has been through several evolutions of this technology, beginning with CermiCrome in the early 1990s. That process proved problematical due to wear and oil consumption issues and was discontinued in 1997. It was followed by CermiNil and eventually ECI's current trade name, Nickle+Carbide. The treatment is supposed to—and evidently does—provide a harder, more wea- and corrosion-resistant surface than the OEM nitriding process.

ECI's Tim Morland says it can be done on a custom basis to OEM cylinders, but the company discourages it due to cost. (It's about $350 per cylinder for new, non-ECI jugs.) ECI prefers to offer Nickle+Carbide as an upsell to its own new or overhauled cylinder lines. Morland says it takes about three weeks to turn around a customer cylinder sent in for overhual.

Our previous surveys have revealed a high degree of customer satisfication for both CermiNil and Nickle+Carbide, particularly for engines that aren't flown often and which are susceptible to corrosion.

"I have two engines with CermiNil cylinders. They use very little oil, run good compressions and certainly last longer than factory TCM cylinders. In 80-octane engines, they tolerate 100LL much better than factory TCM engines. They are just a better product overall," says owner Steve Wilson. Added Craig Ehman: "Had cylinders removed due to low compression and exhaust leak, plus two oily plugs. Flew the airplane down to River City Aircraft Engines in Castroville, Texas. Guadeloupe Dimas removed the cylinders and I delivered them via a 30-minute drive to ECI. They rebuilt my low-time cylinders and did the CermiNIL process. Best money I ever spent."

Not too surprisingly, given the good results owners seem to get with Lycoming cylinders, almost all of the comments we heard about CermiNil or Nickle+Carbide were for Continental cylinders.

"Cylinder wear is historically not the life-limiting issue on my relatively low temperature, low-stress installation (Lycoming O-360 in a Cardinal), so the extra cost of exotic/coated/super-premium cylinders didn't seem to make sense to me," said owner Bob Spofford .

We agree. We wouldn't bother with Nickle+Carbide on Lycoming cylinders unless they were being overhauled by ECI, in which case the process is standard.

SUPERIOR: BACK IN BUSINESS

Superior Air Parts, after a rough patch of bankruptcy following its acquisition by Thielert AG, is back in the cylinder business. Although Lycoming made a run at buying the PMAs for its Lycoming cylinders, the bankruptcy court rejected the offer and Superior was bought in 2010 by Chinese interests.

As of March 2012, it was in the processing of bringing most of the Millennium line, according to Superior's Kent Abercrombie. These include the popular cylinders for large displacement Continental engines and a selection of four-cylinder Lycoming engines.

Abercrombie told us the vendor supply chain for Superior cylinders is similar to what existed before the bankruptcy. Components are sourced on the world market, but the final assembly and QC is done domestically. Abercrombie said that Superior's Chinese parent, Superior Aviation, Bejing, will act an Asian distributor but will not, at least for the short term, do any manufacturing. Most of the product flow will be into China, not out of it. We asked what Superior's expansion plans might be for its cylinder line.

"Quite honestly, right now we're just trying to get back where we were before the bankruptcy. 2012 is going to be our stabilizing year," Abercrombie says. "But we do have some additional cylinders. We have the A65 and that will mostly likely be back on with the next six months," he adds.

in one ECI cylinder. Had Penn Yan rebuild the same engine using ECIs again. Should start break-in this week."

SUPERIOR AIR PARTS

The hard luck company among our Gang of Four cylinder builders is Superior Air Parts. It came into the market with a big bang in the 1990s with the well-regarded Millennium line of cylinders. But things went downhill for Superior when it was purchased by the German diesel engine company, Thielert AG, in 2006.

Two years later, the GA market tanked and Superior went bankrupt, removing a major competitor from the market. Superior reorganized and in 2010 was snapped up by a consortium of Weifang Tianxiang Technology Group and the Chinese government. It operates as a subsidiary of Superior Aviation, Beijing, but as far we know, none of the products are made in China.

A year ago, Superior began slowly ramping up production of Millennium cylinders for some popular Lycoming and Continental engines. Having been in hibernation for two years, Superior didn't loom large in our survey, nor is it a bright blip on the radar of field overhaul shops we talked to. (These shops have definitely tilted toward factory cylinders.)

Survey responses on Superior were somewhat polarized. About half said they would definitely buy them again, while an additional 19 percent said they were somewhat likely to purchase Superior cylinders again. But 20 percent said they were unlikely to buy Superior cylinders again, a negative second only to Continental.

We're not quite sure why this is so, since a low percentage of readers reported problems with Superior cylinders and there's no clear pattern to the complaints. We heard from three readers who reported premature compression loss, three with valve guide wear and three with high oil consumption.

RECOMMENDATIONS

As noted earlier, the last time we did our cylinder survey, Lycoming and ECI came out as clear winners. In this survey, Lycoming has, improbably, improved its rating among survey takers and it gets few complaints.

ECI has declined a little, but perhaps not so much to be of consequence. The same can't be said of Continental. Although we weren't overwhelmed with brickbats hurled at Continental, its overall satisfaction ratings remain the lowest of all the companies surveyed.

With that in mind, for Lycoming engines, we don't see a compelling reason to use anything other than factory cylinders unless the factory price is significantly higher because there's no PMA competition, in which case overhauled cylinders may be an option. For a couple of hundred bucks more per cylinder, we wouldn't sniff about paying for the factory parts, given what appears to us to be sterling performance. If you have sound first-run Lycoming cylinders, ask your shop about the option of overhauling them. It might be a cost-effective option.

Conclusions on Continental cylinders are less clear cut. We hate to weasel out on this, but the data just doesn't support black-and-white conclusions. The shops we interviewed tell us they're fielding far fewer complaints and returns on Continental factory cylinders than they were five years ago.

It's possible that the low ratings and negative comments we collected in our survey are artifacts from the days when so many owners had trouble with their Continental cylinders. Or perhaps the survey wording resulted in inconsistent responses.

Either way, we lean toward ECI cylinders for Continental engines for now. And considering how much owners seem to like ECI's Nickle+Carbide treatment, if budget allows, we think it's worth considering for any new cylinder as a hedge against premature wear and corrosion, especially for an engine that's not flown frequently. And these days, that's most engines.

As for Superior, we'll keep an eye on their return to production, pricing and delivery schedules. For now, we just don't have enough data to judge the new products. But we see Superior's re-entry into the market as nothing but good news, given how the OEM inflate prices for cylinders for which there's no PMA competitor.

TBM 850: Fast, Comfortable, Manageable

For a 300-knot-plus turboprop, the TBM is remarkably easy to operate, although most pilots will let the autopilot do the work. Five years of free maintenance sweetens the deal.

AIRCRAFT FLIGHT TRIAL

When you put a sharp pencil to it, a 20-knot speed advantage for one airplane over another really isn't squat. It amounts to 12 minutes on a 500-mile trip. But how about 50 knots or even 100? On a 1000-mile trip, that's the difference between landing just in time for dinner or arriving early enough for a round of golf and cocktails. Above 300-knots cruise speed, the space-time scale shifts and that's where the Daher-SOCATA TBM850 lives.

The airplane is a no-apologies, uncompromised high-altitude personal transportation aircraft that enjoys, if not high-volume sales, a loyal following and an improved market thanks to the lukewarm blooming of the very light jet market. Daher-SOCATA is positioned to sell about 30 to 50 TBM850s a year and although the company sees an international market for the airplane, most of its sales are in the U.S. where there's enough wealth to support the $3.4 million sales price. What do you get for that? An honest, 300-knot airplane with sophisticated automation, a comfortable 1200-mile range and a cabin that seats four with flexible loading options that make it practical to carry large and heavy cargo, in addition to a couple of passengers. A recent additional pot sweetener is free maintenance on everything but consumables for a period of five years. If it sounds like Daher-SOCATA is confident in the reliability of the TBM850, they seem to be just that.

MODEL HISTORY

The 850 traces its roots to the early 1980s, when a group of French investors bought Mooney just as the company was developing a big cabin-class piston single to compete with the Cessna 210 and, eventually, the Malibu. That Roy LoPresti-developed airplane, the 301, flew in 1983, but it never reached production because the investors thought it would be too slow at 260 knots. (That is, by the way, about the cruise speed of two of the TBM850's competitors.)

Since Mooney didn't have the resources to redevelop the airplane as a turbine, the investors set up a joint venture with SOCATA. What followed was development by SOCATA that eventually yielded the TBM700, which appeared in late 1990 at a price of about $1.3 million. Although Mooney and SOCATA parted ways, the "M" in TBM derives from the Mooney connection, with the TB meaning Tarbes-built, where the airplanes are still manufactured. Originally, Mooney's Kerrville plant was supposed to run a second line for the TBM700, but it never hap-

TBM850 interior, left, can be configured with club seating, center photo, or with two seats and expanded cargo area, top photo. G1000 installations, lower photo, have 15-inch center MFDs.

pened. The TBM700 proved a good seller, albeit in that small volume niche of the expensive, owner-flown turbine market. Even against newer designs such as the Pilatus PC-12 and the Piper Meridian, the TBM700 was fast, touching 300 knots, although real-world cruise speeds were less.

With the success of the TBM700—some 324 were sold—SOCATA saw room for a faster variant that could climb and cruise quicker, but carry about the same load, if not a little more. Thus was hatched the TBM850, with a more powerful PT6A-66D engine and, since 2008, glass cockpits and digital autopilots.

FLEXIBLE CABIN

The airplane itself is not huge; think of it as a cross between a King Air and a Malibu. Wingspan is 41.6 feet with a fuselage length of 35.9 feet. That might fit in the largest T-hanger, but at 14.3 feet, the tail might not clear the door. Large box or group hangars are the more likely choices. The cabin is about 4 feet wide and tall, not quite tall enough for standing up.

Unusual for pressurized airplanes, the TBM850 has a large, top-hinged main cabin door reminiscent of an airplane intended for cargo. The version we flew had four cabin seats in club arrangement, but all 850s for 2012 have the option of re-configuring for two cabin seats, opening an enormous rear area for cargo or luggage.

With full fuel, the TBM850 has payload of between 830 and 900 pounds. So with four people aboard, you could stuff another 150 to 300 pounds into the airplane. Fueled for 900 miles (200 gallons), you can fill the seats and still have more than 400 pounds of additional payload.

In the real world, says SOCATA's CEO, Nicolas Chabbert, owners tend to fly with two or three aboard and full tanks. Even if they don't stretch the airplane's range, the additional fuel offers alternate options in poor weather, which this class of airplane is likely to tackle. (It's fully de-iced with bleed-air inflated pneumatic boots.)

Because the cabin is not quite as wide as larger turboprop twins, getting into the cockpit through the seat aisle from the rear is a squeeze. SOCATA's solution to this is a crew door for the pilot, with a small folding step. You can thus load the passengers and secure the main door, then man up the front.

The TBM850 appeared in 2006 as the TBM700 follow-on. The early airplanes had steam gauges but as of 2008, all are Garmin G1000 equipped, with two EFIS displays and a 15-inch center MFD. Current models have Garmin's GFC700 autopilot and most are shipped with a wing-mounted pod for ship's radar. The G1000 airplanes are lighter enough to have picked up 20 additional pounds of payload.

Airplanes in this class are typically shipped with all the options, but the TBM850 has so many standard features that the list isn't very long. The cabin can include a chemical toilet and cabinets, and buyers can spec customized paint and interior wood trim, among the add-ons. Before 2010, a five-year maintenance plan was an option, but now it's standard. That includes five annuals and all repairs involving non-consumables, a deal that strikes us as a strong sales point.

"More and more, people don't want to deal with it. They want us to do all the maintenance," Chabbert says. This can be done at any of SOCATA's 14 U.S. service centers, one of which is at North Perry Airport in Florida.

Typical invoices, says Chabbert, are in the $3.4 million range, a price point a bit above the Cessna Mustang and well above the Piper Meridian at about $2.1 million. Although not a direct competitor, the other big turboprop in this space, the Pilatus

SOCATA SALES: NORTH AMERICAN-CENTRIC

SOCATA president Nicolas Chabbert was in Florida during *Aviation Consumer's visit.* Here are his views on the company's market position.

How has SOCATA fit into the larger Daher conglomerate structure?

Basically, Daher has acquired in 2009 70 percent of SOCATA from EADS. EADS is a large conglomerate equivalent to Boeing or Lockheed, with many operating units. We were part of that.

Daher has two core businesses; one is aeronautics, basically as a subcontractor for the majors such as Airbus, Eurocopter or Dassault. The second part is more traditional, having to do with logistics. The model of Daher is manufacturing on one side, service on the other. SOCATA represents about half of the Daher aeronautical group.

Obviously, the TBM850 is the flagship product, but what else does SOCATA manufacture?

SOCATA is a 50 percent company, 50 percent in the complete product, which is the TBM, and on the other side, 50 percent in subassemblies. We are involved in many programs with Airbus. We have built the airframes for the Eurostar helicopters AS355 and 350s. We produce some parts for the Airbus 380. We also produce the fuselage for the Falcon 7X. The TBM is made in Tarbes.

Speaking of Tarbes, the Tampico, Trinidad and Tobago are still supported by SOCATA. Will these come back into the market?

It's a difficult question because on the one hand, the willingness to get back in production [with pistons] is still there, but on the other hand, the economic reality and capability to get back into this type of business is difficult, given the size of the groups and our objectives.

It is not something that's going to happen as it used to be. So we would have to have another third party that would supplement the business and be involved in manufacturing. We have not found this. For the last seven years, we have provided an equivalent level of support for these airplanes as if they were still in production.

Does the TBM850, does it have a marketing advantage because very light jet sales haven't really potentiated?

The TBM850 is competing with light jets, but it is a different offering. The VLJs have other attributes which are very different. The 850 is providing the speed typical of the light jets, but at the same time, it does that with more efficiency, better useful load and range. That separates the TBM from any other offering.

Are you surprised that VLJ sales haven't been greater?

Yes and no. I'm not surprised by the numbers that were promised and never reached because I never believed in them. Numbers in the thousands was totally outside the real world. The reality of the market is about 150 aircraft a year. Maybe 200, which I still think is remarkable. But the market has expanded by that many airplanes a year, which I think is a success. We have looked at a VLJ for SOCATA, but we didn't believe the product separation for us was great enough.

If you look at the world market, where do you see the strengths?

For us, the U.S. is the largest market. That is where the turboprop and light jet is basically sold. Europe is secondary, but kind of on the backside now. Latin America is picking up a lot. This is different from the big jets, which are more involved in Asia.

We hear a lot about the Chinese market. Is it overstated?

As far as the lower side, which we represent, I think it's not even stated. Nobody knows the potential we may have in China. I think the market is understood for the big cabin jets. But it doesn't mean that if it's strong for them, that it is for us.

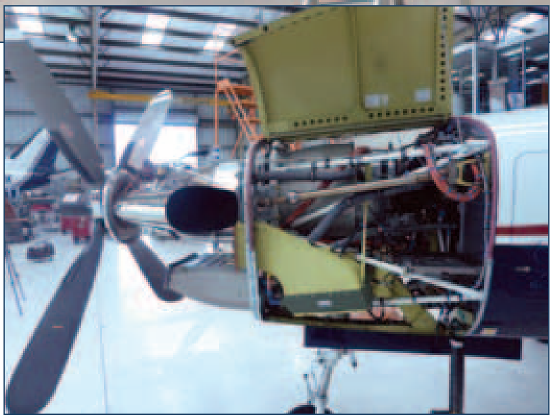
We've seen some limited success on the piston market. So today, I don't see any reality for this side of the market for us. The latest numbers I have seen predict 400 airframes for perhaps the next 10 years. But that's nothing like the volume in the U.S., still.

Who are the buyers of the TBM? How do they use it?

The majority of our buyers are owner/pilots for private transportation. They decide for themselves, buy for themselves, fly for themselves and maintain for themselves. They use it in their business, but I define professionally flown business aircraft as having others fly and maintain the aircraft.

What's ahead for the TBM850?

We will continue to refine the aircraft. We don't have a precise idea of what, exactly, but we have conducted some work at the factory which we will be happy to talk about when we are ready. For now, we think the TBM is ideally positioned for the ultimate personal transportation aircraft.



At its North Perry, Florida, facility, SOCATA has a full maintenance shop. The company has had good success with the Pratt & Whitney PT6A-66D, lower photo.

PC-12, sells for about $4.3 million. As Chabbert explains on page 13, SOCATA sees definite daylight between the appeal and cost of operation of its large single-engine turboprop and an entry-level jet such as the Cessna Mustang or the revitalized Eclipse.

"We are more head to head with the VLJs, which probably has to do with price. We used to have competition with the [Embraer] Phenom, but not so much anymore," Chabbert says.

BIG ENGINE

To make an airplane climb and cruise faster, the simple solution is more horsepower and that's what SOCATA did with the TMB850. The previous model had a Pratt & Whitney PT6A-64, with 700 HP while the 850 has a PTA-66D, with 850 shaft horsepower. These are essentially the same engine, but the 66D has improved metallurgy in its compressor section that allows higher operating limits and thus more power. The -64 was limited to 800 degrees ITT while the -66 allows 850 degrees, which, in operation, the airplane doesn't seem to approach.

Adding another 150 HP—21 percent—posed some certification and engineering challenges related to handling all that torque, especially on takeoff. SOCATA addressed this simply and directly by designing the TBM850 to operate in two engine modes, 700 HP and 850 HP. The higher value is locked out by a switch on the flap control. After takeoff, with the flaps retracted from the takeoff position, you can slide the selector to 850 mode and enjoy the marvel of 2000 FPM climbs. The -66D can best be described as a semi-FADEC engine. With 700-HP mode engaged, it's automatically torque limited. But in either mode, there are no automatic temperature protections, so the pilot is on his own to guard the fuel if a hot start or other over-temp event occurs.

"Most hot starts are because of a weak battery," SOCATA's demo pilot, Wayman Luy, told us. Training for the TBM850 also encourages pilots to have the airplane towed into the wind before start. "Downwind starts are a real no-no," Luy adds.

Managing these temperatures isn't particularly difficult, once you know where to look for the gauge—a virtual analog represented on both the PFD and MFD. Other than adding fuel at 13 percent Ng, startup is mostly automatic. Given the 850's extensive automation, we wondered if it will ever get a full FADEC-protected engine.

CONTACTS

Socata North America
www.tbm850.com
954-893-1400

AC TV

AVweb
http://snipurl.com/22hfepc

"We have asked this of Pratt & Whitney," Chabbert says. "The economics just aren't right. The costs would go through the roof for this engine." While we're on costs, Michel De Villiers, SOCATA's VP of sales, quotes a flat $100 an hour for maintenance and reserve costs on the engine, plus fuel. Block-to-block fuel consumption is in the 60 GPH range, depending on altitude and power setting.

FLYING IT

As with every other modern airplane we've flown, the G1000 stands between the pilot and simplified operation. If you're current and comfortable on the system, the airplane kind of tags along with your operation of the avionics. And this is very much an autopilot airplane, from initial climb to pre-landing. SOCATA has a six-day initial program at Simcom and insurers generally require once-a-year recurrency. If you came in knowing the G1000 cold, this is a generous amount of time, for it's a remarkably simple airplane to fly and hard to get into trouble in, even for the ham handed.

Perhaps the biggest challenge is just staying with or a little ahead of its raw speed. At 2000 FPM per minute, you can blow through a low-altitude IFR restriction in a heartbeat, thus knowing how to arm the autopilot for altitude capture is critical if you lack anticipatory position awareness. On descent, this will be magnified, because it's hardly unusual to see 350 or 400 knots groundspeed with a good push. Fortunately, the GFC700 can easily handle things like programmed descents and crossing restrictions, if you know how to tickle the right keys.

If anything surprised us, it's how well this airplane handles on the ground. Wayman Luy had us try some

continued on page 32

Lightning Detectors: Still Worth Having

Demand for lightning detectors has plummeted in favor of datalink. We think there's still a real place for sferics, however, and Avidyne's TWX670 excels.

CHECKLIST

- (+) Sferics offers true real-time storm depiction and new technology performs well.
- (−) Installation is finicky and expensive. Botching it makes sferics worthless.
- (−) Datalink might offer bigger picture and be a better investment.

by Larry Anglisano

Back in the day if your aircraft sported a Ryan Stormscope, you might lead the way around buildups just like the heavy iron did with ship radar. Today, many owners are yanking old Stormscopes and StrikeFinders from the panel in favor of datalink radar. After all, your trusty portable GPS saddled up with satellite weather tells you everything you need to know about storms.

This argument is highly debatable, and that's why there's still a market for traditional lightning detection gear. The good news is that the used market is littered with models of all vintages to choose from. There's also the high-end Avidyne TWX670 and proven WX500 Stormscope, both of which are compatible with many existing displays. Don't count on an easy or cheap installation, however. Installing this gear in an already packed airframe is more challenging now than ever.

SFERICS 101

On-board lightning detection is considered a real-time avoidance system since it's listening for and paints actual electrical energy around the aircraft. Most intracloud, cloud-to-cloud and cloud-to-ground lightning strikes should show up on a properly working system. Contrast this to satellite-delivered lightning products that may not show all kinds of lightning strikes (see sidebar) and may come with an inherent delay as well as other displayed limitations. Like is said about datalink radar, sferics systems should be used as gross vectoring aids and not for storm penetration.

Sferics systems aren't foolproof. New users must learn to interpret the patterns of painted lightning strikes and get a feel for their distance and strength. Newer systems have strike rate counters that detail building or dissipating storms plus pilot-selectable cell and strikes mode that aid in storm interpretation. Better displays and newer processors might help overcome the issues of radial spread and deciphering what's a bogus strike or one that's associated with a brewing storm.

It gets trickier as you get closer to the action. A condition called 'splattering' is a random pattern of strikes that appear when the aircraft is in close proximity of a cell. Avidyne's new technology addresses this with a processor that excels in accurately painting activity at close range—a place where most systems fall short.

Cutting-edge processing and display makes the TWX670 (below) worth the install cost for some. Installing even a free WX8 (left) isn't worth it for anyone.

USED MARKET? CURB YOUR OLD-GEAR ENTHUSIASM

We'll tell you up front: For standalone systems that offer their own display, we wouldn't bother with a screaming deal on anything older than a WX950. Later-vintage StrikeFinders would be OK so long as they sport a newer antenna and recent factory visit.

WX500s sometimes get salvaged and that can be a deal if you're careful about the NY163 antenna. One owner bought an "as removed" system from a salvage dealer for a song. When the installing shop sent the system to the factory for testing and certification, the antenna was found to be waterlogged—the aircraft was salvaged from a swamp, it turned out—and the factory condemned it. There's no repair, and the replacement antenna cost nearly $1000.

We scanned a detailed search of reputable used avionics sources, including Controller.com, and found the average cost for a serviceable and complete WX500 was around $2500. Older WX1000s can be had for $1000 if you must.

It's important to work closely with your installer when buying used systems because the installation kits, hardware and required cabling are critical to an installation. Before buying, have your shop price out the cost of a new installation kit in case the hardware that comes with the removed system isn't useable. This install material can turn into a real expense, making an otherwise good deal a sucker hole for your wallet.

Sferic systems generally rely on other systems in the aircraft. A lightning detector that knows the aircraft's heading eliminates the need to clear the screen and repaint the activity every time the pilot turns. Even entry-level AHARS systems can be used as a reliable heading, but sync from a mechanical HSI often requires the addition of a 26-volt AC, 400 Hz inverter.

REAL STORMSCOPES

Lightning detection systems are often generalized as storm scopes. That's because the industry-standard Stormscope line dates back to the 1970s when Paul Ryan invented the WX7 Stormscope. While we wouldn't buy one of these old units except maybe to buy a piece of aviation history, there are some Stormscopes worth buying. The WX500 remains in the L-3 Avionics product line and is a worthy choice. It's a blind system that interfaces with a huge variety of third-party displays. Most MFDs and EFIS displays (including the Sandel EHSI line) are on the list, as is the entire line of Garmin GNS- and GTN-series navigators.

The two-piece WX500 is a remote processor that's usually mounted in the tail section of the aircraft and is saddled to an antenna that can be mounted on the belly or top of the fuselage. The processor weighs 2.5 pounds and is reasonably compact at 5.6 inches high and 12 inches deep. It has multiple outputs, so it can drive more than one display. There's a caveat, however; when interfacing with the Garmin GNS 400 and 500 series navigators, lightning data can't be displayed on the GPS's map page unless the system is heading stabilized or with a so-called heading "bootstrap."

For dedicated display rather than an output to an MFD, we like the WX950 Stormscope. It looks ancient with its CRT display, yet it's a decent performer with both cell and strike mode, rate counter, 200-mile range and the ability to slave with a heading system. The WX950 trickled down from the old WX1000, a three-piece system that included a space-eating remote processor. They're all over the used market in various flavors. See sidebar for tips on hunting a used unit.

The Insight Avionics SF2000 Strike Finder isn't technically a stormscope, but it fills the same role. Early units suffered from antenna problems, but it hung in there and became a popular seller. It's still in the company's lineup with sensors that utilize broadband digital sampling. Insight says this offers a greater bandwidth that leads to improved signal fidelity and better unwanted noise rejection. The original plasma displays have been discontinued, replaced only by LED assemblies. Systems with later serial numbers and mod status were good performers with an option for a bolt-on heading synchro module. This simplified heading input.

AVIDYNE TWX670

Avidyne's two-piece (three with a display) tactical weather avoidance TWX670 system is the most modern sferics device to be had. It's also the most expensive at $7995. Introduced a couple of years ago, the system is parts of Avidyne's MHAS or multi-hazard awareness line.

What makes the system different from other sferics is its ability to accurately detect and paint lightning at close range, as well as accurately detect the bearing of the strike. The receiver and system processor also filter the radial spread or splatter that's inherent in other brands units.

A WX500 can play on four displays, with only one of those displays capable of mode control. The TWX670 can drive up to seven exter-

CONTACTS

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

Insight Avionics
905-871-0733
www.insightavionics.com

L-3 Avionics
800-253-9525
www.l-3avionics.com

nal displays—perfect for the modern, high-tech cockpit—and every display can have control over the system. That's because each display interfaces via its own bidirectional RS232 serial port. Avidyne also offers a dedicated MHD300 color display.

While the Stormscope products paint lightning symbology as on-screen "X" and "+" symbols, Avidyne does it with hexagonal dots that are color coded if played on a compatible display. Up to 1024 of those dots can appear on the screen at corresponding range and bearing relative to the nose of the aircraft. When we flew behind a TWX670 last summer in a Piper Matrix equipped with Avidyne's Entegra color screen we found the symbology to be intuitive and accurate especially maneuvering around an increasingly volatile atmosphere that had the system working hard.

The TWX670 is unique in that it can do voice call-outs when strikes are within five miles—"lightning, one o'clock"—much like a traffic system. The installer must tap into the aircraft audio panel's switched or unswitched audio channel. Whether this extra effort is worth the expense is up to you. To us, seeing the drama of close-by convection unfold on the screen is enough.

THIS INSTALL MATTERS

It's not uncommon for sferics installs to top the $8000 mark. That's realistic given the complexity of a quality installation. Run, don't walk, away from low-balled quotes. This is specialized work that will leave you chasing bogus lightning strikes if done wrong.

That's because sferics weather-mapping systems detect electrical discharge activity. As a result, the installation and placement of the components—particularly the antenna—is critical. An antenna cable passing too close to RF transmitters and servo actuators can cause false strikes that will drive you bonkers. As a rule, the antenna should be at least five feet from strobe lamps and power supplies, three feet from autopilot and trim servos, two feet from transmitting antennas, and five feet from fluorescent lamps and ballasts. The antenna and cabling must be out

continued on page 19

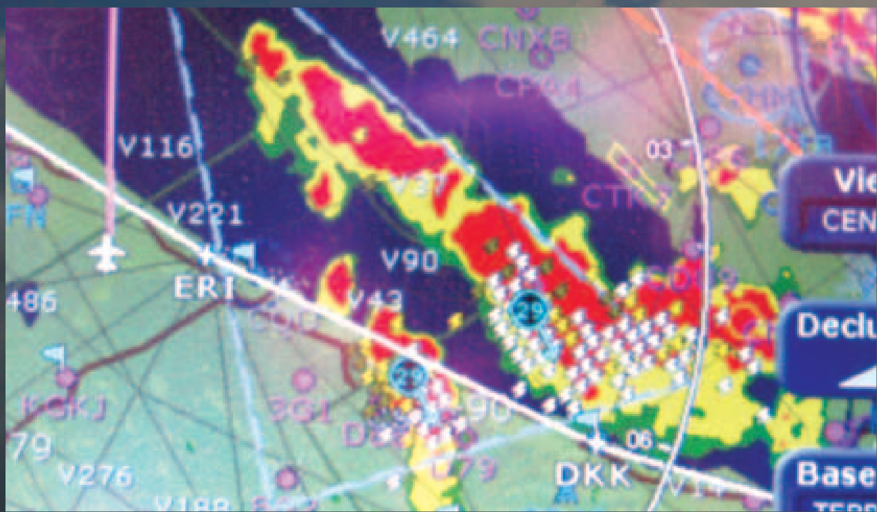
Informed Buyer

THE LIMITS OF DATALINK ZAP

To decide if sferics is worth the expense for your mission, you need to understand how datalink differs from sferics and the lighting products you're might be receiving via datalink.

First things first: Quality sferics gear displays most lightning activity in real time throughout the life cycle of a thunderstorm. Real-time depiction is the key because by the time satellite delivered lightning data makes its way to your screen, the storm you're tracking may much further developed, moved or maybe even dissipating. A skilled user can combine the information of on-board sferics and satellite-delivered NEXRAD to build a much more complete picture of the weather right now. Datalink lightning can reinforce and clarify the picture you're getting from satellite NEXRAD, but it's subject to much the same limitations. There's also something to be said for keeping some storm detection that doesn't rely on receiving a message from space.

XM Satellite Weather datalink delivers data derived from the National Lightning Detection Network displayed in four-km resolution. (You can see the grid pattern in the image below.) This is only cloud-to-ground lightning strikes that might be as much as 30 minutes old by the time it makes its way to your display. So if real-time lightning data is gotta-have data for your flying, then a sferics system is your only choice.



WSI's lightning data is born from the Global Lightning Network, a comprehensive source that allows WSI to depict both cloud-to-cloud and cloud-to-ground strikes as they are observed (these different types aren't, however, differentiated on the display). WSI admits there is a few minutes' delay due to the entire processing and transmission frequency of the network as a whole.

You'll need Avidyne's MLB-600 datalink receiver to play WSI weather, but that might be worth it if you like the enhanced lightning. WSI throws other products in the mix for detecting convection including a cloud-top image, which can be filtered to show cloud tops at your current altitude and above, a radar summary product, showing the highest tops from each cell, and convective SIGMETs and PIREPs.

Lynx Bluetooth Headset: Not For Everybody

As a standalone headset or to add Bluetooth to your current headset, the Lynx offers loads of features. But that doesn't necessarily make it a good value.

by Jeff Van West

CHECKLIST

- Feature-packed controller with rechargable battery to power ANR
- Many features of limited appeal or utility for many users
- Bulky controller and early-90s cellphone operating logic

Several years ago at Oshkosh, we saw a unit called the Angel that was designed to add Bluetooth connectivity to a headset, complete with a full telephone keypad and music inputs. The product looked promising, but we never got one to test before the company vanished into the great aviation business abyss.

The Angel was licensed and improved upon by the well-respected Headsets, Inc., of Amarillo, Texas, (who also acquired and now sells the DRE line of headsets). The reborn device is called the Lynx. It's available as a $449 device to add Bluetooth and other features to your current headset, or for $599 you can get it mated up to the DRE 6001 ANR headset as a complete unit. Considering the DRE 6001 is normally $476 on its own, that has the makings of a pretty good deal.

A MIXED BAG

We tried the Lynx-headset combination, which is called the DRE 8001. But the real story here is the Lynx controller itself. On the plus side, the unit feels industrial strength, with big buttons that are easy to see and push. They're also backlit for night ops (and the controller screen automatically dims). The Lynx's battery is rechargeable via a USB plug and can power the ANR. If you're just buying the add-on unit, Headsets, Inc., can hardwire the unit to your own headset. There's a battery-level indicator right on the controller screen. We like that.

The Bluetooth system to pair a phone or music source works well (although our unit still identified itself as "Angel" over Bluetooth). There are additional wired inputs for music or cell phones, and also a wired output if you want to record the audio of your flight.

The words "and also" seem be central to the Lynx marketing strategy. The controller's five-way switch lets you page through multiple menus to set reminders to switch fuel tanks, set multiple approach timers, access E6B functions for all phases of flight and control your remote music. There's a phonebook and call list downloaded from your phone. There's a thermometer. (No we don't know why, either.)

We think this is where the sell-copy of the Lynx breaks down. Do you really need all this stuff? Will you use it? We found the implementation lacking in places as well. Set the volume of your music too low and you won't hear your tank-switch reminder. Approach timers beep for a few seconds and then stop automatically, rather than making

The Lynx controller isn't small. Backlit keys and the display screen mean you can make calls, control music or set timers from the controller rather than your phone or music player.

sure you acknowledge them. (Who times approaches any more anyway?) Sure, there's a missed-call list on the headset controller, but how many missed calls are you going to get in the air that can't wait until you pull out your real phone after landing?

Too many features get in the way sometimes, as well. There are controls for the remote music, but they require navigating menus to use them. Competing Bluetooth add-ons and headsets have dedicated controls for this so the common action is a one-push operation.

Because we only tested the Lynx with the attached DRE headset, we can't speak to its audio fidelity for music. A DRE strongpoint is industrial toughness. We don't think they score as highly on audio quality for something as subtle as music, and the 8001 unit wasn't nearly as high-fidelity as a Zulu or Bose.

NOT BAD, BUT NOT WOW

We've given Headsets, Inc., high marks in the past for their retrofit ANR units that turn old passive headsets into ANR ones. We also think the DRE series, while no Bose, Lightspeed or Sennheiser, represents a good value for the money. So if you were in the market for the DRE 6001, upgrading to the 8001 to get the Lynx and headset together makes sense.

But even in this case, we think the Lightspeed Sierra for essentially the same price is significantly more comfortable with better ANR and better overall sound quality, especially for music. The Sierra only allows Bluetooth for a phone, however. Music must be via a cable.

To just add Bluetooth to a headset you own and like, we still think the PilotUSA Blulink is a better deal at \$250-\$300. It does nothing more than add Bluetooth music and phone with remote controls, but it does it well, simply and cheaper. Unless you're really jonesing for an approach timer on your headset controller, do you really need anything more?

CONTACTS

Headsets, Inc.
800-876-3374
www.headsetsinc.com

Quick WX for Droid: We're Underwhelmed

All we want is an app that gives METARs, TAFs, NEXRAD and PIREPs both graphically and in text. That's apparently too much to ask, at least so far.

by Jeff Van West

Last month we dug into moving-map apps for the Android platform, but sometimes you just want a quick check of local weather on your phone to see if it's worth a trip to the airport—or if it's time to push the "no-go" button on your plans and go have a beer.

We think the bare minimum for this would be METARs and TAFs—ideally presented graphically on a map with text details available—local NEXRAD and PIREPs. Armed with this ideal, we forayed into the Android Market and came up empty handed.

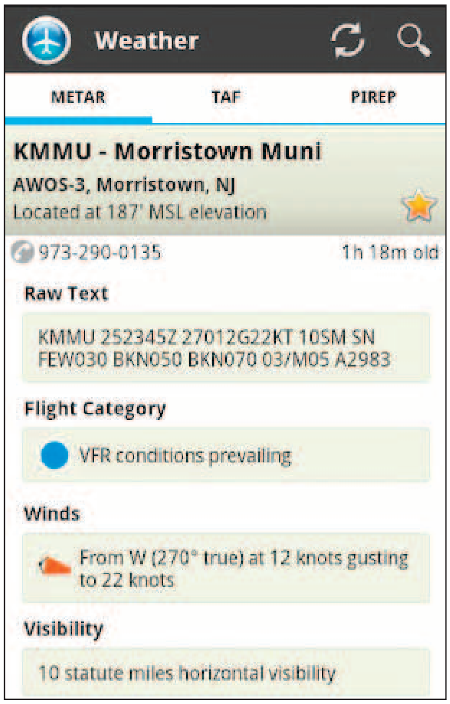
That's not saying there's nothing out there. Here are our front-runners, so you don't have to gamble your five dollars on which one does what.

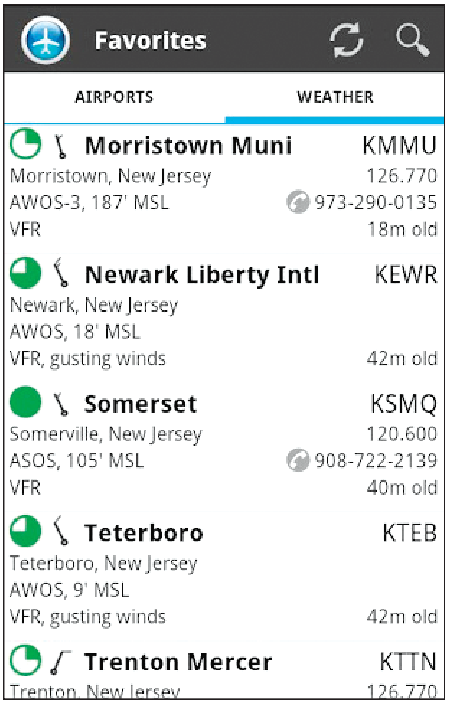
FLIGHTINTEL AND FLTPLAN

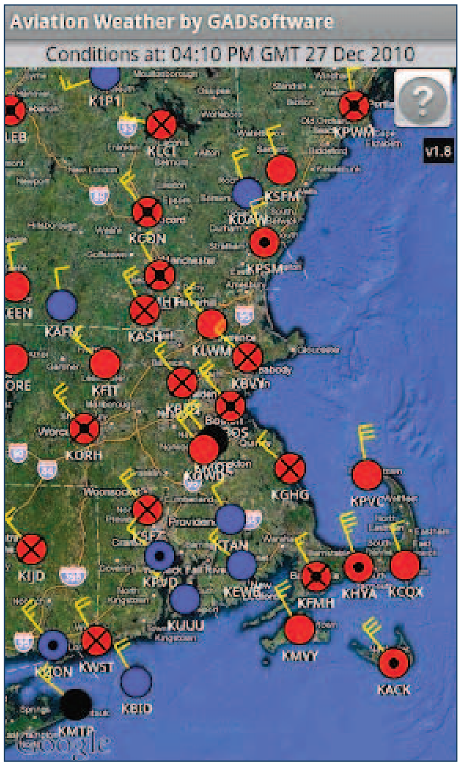
Free is good, and that's why if you have a Droid phone you should download FlightIntel for pilots. The app is really basic weather plus A/FD data and approach charts, but it's well done and easy to use. You can select your airport from a list of favorites or nearby airports. But a nice plus is that swiping across the favorites screen loads a list with quick weather for nearby airports.

This isn't as good as having the

The free FlightIntel app does a decent job for at-a-glance weather of your favorite airports. It also has A/FD data and approaches.







Aviation Weather by GADSoftware is the only app we found with METARs graphically on a map.

METARs on a map, but it gives you several airports at a glance. We'd like to see the actual ceilings and visibilities in this list, however, rather than just an icon for VFR to LIFR. The icon does show winds and cloud cover.

Tapping any airport from any view brings up details you'd expect from the A/FD, such as frequencies and runway lengths. But the METAR also appears in this list and lets you call up TAFs and PIREPs. The navigation sounds odd, but it's actually fairly intuitive in practice.

The no-fee app actually only misses our want list by not offering NEXRAD and not putting METARs on a map view. It also gave us some trouble in some views on our Droid tablet, but its pretty clearly optimized for a phone.

FltPlan.com's popular flight-planning website is accessible by any web-enabled phone, but they also have a free Droid app that offers some handy shortcuts. You can save six airports and six routes for one-button briefings. These are essentially the same briefings you'd get from quick weather or quick route weather on Fltplan.com: METARs, TAFs, PIREPs, NOTAMs and an option to see a map with your route and the latest NEXRAD. It's not the cleanest interface or super-easy to read on a phone, but it's pretty close to hitting all our punch-list items.

There's also A/FD data, additional airport info and the option to download and view approach plates. Both FlightIntel and Fltplan.com can call the phone numbers they list for ASOS recordings or rental cars.

AVIATION WX BY GADSOFT

There are a handful of apps that claim the name "Aviation Weather," so be careful if you buy one that it's the one you want. We like this one by GADSoft. It has a trial version that's limited to the Massachusetts area only—great if you live in Mass., as you might never need the $4.99 full version.

The app opens and pulls the weather for your local area on a basic Google map (or satellite map if you prefer). Current METARs are color-coded for easy reference and there's an optional wind barb. Tap any airport and you get the detailed METAR and TAF in text.

Missing, however, is a NEXRAD overlay, but this is in the works.. There's also no nearby TAF function, so if the airport you tap doesn't have a TAF, you're empty-handed. Even with these shortcomings, this is the best at-a-glance app we saw.

QUICKWEATHER

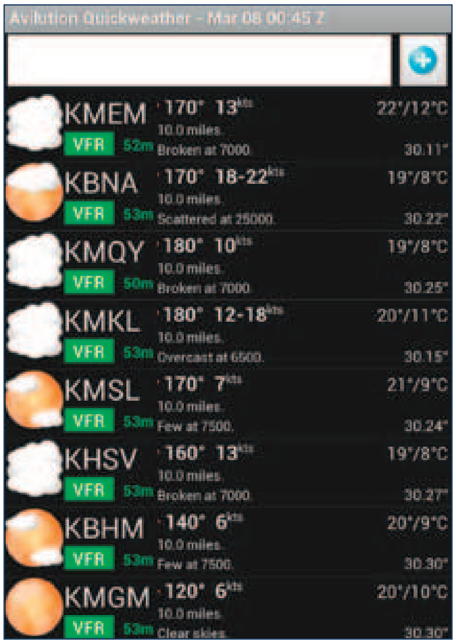
We picked Avilution's Aviation Maps as our favorite for now in full-up moving map apps for Android. The company also offers Quickweather for a one-time fee of $4.95 (again, beware that there are multiple apps called Quickweather). The app pulls up a list of your favorite airports, similar to FlightIntel, with current conditions. But unlike ForeFlight, tapping one pulls up a wealth of data in a long list. It's the same data you get from the full-up mapping app in fact.

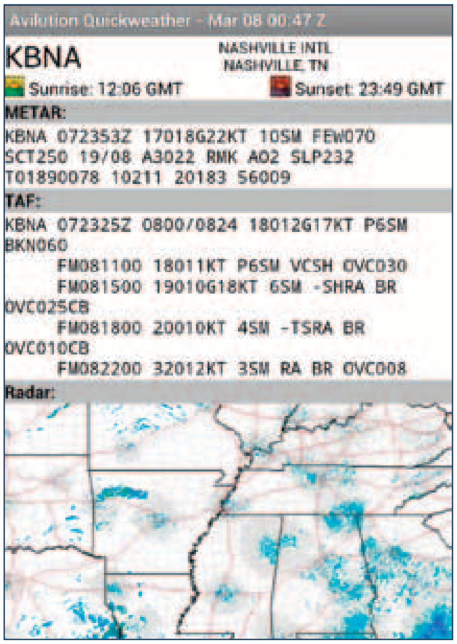
The list includes the METARs and TAFs, but also a static image of local NEXRAD radar, freezing levels, SIGMETs and AIRMETs, surface winds, NOTAMs and a local TFR map. One item we really like is that Quickweather includes the Area Forecast. Pilots tend to focus on TAFs for a forecast, but by their nature TAFs often don't include forecasts for scattered showers or other phenomena. PIREPs are still noticeably lacking.

FOREFLIGHT WEATHER

Sorry, but this isn't ForeFlight Mobile HD for the iPad/iPhone. It does use some of the same clean design, however, which makes it the easiest

QuickWeather from Avilution has the useful favorites list, but also pulls a wealth of weather data and graphics when you select individual airports.





ForeFlight for Droid copies the iPad version's clean presentation, but is quite limited in functions.

to use app of the lot. It opens with a favorites list of airports, color-coded for VFR through LIFR, as well as winds. These are just a list, though.

Tap any one and you get text for METARs and TAFs that are both decoded and color-coded for easy reading and alerting you to changing conditions. There are text winds as well as animated radar and satellite imagery at five-zoom levels.

There's no scrolling or pinch zooming, and no PIREPs. The lack of zooming and scrolling freely is a real miss when it comes to seeing how NEXRAD might affect your route. ForeFlight has made it clear that they are focusing their development efforts on the iPad platform, so don't expect more from this app down the line. At $9.99, it's a relative fortune for an app. But then again, that's like a few minutes of flight time.

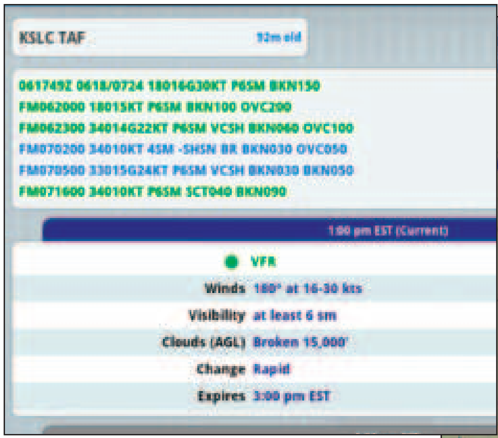
HONORABLE MENTION

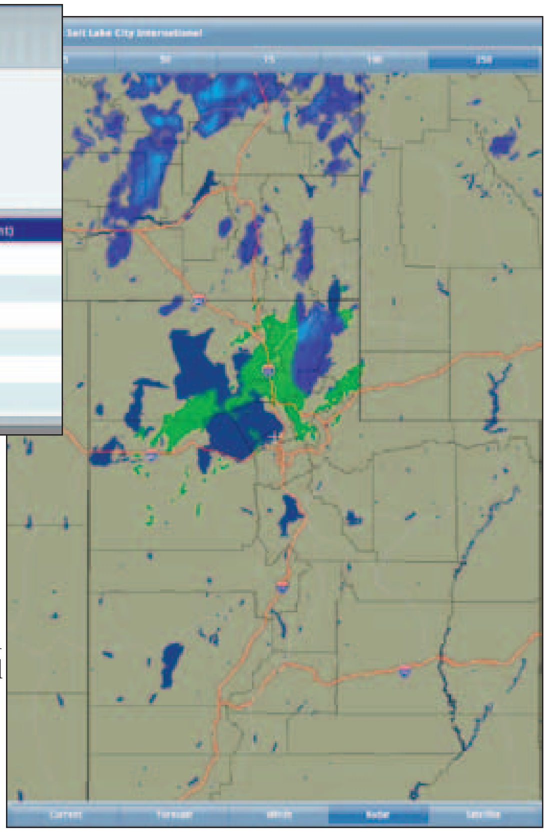
AirWX is available for the iOS as well as Android, but it's a stronger contender amidst the slimmer competition of Droid. Tap one of your favorite airports, or choose from a nearest list, and you can get METAR/TAFs, PIREPs, NOTAMs, major weather charts (such as a surface analysis or prog charts), static NEXRAD and even approach plates.

The app is quick to load data and in active development. At $6.99, it's not the best buy out there, but it could develop into one. There's a 15-day refund policy to try it out as well.

A similar app is Aviation Weather from NOAA/NWS. This one is really a portal to pull text reports, RADAR images and a bit more from NWS servers, but it works well and is free if you can put up with the adds. Or you can pay $0.99 to get rid of them. The app is cumbersome to use for METARs et al., as you can only enter one airport at a time, but it's quick for animated NEXRAD and static graphics, such as graphic AIRMETs.

FlightBriefer will set you back all of $0.99. For the price, it's not a bad deal. On the plus side, you can put in departure, destination and airports along the way to get METARs, TAFs,





winds and PIREPS. We had an issue in testing where it showed no NOTAMs for an airport that had published NOTAMs but didn't see that again. The developer is checking into it. Flightbriefer can pull up TFRs, but they aren't in relation to your route—it's the full national list. FlightBriefer can retrieve DUATs briefing and file a flight plan.

BETTER TO COME? MAYBE

There's definitely a space in the market for a fast, complete app for weather information. We hope one of the contenders mentioned here takes the extra steps to fill in the holes. Something like Voyager's FreeFlight for iPhone would be a welcome addition to Android. It's equally likely, however, that the final winner will be a version of one of the more complete moving-map apps that simply works as well on the phone.

CONTACTS

All apps are available on the Android market at: market.android.com.

Lightning Detectors

(continued from page 15)

of the ground-return current path between the battery and alternator as well. Static buildup (and the ultimate static discharge) from plastic lamp covers, fiberglass housings and windows can alter performance. So can aircraft skin currents. Now get all that right within the tight quarters of a small and already packed airframe. That's what you're paying for.

In the older days, shops would perform a process called skin-mapping to sniffs out interference and aid the tech in finding a noise-free mounting location. Unfortunately, this careful approach too is often overlooked. But Avidyne confronts this with an integrated spectrum-analyzer-like tool built into the TWX670 to sniff out potential noise in the airframe to show the installer.

CONCLUSION

If you live in a climate where navigating thunderstorm activity is a regular challenge to your operation, the tactical help of Avidyne's TWX670 is our top pick. It's a solid performer with modern features. The L-3 WX500 won't disappoint either with years of Stormscope experience (and over 60,000 units produced) built into its processor.

And if you pass on sferics in favor of satellite broadcast lightning data, WSI's InFlight offers a definite edge over XM's delivered product. But you'll need to buy the Avidyne MLB700 for that, and that expense that equals that of a sferics installation. So, in the end, it's really up to how valuable on-board lightning detection is for you.

AIRCRAFT COMPARISON

Cessna 152 vs. LSA: Vintage Wins the Day

On the flight training line, ancient 152s can still be more profitable, chiefly because LSAs lack a mature parts chain and repair support infrastructure.

by Paul Bertorelli

CHECKLIST

- + Despite their age, vintage 152s remain serviceable if not cosmetically perfect.
- + Years in service have matured the 152's parts and repair chain.
- − Capital costs for LSAs are much higher and repairs, while not more frequent, aren't as quick.

It's fair to say the entire foundation of the GA industry was built on the back of the dowdy Cessna 150 and 152. But even the newest of these airframes date to aviation's Jurassic age. Some in the industry thought the light sport wave would fill the need for new airframes as the old 150s and 172s become uneconomical to operate. To a degree, that has happened, but the wave has been more of a ripple than a tsunami. LSA sales have been modest at best and these airplanes have proven more kite-like than even the venerable Piper Cub. Flight schools have found LSA economics less attractive than was originally thought and maintaining an old Cessna is just more profitable.

To put some numbers on these otherwise vague sentiments, we recently visited a busy commercial flight school near Dallas—U.S. Aviation Group—which operates both older 152s and newer LSAs, specifically the Remos line. We flew both airplanes, compared their flight characteristics and spoke with the staff about their impressions of teaching in both.

U.S. Aviation is headquartered at Denton, Texas, tucked in under the Dallas-Fort Worth Class B airspace. It's a relative rarity—a recently organized flight school that's a full-service business, including light and heavy maintenance, avionics, training, charter and an in-house engine overhaul shop. It was founded by three aviation-interested investors six years ago and has grown rapidly enough to employ more than 170 people in a sprawling facility in Denton and a second in Hondo, Texas.

U.S. Aviation specializes in training foreign students, including Chinese nationals. A lot of them. When we visited in early March of 2012, more than 100 Chinese students were enrolled in various phases of training. The company's general manager, Jeff Soules, told us these pilots are exposed to intense, drink-from-a-firehouse training that takes them from zero to 250 hours, a commercial ticket with instrument rating and 20 hours of turbine time in about 10 months. The school's two dozen or so Cessna 152s—in fact, all of its airplanes—are constantly on the move and the maintenance shop is hopping with mechanics to keep them airworthy.

What we found most intriguing about this operation is how well it tracks every dime that goes in and out and every maintenance metric that can be measured. Given the large number of hours flown, U.S. Aviation struck us as the ideal laboratory for a

U.S. Aviation relies mainly on a fleet of Cessna 152s, but it has put the Remos G3, inset, on the training line with mixed results.

hardnosed comparison of old-school 152s against new-age LSAs.

With 77 aircraft in the fleet, Jeff Soules told us the company's aircraft choices are driven by cost, availability and dispatchability and it gains by having fleet commonality. Nonetheless, it decided to try the LSA route because these airplanes are new, more technologically advanced than the older Cessnas and because selling airplanes is part of its business strategy.

Before 2008, when LSA sales looked promising, U.S. tilted toward two LSAs, the Breezer and the Remos G3, both German imports. Soules said U.S. Aviation liked the G3 because it has slightly better payload than other LSAs they shopped. "You can carry a couple of people with no problem. We found them to be a stable airplane to fly," he says.

Although would-be buyers and LSA companies complain that banks are reticent to finance light sport purchases, U.S. Aviation didn't have this problem, probably because it's well capitalized and can show a lender a positive P and L. As part of its continuing expansion, U.S. Aviation put a couple of new G3s on the line in 2008. Soules told us the airplanes were well received if not enthusiastically sought after. They liked the G3's folding-wing option, which they put to use in trailering the airplanes around to various promotional events. "We had an airplane at the Dallas boat show. We had one at one of the malls for most of December," he said. You can't do that with a 152.

But from the purchasing point of view, the G3 and the other LSAs are at a significant disadvantage compared to legacy 152s or 172s. "In the LSA market, you put a lot of money down up front, wait a few months and they start to build your airplane," Soules says. That ties up capital but, more important, you can't fly what you don't have. "You just can't make money like that," he says. In buying a 152, says Soules, U.S. Aviation shops the used market, makes a deal and gets the airplane on line quickly.

There are tradeoffs. There aren't many, if any, cherry 152s out there and cosmetically, the legacy trainers won't win best of show. "Before we even put them on the line, we do about $10,000 worth of work on them," says Soules. "We put in a Garmin radio, we paint them. We

CESSNA 152	DATA POINTS	REMOS G3
LENGTH: 24.1 FT WINGSPAN: 33.3 FT HEIGHT: 8.5 FT	DIMENSIONS	LENGTH: 21.4 FT WINGSPAN: 32.3 FT HEIGHT: 6.5 FT
1670/580 LBS	WEIGHT/USEFUL LOAD	1320/691 LBS
LYCOMING O-235	POWERPLANT	ROTAX 912S
2400/$8.75	TBO/ RESERVE PER HOUR	1500/2000 /$8.50-$11.70*
105 KTS	CRUISE SPEED	112 KTS
26 GAL.	FUEL CAPACITY	21 GAL.
10.44 LBS/FT^2	WING LOADING	11.2/LBS/ FT^2
.066 HP/LB	POWER LOADING	.075 HP/LB
$20,000 TO $30,000 (USED)	PURCHASE PRICE	$85,000 TO $95,000 (USED)
MAINTENANCE: $36.55** FUEL: $26.78 CAPITAL: $0	HOURLY COST	MAINTENANCE: $80.90** FUEL: $15.45 CAPITAL: $0

*Rotax engine TBOs have recently been extended to 2000 hours, but most engines in the fleet are at 1500. We used the lower figure

**Hourly maintenance includes U.S. Aviation's costs, plus our calculated engine reserves. Zero capital costs were assumed for both engines.

No fancy glass panels here. U.S. Aviation's Cessna 152s get a Garmin SL40 while the LSAs have steam gauges and a radio.

do any repairs to bring them to our standards."

Cost wise, you can buy 152s all day for about $20,000 to $25,000 plus or minus 20 percent. Add another $15,000 for upgrades and perhaps even an engine overhaul and you're into the airplane for $35,000 to $40,000, less than a third of the cost of a new LSA. We asked if U.S. Aviation views the supply of used 152s as sustainable for the long haul. Is there a shortage of serviceable 152s?

"Right now, no," says Soules. "But I think there's going to be. You know, South American buyers are going after these airplanes. I bought one for $24,000 that the seller had listed for less than that. We've gone as far as California and Florida to pick them up and truck them back." Despite their age, support for these airplanes remains good. U.S. Aviation has a large, computer-inventoried parts system and neither Soules nor the maintainers we spoke to suggested that the 152s or older 172s go AOG for lack of parts.

But that's not the case for the LSAs. It's not so much availability of parts for the newer airplanes, although that can be a spotty problem, so much as it is documented procedures to repair things that break. And that's where LSA costs spiral out of competition.

MAINTENANCE DELTA

U.S. Aviation presented us with a detailed spreadsheet comparing direct operating costs—maintenance and fuel only—for all the airplanes in its fleet. It has accurate tracking for these numbers because the company's mechanics keep careful tabs

U.S. Aviation has two dozen Cessna 152s maintained by a busy in-house shop. It benefits from low internal costs which are accurately tracked.

on both the hours spent slinging wrenches and time burned to chase parts and doing the paperwork necessary to keep the FAA happy.

That's where the numbers run off the rails. Soules' spreadsheet showed direct hourly costs for the Cessna 152s to be $27.80 per hour, not including the engine reserve. Block fuel burns are 5.2 GPH at about $5.15 per gallon, so call that $55 per operating hour, plus engine reserves of $9 an hour. Our estimate of the all-in total is about $64 an hour, if the engine is outsourced for overhaul.

Scrolling down the columns for the LSAs—U.S. Aviation lumps the Breezer and Remos together, since the costs are similar—revealed a maintenance cost of $69 per hour and block fuel burns of 3 GPH for a total of $84.45. Add the Rotax engine reserve ($11) and the total is about $96—$32 more than the 152s or 50 percent. (Later Rotax engines, with 2000-hour TBOs, reduce this $3 per hour.) These numbers don't include the capital costs of buying a new airplane against an older airframe.

What's going on here? Do the LSAs break so much more often than the 152s to drive the costs this much higher. Or are parts more expensive?

Neither, really. The higher costs relate to the way maintenance happens at a busy flight school. Dispatch reliability is everything and when an airplane goes down for maintenance, the less time it's down, the better. But Soules told us the Rotax-powered LSAs soak up more time for routine scheduled maintenance. "An oil change on a Rotax isn't difficult," he says, "but it takes just a little longer than it does on the O-235."

But the larger component of the higher LSA costs probably relates to the paper chase, according to Nathan Probst, who is the LSA go-to guy at U.S. Aviation. "The problem is that the manufacturers may have the guidelines out there for maintenance, but they're not the best at making sure you can get them," Probst says. "Part of the reason is that a lot of the LSAs are made overseas. They're coming from the Czech Republic, from Australia and from Germany. The support over there may be fine, but it's not here." Parts can be a problem, more in delay in getting them than in getting them at all. Delays also accrue from having to do repairs not listed in what may be a sketchy repair manual to begin with.

"So the snag you run into there," adds Probst, "is that you have to get a letter of authorization for the repair. What's in the maintenance manual is the bare minimum according to ASTM." But quality of the documentation varies widely, says Probst, with companies like Jabiru and Remos near the top, but others less so. U.S. Aviation does volume work on LSAs outside its own fleet, and is approved to repair most LSAs.

When the repair manual offers no solutions, that entails not just contacting the company to obtain the LOA, but finding the right person who can or even will respond. Meanwhile, the airplane just collects dust. This sort of thing might not be much of an issue for a private owner who can tolerate an AOG airplane for a few days or even weeks, but a flight school doesn't have that luxury. By comparison, legacy Cessnas can be repaired flexibly using accepted practices well-established in Cessna documentation or in advisory circulars. For the would-be LSA maintainer, the process is fuzzier and improvisation is much less certain. The FAA gives no prizes for creative maintenance solutions.

Theoretically, as the LSA industry matures, shouldn't it get better at providing the kind of documentation that Cessna developed over 50 years? "Absolutely, it should," says Soules. But who's supposed to fund that learning curve? If U.S. Aviation doubled down on its LSA fleet, it would have much higher capital and investment costs and significantly higher hourly operating costs in return for…what?

DOES NEW MATTER?

We asked Soules if it mattered to his customers if an airplane was new or 30 years old. Does the cosmetic condition of the airplane have a bearing in attracting new students? His answer was a qualified no. The core of U.S. Aviation's market is contract foreign training, mostly from China. It gets some local flight training prospects who may or may not be attracted to shiny new versus rough around the edges. But neither Soules nor the company's in-house examiner, Howard Hurlbut, were sure they could detect such a preference.

For flight hours bought in block time, U.S. offers its 152s at $90 per hour and the LSAs for $95 an hour. Soules says he thinks the LSAs should probably be billed at closer to $110, almost what it charges for a Cessna 172. The G3 we flew in was a steam-gauge airplane and we asked if a slick glass panel might prove more attractive to foreign students.

"No," said Soules, without hesitation. "The graduates coming out of this school will probably never see another light sport or light airplane. They'll go straight into an Airbus or a Boeing." Those aircraft will likely be glass airplanes, but with systems that bear no resemblance to a Dynon or Garmin system. Besides, he adds, adding the task of mastering a glass system slows for a zero-time student's learning of the stick-and-rudder skills necessary to solo an airplane. (And the LSAs' twitchy control forces make soloing a little harder, too.)

CONCLUSION

None of the foregoing suggests that light sport airplanes can't or don't have a role in the training market. We have spoken to operators who are succeeding with them, especially those plying the recreational market where glass panels and shiny white paint matter more than they might with young Chinese students just learning to fly.

But there's little question that in the training role, LSAs aren't cheaper, despite their lower fuel burn. Even though the lower fuel burns can be offset further by using mogas, higher capital costs and less efficient maintenance flow keeps costs higher. It remains to be seen if costs will come down as LSAs age, just as they have with legacy Cessnas. A more mature parts and support chain would help.

But say this about an old 152 with 8000 hours, of which U.S. Aviation has several: It has stood the test of time. These airplanes have been beat mercilessly for 30 or more years and not only are they still flying, they're still making money. If you're in the flight training business, isn't that the point?

Find out more about U.S. Aviation Group at www.usaviation.aero and 866-383-2400.

EXACTLY HOW LIGHT IS LIGHT?

In our reports on the many LSAs we've covered, we've allowed as how the airplanes have light control forces which, in retrospect, shows we have a penetrating grasp of the obvious. "Light" might be a good thing or a bad thing, depending on what you hope to achieve. For training students, it can be a hindrance.

During our visit to U.S. Aviation, we compared the actual control forces between a Cessna 152 and a Remos G3. The results weren't surprising, but the degree of difference was. Flying with the school's in-house examiner, Howard Hurlbut, in both airplanes, we did some basically stability tests and control force measurements to put some numbers on what "light" really means.

During our flight, Hurlbut had commented that pilot applicants are often nervous on their checkrides and tend to overcontrol. Does he notice that more in the LSAs? Definitely, he said. It's easy to see why.

Although the G3 damped a basic phugoid cycle much quicker than the 152 did and in only a cycle and a half, its trim stability is weak. Trimmed hands off at one airspeed, it won't stay there long, even in still air. It wants constant attention to hold a trimmed airspeed. Minor power changes on approach require re-trimming. The comparison with the 152 is stark; once trimmed, it stays put.

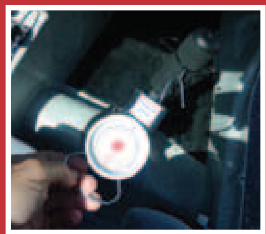
Spiral stability—the tendency for the wings to return to level when the controls are released in a bank—was fairly similar. The Remos departed into a dive in a left turn and had to be pulled up by hand, but it was positively stable to the right. The 152 was just the opposite. Rigging may be at fault in both cases.

Stick breakout forces—the force necessary to impart control command—was practically nonexistent in the Remos. It was too low to measure. In the 152, it was a little less than a pound. This, of course, gives the Remos fingertip control, but that cuts both ways. Merely breathing on the stick imparts a roll command, leading Hurlbut to remark that LSAs are more like helicopters. "You let go of the stick and you don't know what's going to happen. But it might not be good," he laughs.

An acceptably designed airplane should exhibit increasing pitch forces as the stick is pulled back and the Remos does. But its stick force gradient is quite flat, going from about a pound initially to three pounds at full deflection. The 152 gets stiff at max deflection, requiring almost 10 pounds.

Stick-force-per-G, another pilot perception or "feel" measurement is much higher in the 152 than in the Remos. It took only two pounds to hold 2G in the Remos, versus nearly 10 pounds for the 152. Such overly light feedback is a worry because it's so easy for the pilot to overpull when recovering from an upset, say one caused by that spiral instability we noted. A too-rapid pull can overstress the airframe.

So which is better for a student pilot? To a degree, it's a matter of taste, but we think the 152 has control forces even a new pilot might expect. It behaves itself when the controls are released and doesn't require constant attention. More important, there's less tendency to over pitch or over roll in the landing flare; the airplane self damps a little. That makes it easier for a newbie to learn to land, even if it takes a little more grunt to get into the flare.



Piper Saratoga and Lance

Stable and strong, it's a great choice when load and comfort matters more than speed.

All airplanes are compromises. Since most of us lack an unlimited budget, we're often forced to choose between going fast in a relatively small cockpit or dragging around a larger cabin more slowly. It's simple, really: The "go-fast" airplane will get us to our destination sooner, but we might be forced to leave behind a few things, or a few people. The slower, large-cabin bird gets us there just fine, thank you, and lets us carry all the stuff we'll need upon arrival.

In the six-seat, retractable piston-single market, there are three basic choices: Beech's Model 36 Bonanza, Cessna's Model 210 Centurion or Piper's PA-32R series, the Lance and Saratoga. The Bonanza arguably handles better than the other two while probably squeezing out a knot or two over the Centurion. The 210, on the other hand, generally has better short-field performance than the Bonanza and offers an improved hand-flown IFR platform. Piper's Lance/Saratoga series, however, can carry more than the other two, albeit more slowly, and usually is thought of as the most stable of the three when flying IFR.

All three of these airplanes are growth versions of earlier, smaller airframes. All three are available in turbocharged models, either from the factory or in the aftermarket. In some cases, you have fixed-gear versions or derivatives as alternatives.

If trying to describe their differences by referring to the automotive world, the A36 Bonanza might be thought of as a BMW station wagon; the 210 as a Ford Explorer; the PA-32R as a Chevy Suburban. All three make fine platforms when there are two or three people and a few bags. But when there are a lot of bags and people, the Suburban is one that gets the job done with ease. So it is with Piper's Lance/Saratoga.

You just might have to stop for fuel a bit more often.

Most find the PA-32R quite comfortable. It's remarkably quiet, due in no small part to the baggage compartment between the cabin and engine.

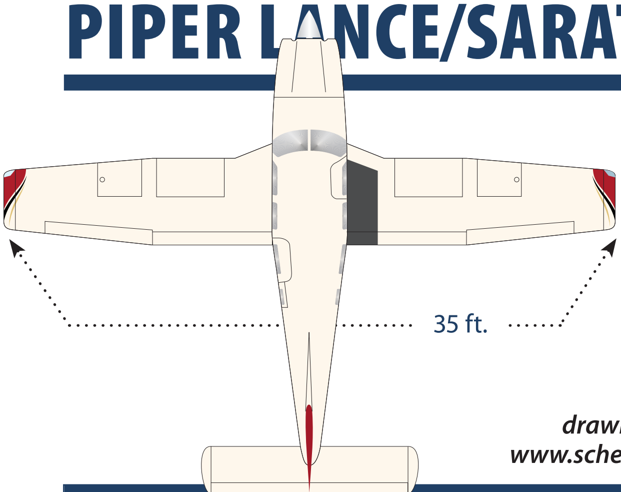
HISTORY

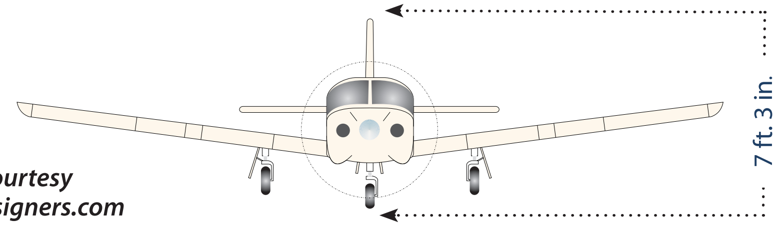
In the early 1970s Piper suffered a major setback when a flood destroyed much of its Lock Haven, Penn., plant. Among the casualties was the tooling for the popular, but labor-intensive, Comanche, which had an option for small third-row seats.

The company decided to abandon the Comanche in favor of a new retractable derived from the fixed-gear PA-32 Cherokee Six. The company was already having success with the Seneca, a light twin derived from the same airframe, so it made sense to build on a familiar design. Not much needed to be done to the Cherokee Six: The PA-32 was already available with the 300 HP Lycoming IO-540, so essentially the only change was to fit a retractable landing gear. That meant a new engine mount and changes to the wing. Piper also modified the wing spar in the process, allowing a 200-pound boost in gross weight, to 3600. The new airplane was dubbed the PA-32R Lance and introduced to the public in 1976.

The powerplant was the 300HP Lycoming IO-540 K1G5D with a 2000-hour TBO in the normally aspirated airplanes and the TIO-540-S1AD with a TBO of 1800 hours in the later turbocharged models. (The first 140 Lances built had K1A5D engines, the only difference being in fuel pump design.) The D means that the engine has the infamous Bendix dual magneto system. The fuel system originally held 94 gallons in four tanks, later upped to 102 gallons.

PIPER LANCE/SARATOGA SERIES



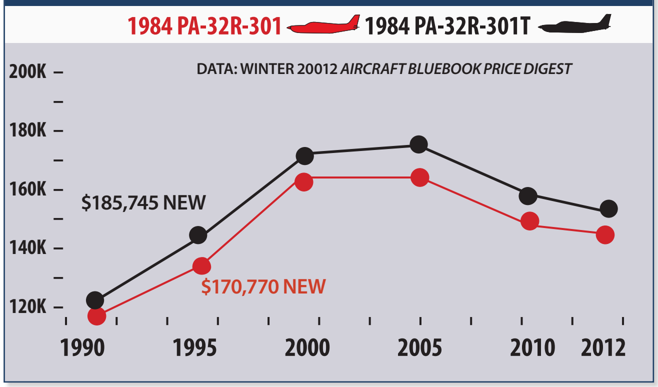


drawings courtesy
www.schemedesigners.com

PIPER PA-32R LANCE/SARATOGA SELECT MODEL HISTORY

MODEL YEAR	ENGINE	TBO	OVERHAUL	FUEL	USEFUL LOAD	CRUISE	TYPICAL RETAIL
1976-78 PA-32R-300 LANCE	LYCOMING IO-540-K1G5D	2000	$31,000	94	1632 LBS	156 KTS	±$79,500
1978-79 PA-32RT-300 LANCE II	LYCOMING IO-540-K1G5D	2000	$31,000	94	1632 LBS	156 KTS	±$85,000
1978-79 PA-32RT-300T TURBO LANCE II	LYCOMING TIO-540-S1AD	1800	$42,000	94	1529 LBS	175 KTS	±$90,500
1980-92 PA-32R-301 SARATOGA SP	LYCOMING IO-540-K1G5D	2000	$31,000	102	1660 LBS	158 KTS	±$130,000
1980-92 PA-32R-301T TURBO SP	LYCOMING TIO-540-S1AD	1800	$40,000	102	1597 LBS	177 KTS	±$153,000
1994-2007 PA-32R-301 SARATOGA II HP	LYCOMING IO-540-K1G5D	2000	$40,000	102	1189 LBS	166 KTS	±$225,000
1998-2007 PA-32R-301T SARATOGA II TC	LYCOMING TIO-540-AH1A	2000	$60,000	102	1136 LBS	177 KTS	±$300,000
2008 PA-32R-301T SARATOGA II HP	LYCOMING TIO-540-AH1A	2000	$40,000	102	1189 LBS	166 KTS	$385,000
2008 PA-32R-301T SARATOGA II TC	LYCOMING TIO-540-AH1A	2000	$60,000	102	1136 LBS	177 KTS	$425,000

PIPER PA-32R-301 RESALE VALUE

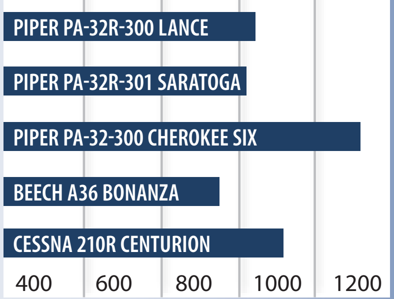


SELECT RECENT ADs

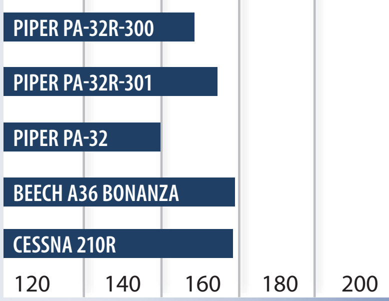
AD 10-15-10	INSPECT AND REPLACE CONTROL-WHEEL SHAFTS
AD 09-05-05	MODIFY AVIDYNE PRIMARY FLIGHT DISPLAYS
AD 06-03-08	REPLACE STC AERO ADVANTAGE VACUUM PUMPS
AD 95-26-13	RECURRING INSPECTION OF OIL COOLER HOSES
AD 78-23-01	INSPECT FUEL DRAIN LEVER DOORS EVERY 100 HOURS OR REPLACE

SELECT LATE-MODEL COMPARISONS

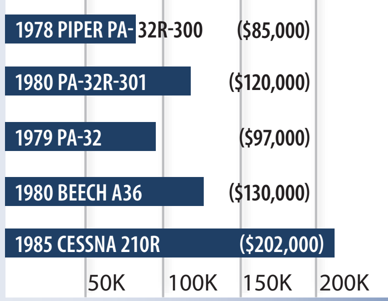
PAYLOAD/FULL FUEL



CRUISE SPEEDS



PRICE COMPARISONS



The PA-32R borrows heavily from its siblings. The main landing gear is much like the Seneca—logical, since the basic airframe is the same—and the nose gear resembles the Seneca and also the Arrow. The PA-32R also came with Piper's automatic extension system for the landing gear. The fuel system is similar to the Seneca's.

The Lance remained essentially unchanged for two years. In the late 1970s, though, someone at Piper decided that T-tails were a good idea. We believe it unlikely that the responsible parties were aerospace engineers or experienced pilots, based on the aerodynamic qualities of the Piper T-tail singles in general. The Lance wasn't the only T-tailed Piper. This also was when the PA-38 Tomahawk was rolled out and the T-tailed Arrow IV debuted.

Piper combined the T-tail's introduction to the PA-32 airframe with a turbocharged variant. These two aircraft, the Lance II (PA-32RT-300) and Turbo Lance II (-300T), were not very well received. Though Piper ballyhooed the supposed advantages of the T-tail (smaller size and weight, reduced pitch changes with trim and flap application), the truth was that when the stabilator was moved up out of the propwash, the airplane's handling suffered. In particular, takeoff runs increased significantly since it took a good deal of speed for the stabilator to become effective, and when it did, the result was a pronounced pitch-up. Some complained of lack of rudder authority. The T-tailed Lances were also sensitive to trim settings. The T-tail was also a pain to preflight, especially in winter, when a ladder is required to remove snow from the stabilator.

When pilots found out about these traits, sales plummeted. In 1980, two years after the T-tail's introduction, Piper saw the light and reverted to the original tail design.

At the same time, the company applied the same wing upgrade that had already appeared in the PA-28 series. The constant-chord "Hershey Bar" wing was replaced with a semi-tapered planform. Piper also "simplified" the designation of the entire PA-32 series, renaming them Saratoga SP. The fixed-gear versions were simply called Saratogas. As before, there were turbo versions available, designated by a T at the end of the model number. The fixed-gear option was dropped in 1993, only to reappear briefly as the Piper 6X from 2004-2007. The retractable version saw various iterations under the Saratoga name until 2008.

Used values of the T-tail models have historically been lower than those of the conventional-tailed airplanes, which makes the T-tail a relative bargain in a six-place airplane. Owners of T-tails seem to like them. It should be noted that although T-tail owners without exception stand behind their airplanes and claim the poor reputation is undeserved, the airplane nevertheless has documented performance differences from the otherwise identical straight-tail version (more on this later).

An early-80s Cherokee Six panel (upper) is what you'll get in factory-installed avionics from a similar-era airplane. But the acres of panel space makes just about any avionics upgrade possible, as seen on Richie Canastra's 1981 Saratoga (lower).

TURBO DIFFERENCES

The turbocharged engines have AiResearch turbos with wastegates mechanically linked to the throttle controls. The pilot has to adjust the

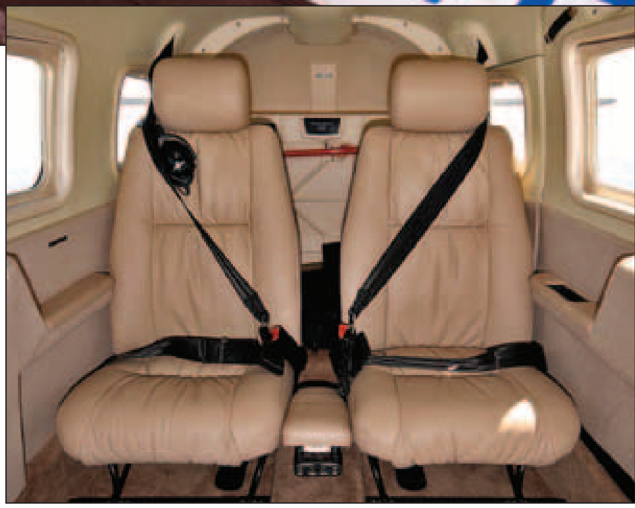
The large door for loading/unloading people and cargo is a family pleaser. The rear baggage area is directly behind the rearmost seats.

throttle to maintain manifold pressure during climb, and it is possible to overboost the engine if too much throttle is applied. (The MP gauge is inconveniently located in front of the pilot's right knee, but there is an overboost warning light on the panel's eyebrow.)

The Turbo Lance II has an unusual updraft engine-cooling system that takes air in through a low-mounted "fish-mouth" oval scoop, forces it up over the cylinders, then back down and out through cowl flaps. Owners say the system is ineffective and requires the use of extra fuel and step-climbs to avoid engine meltdown. The Turbo Saratoga SP has a more effective cooling system replacing cowl flaps with louvers mounted on top and on the bottom of the cowling. A popular mod is to add an intercooler.

CLUB INTERIOR

Most find the interior of the PA-32R quite comfortable. The cabin is over 10 feet long and 3.5 feet high. Shoulder room for the front and center seats is four feet and 3.5 feet for the back row. Most 32Rs have club seating and there's a big side door for the passengers, who need not clamber over a wing to enter the airplane. It's remarkably quiet, due in no small part to the presence of a nose baggage compartment located between the cabin and engine. The rear seats are easily removed for cargo, and some owners just leave the rear ones at home most of the time. Because of the wide cabin, there's plenty of room on the panel for any gadget one might want. Other than that, it's pure Piper single.



The fuel selector is a bit different from the familiar PA-28 sidewall-mounted pointer, being sensibly located on the center pedestal. One thing we don't like is the sump-draining procedure. Not a simple matter of sticking a fuel tester in a quick drain, the procedure requires the pilot to first put a bucket under a nozzle in the belly, then get back in and hold down a lever located under the right center-row seat while simultaneously switching tanks.

This gymnastic routine continues for a minimum of 18 seconds due to the length of the fuel lines, after which the pilot gets to go back outside, look in the bucket and try to figure out which tank the water came from.

Later PA-32s have some good crashworthiness features, including seats with S-shaped frames designed to progressively crush on impact and a thickly padded glareshield.

LOAD CARRYING

Typical of single-engine airplanes, the Lances and Saratoga SPs force the pilot to choose between filling the cabin and filling the tanks. Still, an airplane this size is quite practical when it comes to hauling, because carrying four with baggage and full fuel is possible. The turbo models are a bit more limited. With six FAA-standard people aboard, a PA-32R can carry enough fuel to fly 2.5 to 3.5 hours. The CG range is quite wide, but with only two people

The fuel selector is big, simple and mounted directly under the center console's engine controls and is easily reached from either front seat.

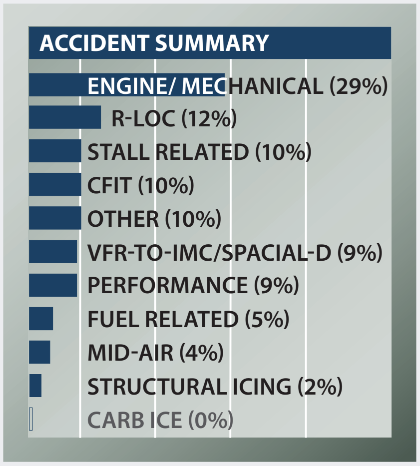
ACCIDENTS: MORE ENGINES, FEWER PRANGS

Our usual parade leader in these accident scans is runway loss of control (R-LOC), but for the Saratoga, nearly double that number of accidents came up as mechanical issues, particularly engine-related problems. Most of these were human error, such as improper installation of a part that, say, kept all the oil inside the engine. One of these probably shouldn't have been an accident as the flight instructor noted the low oil pressure but elected to continue because, "the engine was running smoothly." About 20 minutes later, it got a lot less smooth, probably due to the field they landed in.

There were, however, an unusual number of in-flight fires due to exhaust leaks, particularly with some model turbo chargers. In fact, one NTSB report referenced three other NTSB reports of the same turbo failure. Surprisingly, only a few of these in-flight fires were fatal.

Some of the mechanical might actually be better put in the performance category. All we know is that the pilot claimed the aircraft lost power, but the rest of the description sounds like poor performance of a heavy airplane at higher density altitudes or in the face of downdrafts. We think there's a common thread through accidents in the R-LOC, stall-related, performance and "other" accidents were pilots get caught because their fully loaded hauler doesn't have the the quick response to power and good climb rate of a lightly loaded trainer. We can't prove that, but it certainly looks that way.

We found a typical, if depressing, number of "the non-instrument-rated pilot departed into IMC" scenarios, often at night and almost always with a fatal result. These accidents seem most common in step-up airplanes like the Saratoga. One of these is probably the most famous GA accident of modern times. There were six in-flight breakups; it's rare for us to see more than one. Four of them involved flying into thunderstorms, which no GA airplane is built to handle. One involved a wake turbulence encounter while six knots under Vne. Another was while one instructor was checking out another one. No comment on that.



Even so, the 'Toga isn't going to stall or fold up, so long as the pilot does the right thing. One report reads: "[The pilot] reached the conclusion that he was not going to be able to avoid [the hill], so he maneuvered the airplane into a controlled crash." Everyone survived.

aboard, care must be taken to avoid exceeding the forward limit. There are two baggage compartments, both with a 100-pound capacity: the nose bay and a large one aft of the rear. One way to improve the T-tail's squirrelly handling reputation is to put 50 pounds in the aft baggage compartment to bring the CG aft into the center of the range.

PERFORMANCE ANXIETY

While 150 knots isn't all that bad, when compared to other big retractables the PA-32Rs are rather slow. Almost any A36 Bonanza or Cessna 210 will walk away from the 32R, being about 10 knots faster.

At 75 percent power, a Lance cruises at 158 knots while burning 18 GPH. The Saratoga SP isn't faster, but improvements in induction air cooling allow their engines to be leaned to peak EGT, saving a couple of gallons an hour. The turbocharged airplanes can cruise at 177 knots while burning nearly 20 GPH up high, but at lower altitudes they're only a couple of knots faster on the same fuel.

Because of its T-tail, the Lance II has a significantly longer ground roll than the conventional-tail models. The books indicates a 1650-foot ground roll under standard conditions, and notes the roll will be one-quarter longer if the airplane is loaded toward its forward CG limit. Ground rolls for the Lance and SP are posted as 1380 and 1200 feet, respectively. Initial rate of climb is a tad over 1000 FPM for all models.

MAINTENANCE

Several Turbo Lance II owners complained about their hot-running engines. (One said his mill once toasted the forward baggage compartment sufficiently to melt plastic diaper bags that had been stowed there.) However, as noted below, there are modifications designed to eliminate the heat problem.

Among recurring ADs are: 77-12-06, which requires the shanks of Hartzell Y-blade propellers to be inspected and cold-rolled every 2000 hours or five years (90-2-23 also calls for a one-time inspection and possible replacement of the hub, and 94-17-13 requires recurrent inspection of hub grease fittings); 78-23-01, which requires the fuel drain lever doors in naturally aspirated Lances to be checked every 100 hours until they're replaced; 93-5-22, which addresses the fuel injector lines on the TIO-540-S1AD engine; 95-26-13, which requires recurrent inspection of oil cooler hoses.

A rash of engine fires in turbocharged Lances and Saratogas prompted an Airworthiness Directive requiring portions of their exhaust systems to be periodically inspected and eventually replaced. The AD targets the fittings on a 90-degree elbow between exhaust ports and turbocharger in the Lycoming TIO-540-S1AD engine powering the big Piper singles.

In 1988, NTSB issued a warning about the fittings when it concluded its investigation of a Turbo Lance that crashed during an attempted emergency landing in Lincoln, Neb. The Safety Board found the elbow fitting in the Lance had separated, allowing hot exhaust gases to flow into the engine compartment and start a fire. The board noted the gasket and flange on the fitting had been misaligned during maintenance on the exhaust system about a month before the accident occurred.

The FAA responded with an AD (89-12-4) requiring periodic inspections of the exhaust elbows and fittings, and replacement with

The Turbo Lance "featured" this large scoop, louvers on the top and up-draft cooling in between. It wasn't the best solution, but the aftermarket came up with STC'd mods to cool things down. Photo by Brian Spurr.

modified components developed by Lycoming. The FAA estimated that compliance would cost $858 per engine.

However, later evidence of a string of exhaust system-related accidents and incidents involving both the Turbo Lance II and the Turbo Saratoga SP prompted the NTSB to call for a more stringent AD. Four such crashes occurred in 1990 alone. The Safety Board, noting that some of the crashed aircraft had received new parts called for by the AD, declared the AD was not an effective solution and called for a revision mandating repetitive inspections whether or not new parts are installed. The revised AD, AD 91-21-01, requires new exhaust parts that would beat the cracking problem

Landing gear problems are prominent in SDR reports, accounting for about a quarter of the total. Chief among them were broken nosegear actuators and cracked or broken nosegear trunnions. Other frequently cited problems included cracked engine mounts, exhaust system leaks and separations, broken magnetos and loose stabilator attachments.

MODS, OWNER GROUPS

Several companies have developed means to alleviate the heat problems plaguing the Turbo Lance II; if this is the model you're interested in, check to see if one of these kits has been installed in a candidate airplane. TurboPlus still offers intercoolers for the turbocharged Lance and Saratoga (www.turboplus.com).

Aerodynamic clean-up kits (e.g., gap seals and fairings) are available from a number of companies, including Knots 2 U (www.knots2u.com) and Laminar Flow Systems (www.laminarflowsystems.com). LoPresti (www.speedmods.com) offers gap seals, too, along with a redesigned cowling, which the company says improves engine cooling and reduces drag.

Precise Flight (www.preciseflight.com) offers speed brakes, a standby vacuum system and a pulse-light anti-collision system. Upgraded propeller systems are available from both Hartzell (www.hartzellprop.com) and McCauley (www.mccauley.textron.com) for most PA-32R models.

About 4000 owners of PA-28 and -32 series airplanes belong to the Cherokee Pilots Association (866-697-4737 or www.piperowner.org). The group holds an annual convention and regional fly-ins, and publishes a monthly magazine focusing on maintenance and operational information.

OWNER COMMENTS

I bought my 1980 Turbo Saratoga (intercooled by Turbo Plus) in 1994. I have not regretted the choice. I have installed speed mods, cosmetic enhancements and almost every avionics update available. After eight planes and over 20 years as an owner/pilot, I've come to believe that you get what you pay for.

Piper's Lance/Saratoga is the company's retractable version of the do-anything Cherokee Six. Although its basic design is some 40 years old, updates like a cleaner cowling have kept it relevant in the 21st century.

Most years my Saratoga annuals run about $5000, but have been as high as $15,000. A less fussy owner can certainly maintain a plane like this for less money. This airplane carries my granddaughter and I'm not willing to compromise anything I see as a safety issue to save money.

Every pilot wants more speed, but I'm satisfied with 185 to 190 knots at long-distance cruise altitudes in the mid-teens, where I am above most of the weather. I never have to worry about weight, balance or room. In the four years my son was a student in Washington, D.C., a 240-mile trip, we drove our Jeep Grand Cherokee exactly once. It simply could not handle the load that the Saratoga could carry, and the plane made overnight stays optional, not mandatory. Another four years of school in Philly only reinforced that view.

The Saratoga was also the only practical way for my late father to visit his older brother in Maryland. Both men, in their 80s and 90s, were too old and too physically impaired to travel either by ground or airline. The Saratoga interior volume means that almost anyone can enter, exit or ride in comfort. Almost anyone can get into or out of a Saratoga with a plastic footstool and that big-ass rear passenger door. For SCUBA or ski trips I can literally toss all the equipment I want into the back without even thinking about it. I don't deny that I would like another 20 knots or so, but I would lose almost all the utility for the kind of flying I do.

I've made a lot of very long trips (1500 miles or more) and the ability to stretch out, read a book, use a laptop or have a sandwich can't be equaled without a much bigger and more expensive plane.

I'd love to own a Meridian or a TBM, but realistically that won't happen. For pilots whose need for speed outweighs the need for space, or don't need to save five GPH, there are better choices. But when I balance the speed of the little airplanes against the room and practicality of the Saratoga, there's no contest.

Brian Peck
Middlebury, Connecticut

I bought my normally aspirated, fixed-gear Saratoga in 1998 to serve the transportation needs of my young family, and almost 14 years later it is still carrying out its mission. My friends said that I didn't need a six-place airplane, but I have had no regrets.

The Saratoga has all the utility of a minivan with wings. I cannot think of a trip where we had to leave anything at home. On one trip we loaded our family of four, two grandparents, luggage for a weekend and an outboard engine and went to Maine, still under gross. When it was first introduced, Piper boasted of the size of the Saratoga when it published sales literature showing a piano being loaded in one. Has anyone ever tried transporting a piano in a Skyhawk?

The Saratoga is a well-designed airplane that performs well in several categories. If you don't fill the 107-gallon tanks, it really can carry six adults. If you watch your load, it really can go 800 miles non-stop at 145 knots. It is well-equipped for IFR flights, and the cockpit is comfortable and stable. Most of my trips are in the Northeast and from one to two hours long, so the lack of retractable gear and turbo-charging is not missed and the savings are appreciated. Angel Flight passengers are easy to load through the large rear door.

When newer pilots ask me for advice about the purchase of a plane, I tell them to focus on their typical mission. When it comes to my typical missions of transporting family, friends and Angel Flight patients around the Northeast United States, you can't beat a used Saratoga.

Thomas G. Clements
Glens Falls, New York

I own a 1999 II HP based in Florida with about 2100 hours. The biggest selling points are its stability as an instrument platform and the comfortable seats up front. Minuses include climb performance at altitude, the long takeoff roll and the very limited full-fuel useful load. I limit myself to airways no higher than 12,000 feet and always ask for the longest runways at high altitude airports, even then using short-field techniques as a safety measure.

The post-1999 'Togas have great panels sporting HSIs and Garmins, and often come with TCAS and a Stormscope. I have added a panel-powered 396. I definitely recommend the S-Tec 55X autopilot vs. the non-"X"-model, as it saves you from constantly adjusting the tracking. Annuals run between $3000-$7000 as there are usually a couple of things that need to be replaced. The perfect progression for this plane would be via Cherokee/Archer, Arrow and then Saratoga. From there it's a small jump to a Seneca, followed by a somewhat bigger one to a Mirage or Meridian.

Compared to a Bonanza, the Saratoga trades speed for comfort. Versus a 206, you trade speed for useful load. Compared to its predecessor, the Lance, the Saratoga gives you many creature comforts at the price of the Lance's load utility. A problem is getting a CFI who is really intimately familiar with the plane for the initial training. It's better with A&P mechanics and parts.

Given that the pre-glass-panel Saratogas were virtually unchanged between 1999 and 2006 save for the upgrade to a GNS530, the earlier versions represent excellent value. If I had to do it over again, I'd get a TC for my flying in California. The HP is much more economical, however, if used mostly in eastern, southern or Midwest states.

Jim Jiao
Florida

I purchased a fixed-gear 1988 Saratoga (PA32-301) seven years ago to accommodate travel for our five-place family. We selected it for a combination of speed and capacity, which is another way of saying a Bonanza wouldn't hold our family, bags, dog, and so forth. About 600 hours later, it's taken us from the Tropic of Cancer to Canada, from the Atlantic Coast throughout the Rockies. As a family, we're delighted with the aircraft.

Perhaps the largest transition was getting used to the Saratoga's nose. That long nose hides a lot of runway or taxiway. A loaded Saratoga tends to squat down on its mains, adding to the challenge. I've flown tailwheel aircraft with better forward visibility on the ground. A spotter in the right seat is well appreciated at unfamiliar airports.

With partial flaps to lower the nose, the airplane can fly a landing pattern at 90-95 knots. Once I became used to the plane I started crossing the fence at 1.3 Vso (79 KIAS) and began fitting into GA runways with less adventure. The aircraft's 1000-foot sea-level takeoff ground roll is the limiting factor in short-field work.

The PA32 is famous for developing prodigious sink rates. The power-off sink rate at best glide (80 KIAS) with the blue knob forward is 1400 FPM. Pulling the prop back lowers that to 900 FPM and greatly extends glide range. A full load can make up to an eight-knot difference in liftoff speed and five-knot difference in cruise. Climb rates are quite different, and there are several thousand-foot differences in service ceiling. (A fully loaded Saratoga has a service ceiling of 13,000 feet.)

We fill the mains only (70 gallons) and fly three-hour legs with ample IFR reserves, which is about all the family wants to sit still anyway. Starting with an empty weight of 2287 pounds, that configuration allows for an 893-pound payload. It's well worth checking empty weight when considering a PA32 purchase as there's quite a bit of variability in the fleet.

Since purchase, the Saratoga has cost $145/hour in fuel, maintenance and repairs. That's somewhat on the high side, as early maintenance bills included catching up with several items which previous owners had deferred, including SB1006 ($2562), which calls for removal of the fuel tanks and inspection of the spar. Insurance runs $8.68 per thousand for hull insurance (no deductible), and $0.95 per thousand for smooth liability.

The closest thing to a formal users group is the Toga Party email list (groups.yahoo.com/group/toga_party) where one can correspond with other Saratoga owners. The Piper Owner Society (www.piperowner.org), and Piper Flyer Association (www.piperflyer.org) also support the Saratoga amongst other model Pipers. The Piper Forum (www.piperforum.com) is also a helpful and active Internet community.

Joe Budge
Annapolis, Maryland

Gib Dow's family (below) gladly trades some knots for more baggage space. Joe Budge's 'Toga (right) took that whole palette of medical supplies to Haiti. Yes, it all fit.

TBM850

(continued from page 12)

360-degree turns to the right and left in a taxiway hammerhead that appeared to lack anything like the space to do it. If the airplane doesn't turn in its own length, it certainly feels like it. During taxi, speed is controlled with short squirts of Beta, to offset the fact that those two exhaust stacks are churning out quite a bit of thrust, even at idle.

The airplane has a little forward thrust just off the idle stop in Beta. Retracting the throttle commands more reverse. The 850 has both aileron and rudder trim and the latter is necessary to keep rudder pressure manageable during the takeoff roll. This isn't exactly a P-51, but it'll push you back into the seat and head for the left-side ditch if you're snoozing.

Luy had us line up on the centerline with brakes locked. Advancing the torque to 50 percent and releasing the brakes gets the airplane rolling, which it does as if on rails. The G1000 presents a small white power-set caret—a little over 100 percent torque—and once you're there, wait for 65 knots and tug the pitch up to 7 degrees. The TBM seems to show its Mooney origins in that it doesn't bolt to triple digits but kind of collect itself up, accelerates and settles into a robust climb between 130 and 140 knots. Moving the flap switch to 850-mode will push the climb rate to 2000 FPM. This sounds like a surfeit of performance but it will, in fact, turn you into a beggar because what the TBM850 craves more than anything else is unrestricted climbs. This allows it to reach its top cruising speeds in the 20s and low 30s and that will substantially reduce fuel flow. On the ground, the engine is burning 33 GPH at idle and that doubles in low-altitude climb. In the high 20s on a standard day, fuel flow is more like 55 to 60 GPH and to wring maximum range out of the airplane, you need to get high as quickly as possible and stay up there as long as possible. At 10,000 feet, fuel would be disappearing at 75 GPH.

On a previous flight with Nicolas Chabbert, level at FL280, we were motoring along at 308 knots true, right on the book speed, and called up the Garmin's range map, which showed we could make it to Boston, with reserves, from south Florida. But, Chabbert pointed out, ATC often doesn't play.

"When you get to New York, you will be pushed down and the fuel flow goes up," he says. Depending on the wind, this can make reaching the flight-planned destination iffy, an illustration of the most critical skill new turbine pilots have to learn: dynamic fuel planning on max range flights.

SOCATA also encourages pilots to take advantage of one of the TBM850's other tricks: It will descend like a box of hammers if the power is pulled to flight idle and the nose is pushed over to V_{MO}, which is 266 knots indicated. On our flight with Luy, we saw 9500 FPM in descent. It's practical to remain in the flight levels until within 25 miles of the airport, idle the power, dump the nose and slow to enter the pattern five miles out.

Once in the pattern, the 850 fits into the flow without much fuss. For our first landing, we flew a turbine-style pattern at 1500 feet AGL and outside the rest of the traffic. But the airplane is perfectly civil at 90 knots in the downwind and 85 knots on final—basically Cirrus speeds.

Luy suggesting running the pitch trim to the uptrim stop and just let the airplane fly itself on, which it does, requiring only a mild tug and light control pressure to coax it into the flare. If you want to stop right now, yank the Beta to the rear stop and push the nose down and get on the brakes. The POH says this thing will get in under 2000 feet with maximum braking but no reverse. We didn't try it, but our turnoff occurred at about 2200 feet, without trying very hard.

Our estimation of the TBM850 is that it's exactly what Daher-SOCATA says it is. Blisteringly fast personal transportation that's comfortable without excess gilding and easily and safely flyable by a guy not named Steve Canyon.

FEEDBACK WANTED

CESSNA SKYMASTER

For the July 2012 issue of *Aviation Consumer*, our Used Aircraft Guide will be on the Cessna 337 Skymaster, a unique push-pull twin. We want to know what it's like to own these twins, 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 Skymaster by May 1, 2012, to:

Aviation Consumer
e-mail at:
avconsumer@comcast.net