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Number 2

The consumer resource for pilots and aircraft owners

The Aviation Consumer®

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The Aviation Consumer

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An Eternity of Bad Behavior

As a child, I was not well behaved. In fact, I was an excruciating pain in the ass to my parents, my teachers and all my little friends. (Stick with me, you'll see where this is going.) When my mother died some years ago, all of this came rushing back when, much to my surprise, I discovered that she had saved all my report cards.

Amidst my appalling grades in math and penmanship was a column quaintly labeled "habits and attitudes desirable for good citizenship." (They said stuff like that during the 1950s.) Under the row for "neatness," I scored straight red X's. I was below even the *minimum* grade, perhaps owing to the fact that I stripped the tines off my official Mother of Perpetual Guilt and Suffering comb to make blow darts. There were also urgent notes from the Franciscan nuns who ran the place, reporting that all attempts to civilize me had failed. A recurring sentiment in these notes haunted me throughout my academic career: "Paul is capable, but consistently fails to apply himself. His attitude needs improvement." They could have just as easily appended another note, "He'll make a great editor for *Aviation Consumer* someday."

And that would be more or less my general explanation for Peter Rejto's question in this month's letter about how we can complain that a plate viewer is too small to see the entire plate, then bitch about it being too big if it does. It's not so much that all attempts to civilize us have failed—although they probably have—it's just that our job is to find the Goldilocks zone: Not too big, not too small, not too expensive, not too cheap—everything just right. That's what subscribers pay us to do in our reporting.

Van West wrote the SolidFX report, by the way, not me. I feel certain that his academic career is a dreary exercise in overachievement, neatly delineated by the strings of straight A's that crumped the curve for those of us trying to slide by with low C's. But this failure to grasp the really important things in life has not kept him from applying critical thought when it is needed.

When *Aviation Consumer* appeared in 1971, it launched into a different aviation universe. The industry was booming and the aviation press was a pack of lapdogs that never saw an airplane it didn't like. Thirty-seven years later, the industry isn't booming and although there are fewer dogs, they're still lap sized.

So our place is to cut through the usual PR bull that attends many products. If we like a thing, we'll say that. If we don't, we'll say that, too. If it's in between, so be it. It gets harder to do this with each passing year. We are fully aware that what we say in these pages has real impact on companies and the people who work for them. We do not offer our critiques lightly for we, as does everyone else, want these companies to survive and prosper. But our first loyalty has always been and must be to readers.

Given the grim economics of publishing these days in a world driven by markets in which readers expect everything for free, preparing critical product reports is also more challenging than ever. But we carry on because it's needed, it's fun to do and there is still a place for it. And I am, after all, a guy who got through second grade with a toothless comb. After that, all things are possible.—*Paul Bertorelli*

SolidFX, Garmin

I have read with interest your comments on the SolidFX. (See *Aviation Consumer*, September 2009.) I was able to see this in person at Oshkosh and would have bought it save the price. I was very impressed by the unit. To me, it seemed fast enough and the zoom feature was very clever and easy to use.


Solid FX ePlate Reader: Simple, Effective ... Big

However, I did find your comment about the size somewhat confusing. On the one hand, I've noticed that you complain when the full chart can't be seen (AV8OR ACE, October 2009), and you complain when the unit is large enough to see the whole chart!

The bottom line for pilots outside the USA is that we don't actually have any other choices for a paperless cockpit save JeppView. And the charts for SolidFX for all of Australia are only $140/year. I might have just convinced myself to buy this.

I'd also like to comment on the Garmin 695/696. I own a 695 and in nearly every way love this GPS. The screen is fantastic and with the serial input tied to my panel-mounted IFR GPS, the combination is about as good as it gets, unless you are lucky enough to own an all-glass airplane.

My gripe is that there is only one serial input and that you must make a software adjustment involving four button pushes and three twists to modify the input! In my case, I also have a Zaon XRX that must rely on the same serial input. I made up a simple A/B switch to cycle the inputs, but the need to burrow so deeply into the software is really annoying.

Garmin could rectify this easily with a software update; there are unused soft keys that could allow for a rapid change of the serial input type. I tried to speak to some Garmin techs at Oshkosh about this, but I felt like nobody was interested.

Finally, I'd like to ask a question about the Garmin aviation protocol. The question springs from a big annoyance with the uploading of flightplans generated on a computer into all the Garmin portables through the USB port.

The uploading works brilliantly until the realization hits that all the uploaded waypoints are seen by the Garmin as user waypoints, even when they have the exact identifier and coordinates as the Jeppesen database in the GPS. As user waypoints, many of the best features of the Garmin simply don't work.

User waypoints will not show any data on the waypoint and the GPS will not know that there are approaches available. This is a rather sad situation as one of the great joys of the portables is that you can flight plan at home, load the GPS and be ready to go. This user waypoint problem is a rather big obstacle, and in my view makes the USB uploading rather pointless.

But then I thought about how beautifully my panel-mounted Garmin can communicate with the portable. Waypoints are sent as real waypoints and flightplans transfer seamlessly through the aviation protocol. My hope is that some clever flightplan designer will figure out a way to upload a flightplan from the computer into the serial port using some scheme that mimics the Garmin aviation protocol.

Peter Rejto
Via e-mail

More Obsolete Products

I read with interest Pete VerLee's "Telex Beef" in the January issue, since I have had a similar experience with Lowrance Electronics. In July of 2007, while completing the panel for our new experimental, I installed a Lowrance 2000C GPS.

In January 2009, we had some problems with the unit and we returned it to Lowrance for repairs. We did not get the unit back until mid-May 2009, but with a six-month warranty. Returning from the Copperstate Fly-in in October 2009, the unit began to show problems with the display.

I called the Lowrance service line. I was told that Lowrance was leaving the aviation market completely, but that since my unit was still under warranty, they would replace it. I was also told to expedite returning it. And further, I was told that Lowrance would no longer support any of their aviation products that have been sold over the last 10 years. An aviation GPS without a current database is rapidly getting useless.

I have no qualms about a manufacturer deciding to leave a market. But I do have concerns, indeed anger, when I am told that the upkeep of what I purchased in good faith will no longer be offered. In this case, I sent a letter to the parent company that owns Lowrance and of course have not been given the courtesy of a reply.

Oh, one other thing. I sent the 2000C to Lowrance on November 3, 2009, via UPS with an RMA as instructed. As of today (January 2, 2010) I have not received any confirmation other than my completed tracking number from UPS. Finally,

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READER SURVEY

GPS Survey Favorites: Garmin, Anywhere Map

In general, readers planted sloppy kisses on whatever portable GPS they owned. Issues with updates and battery replacements topped the complaints.

by Jeff Van West

Portable GPS devices are arguably the most useful cockpit tool since the invention of the E6B. Or aeronautical charts.

So it was no surprise when our reader survey on portable GPS generated well over 1000 responses. There were comments from pilots still flying trusty, monochrome Magellans to ones using the newest Garmin aera. We saw dozens of poetic waxings about most every major supplier and surprisingly few complaints.

That said, no company or product escaped with no complaints and we saw some direct conflicts: Pilot A had such a dismal time with Anywhere Map that he went to Garmin and is much happier, while Pilot B finally got so sick of Garmin troubles he bought an ATC and now flies in a state of bliss. To each his own.

Some useful trends emerged, however. Budget-conscious fliers told us that however tempting the latest and greatest GPS might be, an honest assessment of their GPS use proved they didn't need it.

A common complaint across all portables was to watch for wear on the screens and keys. All units seemed susceptible here. Most of the remaining items varied with make and model.

Anywhere Map ATC was strong on subscription costs and customer service, but weak on display performance. Users differed on how user friendly the unit is.

THE GARMIN DYNASTY

Just under 66 percent of the respondents had a Garmin aviation GPS. If there was a surprise to that number, it was that it wasn't larger. Overall satisfaction with Garmin GPSs was quite high.

Pilots flying the diminutive GPSMAP 96/96C liked it for its low cost, small size and great battery life on easy-to-find AAs. The chief complaint was the small screen where text can be difficult to read, particularly for older eyes. One 96C owner told us he carries a magnifying glass.

The GPSMAP 196—as well as vintage 195s and GPS III Pilots—emerged as the winner for function over form. "The monochrome display, while not as 'gee whiz' as the color, is extremely clear and easy to read in any light. For me, the extra expense of the color units is not worth the pretty picture." Monochrome units can be had (or replaced) for cheap on eBay.

Many pilots see the 196 as a great, basic portable for backup and basic tasks. These aren't just weekend fliers, either. "Operating a Citation jet I used my Garmin 196 to keep my flight logs, but on one occasion it served to complete an in-progress GPS approach when total nav failure occurred with dual Garmin 530s onboard the aircraft."

What we'll call the GPSMAP x96—the 296, 395, 396, 495 and 496—were the most popular units in our survey. The comments were similar enough to treat them as a group. The units offer a full range of features from basic color to high-res terrain and weather. Said one reader of his 296: "This unit offers the exact mix of features I wanted at a reasonable price. It knows all important aviation facilities, terrain, radio frequencies, etc. It doesn't have XM weather or music receiver, both of which I feel are unnecessary for day VFR (severe clear) flying." Another told us of his 396, "I would buy the 396 just to get Garmin's Safe Taxi."

The x96 earned a middling review on robustness due to its power cable. The rubber cap that covers the plug on the GPS stops fitting correctly on about day two of use, and the plug side will break if plugged and

unplugged often. Garmin has redesigned the cable for better longevity, and will replace older cables for free.

Another power issue with Garmin GPS units comes from the battery used to keep the location known for faster satellite acquisition. GPSMAP 195s and GPS IIIs have a separate memory battery for this. Later units use the main battery. In either case, when an old internal battery won't hold a charge, you'll see long delays getting a satellite lock. The replacement battery must be installed by a technician or Garmin and can be a flat-rate fix of over $150 (depending on the unit or warranty). We saw several gripes about Garmin's flat-rate repair policy, but predominately good reports of the total service experience.

Another item to watch for in used x96 units are early XM antennas that can fail if they get too hot (like sitting on the glareshield). If this is happening to you, a replacement antenna puck should solve the problem. Some users don't like that the 396 and 496 will only display one weather product at a time.

Stepping up to the 696, most pilots love it, so long as they can find a place to mount it. The main beefs were that the approach plates were too small for many to use without awkward scrolling and zooming, and that that data updates for the 696 took a long time, especially if it included approach charts.

Garmin's new aera with touchscreen, high-res terrain and XM rated well by those who had it, but many admitted that their old monochrome units, like this GPSMAP 196 did everything they needed for a lot less money. Several also reported that buttons were preferable to touchscreens in turbulence.

We found the operation of the GPSMAP 696 easier than the 296-496, but many users do not. There are more buttons on

MODEL	OVERALL SATISFACTION	OPERATING LOGIC	DISPLAY	BUTTONS/ TOUCH SCREEN	RESISTANCE TO BREAKAGE	CUSTOMER SUPPORT	EASE OF UPDATE	COST OF UPDATES	PRICE NEW	APPROX USED
AVMAP										
EKP IV / IV PRO	⊕	~	⊕⊕	~	⊕	⊕	--	⊕	$1495 [1]	$900
BENDIX-KING										
AV8OR	⊕	⊕	⊕	⊕	~	⊕	⊖	⊕	$799 [2]	$350
AV8OR ACE	⊕	⊕	⊕⊕	⊕	~	⊕	--	⊕	$1999 [2]	--
CONTROL VISION										
ATC	⊕	⊕	~	⊕	~	⊕⊕	⊕	⊕⊕	$595 [3]	--
PDA-BASED	⊕	⊕	--	--	--	⊕⊕	⊕	⊕⊕	$795 [3]	--
GARMIN										
196	⊕	⊕	⊕	⊕	⊕	⊕	--	⊖	$550	$300
296	⊕	⊕	⊕	⊕	~	⊕	⊕	⊖	$1395	$600
395/396/495/496	⊕	⊕	⊕	⊕	~	⊕	⊕	⊖	$1299-$2195 [4]	$700-$1800
695/696	⊕	~	⊕⊕	⊕	--	⊕	~	⊖	$3295 [4]	$2500
AERA (ALL MODELS)	⊕	⊕	⊕	⊕	--	⊕	--	⊖	$875-$2199 [4]	--
LOWRANCE										
2000C	⊕	⊕	⊕	~	⊕	⊖	~	⊕	$699	$450
600C	⊕	~	⊕	~	⊕	⊖	~	⊕	$499	$300
TRUEFLIGHT										
CHEETAH 150/190	⊕	⊕	--	⊕	--	⊕	--	⊕	$995 - $1595 [5]	--
CHEETAH 210	⊕	⊕	⊕	⊕	--	⊕	--	⊕	$2195 [5]	--

Notes: "--" indicates insufficient data. Several makes and model can display traffic with appropriate receiver/connections.
1: Add $599 for XM receiver. 2: Add $700 for XM receiver. 3: Add $300 for XM receiver. 4: XM receiver included with 396, 496 and 696. 5. Add $595 for XM receiver.

the 696 and therefore more places to go and look for something. Pilots transitioning from a 296-496 can find this frustrating. Pilots familiar with a GNS 430 or G1000 won't have a problem.

Early pilot impressions of the new Garmin aera were quite positive. "Different from the 496 but better after learning it, much faster and better reception with XM and satellites." More than one user felt the nav and XM data acquisition was faster. One user reported mild difficulty with accuracy using the on-screen keyboard. He suggested using the eraser end of a pencil rather than a fat finger.

Far and away, the biggest complaint with Garmin GPSs was the cost of updates. "The subscription costs (if you keep everything current) are too much in my opinion. On my next GPS purchase I will look more closely at the data costs." A Jeppesen nav data update is $49.95 per update or $295/year. But if a 696 user wanted to keep up nav data, terrain and obstructions, AOPA airport data and the approach charts, it would be almost $1500 annually (see sidebar). And that doesn't include a subscription for datalink weather. Many users simply don't bother: "I don't subscribe, but I did update the data once in 1998."

CONTROL VISION'S ATC

Control Vision's Anywhere Map is a well-developed software package that runs on PDAs and Tablet PCs. Control Vision took a step into the dedicated GPS market with their Anywhere Travel Companion (ATC). It's really just a PDA with a built-in GPS, but in practice it's functionally a touchscreen aviation GPS.

Many pilots love their Anywhere Map: "You won't go wrong with Anywhere Map. I've flown NavAir, Garmin, Bendix King, Lowrance. Anywhere Map has them all beat as a complete package." Value for the dollar is a recurring theme. "After years of needing to purchase hardware to utilize updates from Garmin, I switched. I haven't spent another dime in 6+ years with AWM."

Some people don't click with the Anywhere Map operating logic. Others seem to love it, with the likes outweighing the dislikes. More objectively, Anywhere Map had the best scores on items like entering a flight plan or viewing waypoint information—if by a thin margin. Additional pluses to Anywhere Map is that the company issues free updates to the software as it improves over time, and it can run on Tablet PC computers for a big-screen, EFB experience.

Control Vision also has an option for a lifetime data subscription for just $395 (lifetime approach plates are another $395). Control Vision had some trouble with their Canadian data in the past, but they recently have resumed updating it.

We did see issues with problems in reliability with both ATC and PDA-based units. "It took three replacement units to get a unit that worked. Third unit working for six months—so far." A theme seems to be problems displaying weather reliably. "When it works, it's fabulous—but that's only about 60 percent of the time; the rest of the time it craps out ... after shedding the XM WX function, the Anywhere Map now performs reliably." The ATC is also not a WAAS GPS.

On the plus side, Control Vision's customer service earned top marks, often going the extra mile for customers. "The service was completed promptly and I received an e-mail letting me know the service was completed, what they found wrong, what they did to fix it and asking where to ship the unit rather than just sending it to my account address. This was extremely helpful because I was on a travel assignment."

Our middling chart rating on ATC's display needs some qualification. The screen resolution is high—800 x 480—and the touchscreen works well. What doesn't work well is the speed of screen refresh. The

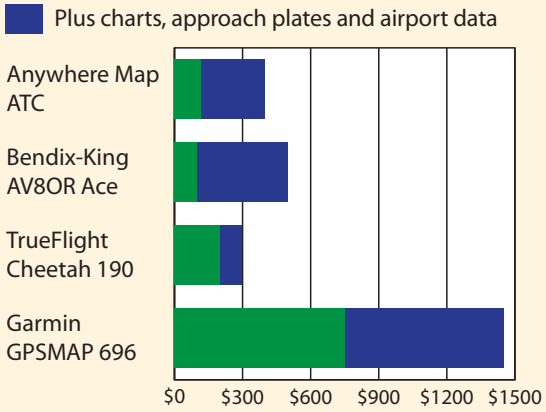
THOSE SUBSCRIPTIONS ADD UP

When we looked at units where there is a choice between having weather and not, such as the Garmin 496/495 or adding Bluetooth weather to an AV8OR, there was a 20-to-1 preference for getting the weather and paying the subscription. Several comments noted that once you have weather and/or terrain, you'll never be willing to go back. One pilot quantified it for us this way: "On one flight in a King Air 300, by evaluating the winds aloft, graphically depicted, I made a series of turns to follow the winds and cut almost 30 minutes off my flight time. This one adjustment saved almost half the cost of the unit."

But that logic leaves out the fact that the weather subscription probably ran $50/month. We're a fan of cockpit weather and consider it money well spent, but it's not a slam dunk for every pilot.

The case is even less clear with data subscriptions. There's no requirement that your GPS is up-to-date, but if you're using it for airport information or approach plates, it almost has to be—or you risk a minimum of embarrassment and the potential for much worse. Part of your purchase decision should include how much the subscriptions you need will cost. As you can see from the table, it varies quite a bit. This chart is somewhat apples-to-kumquats as companies group their data differently. Garmin is the most granular and TrueFlight is the most inclusive. Remember as well that not all GPS units can show all the data you might want.

ANNUAL DATA SUBSCRIPTIONS COMPARED



culprit is the hardware ATC runs on. We saw multiple reports that the screen will slow down or lock up if you get too many commands ahead of what it's showing. We've heard rumor of a new version of ATC that would address this problem, as well as add WAAS.

Bendix-King's AV8OR series was popular for the intersection of size, features and value. The Ace version (right) had scanned plates and en route charts. Complexity of updating data was a complaint.

BENDIX-KING'S AV8OR

The two touchscreen GPS units from Bendix-King, the AV8OR and AV8OR Ace, were generally well liked by their owners. The Ace seemed a particular favorite in terms of cost-value because it included approach plates—georeferenced so the aircraft shows its position on the plate— and en route charts. Additional accolades were voiced for complete Canadian data and visual checkpoints in the database, although it does not have the ability to load instrument approaches into the flight plan.

Users say datalink weather is displayed well. The touchscreen and readability of the display overall was rated as excellent on the AV8OR, the larger Ace version in particular.

Battery life is reported as low (we saw the same in our review). We also saw reports of display and button failures. People's experience with customer support were mixed.

We saw some complaints about the automotive mode (Go Drive) both in usability and with out-of-date information in the database.

On that topic, database updates were a major complaint on the AV8OR. We explored this further and, in our opinion, it requires more computer savvy than equivalent updates on some other products, but it's not unreasonably complicated. The biggest issue seems to be the Bendix-King website itself, which we agree could be better designed.

LOWRANCE LEFTOVERS

Lowrance shipped its last aviation units to retailers in Q3 of 2009. They told us they will continue support of their aviation GPS devices for the foreseeable future, but they have no plans to reenter aviation. So any new Lowrance units you may buy are semi-orphaned.

If that doesn't deter you from buying one, users say Lowrance screen quality is quite good (if somewhat low resolution) and the units are user friendly. The bigger 2000C drains its batteries quickly. The 600C does better. Changing between modes, such as switching to a marine mode, can require loading a different database. Cables in the Lowrance units seem to be a weak point.

THE CURVE'S LONG TAIL

Many other GPS options exist, from Tablet PC-based EFBs to some apps for an iPhone. (We'll look at some of these EFB solutions in an upcoming issue; see page 19 for more on the iPhone.) There were, however, two standouts in the "other" category.

The AVmap EKP IV meets a need for a big screen at a good price. While users say the unit is weak on viewing waypoint info and navigating pages, it has a great display and good overall usability. The EKP IV can also display weather and traffic, but we don't have enough data to say how well.

True Flight offers three versions of its Flight Cheetah. Like Anywhere Map, this is Windows-based software running on hardware that works well or was purpose-built for the cockpit. True Flight has a small but dedicated following who praise the system for a wide range of functions at a good price and excellent support from the small company. We reviewed the Cheetah 210 in our May 2009 issue.

Most any portable GPS will get the job done. The key is finding the package and presentation that works for you. One survey respondent summed it up as well as we ever could, "Buy something that is solid and dependable day in and day out. Identify what will make a difference in your flying safely. Don't buy a product just because it can do something a little faster or a little better if it really won't make your plane more useful or safer to fly."

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800-292-1160

Garmin International
www.garmin.com
800-800-1020

Lowrance
www.lowrance.com
800-324-1356

True Flight
www.aviationsafety.com
866-443-3342

TCM's Lifter Crisis: Reclaimed Parts Rule

The lowly valve lifter used to be the first thing tossed during overhaul. Now, reusable parts are a hot item.

by Jim Cavanagh

Owners buying engine overhauls have more or less adjusted to the idea that cylinders, cams and crankshafts have become a crap shoot. But valve lifters, too? These got added to the list of problem parts last fall when TCM announced that a massive batch of faulty lifters made it into the supply chain. Some showed failure wear in as little as five hours of operation.

Although only engines built after June 19th, 2009, appear affected, the sudden demand has disrupted the supply chain for lifters to the extent that the industry—and the FAA—are relenting on the standard recommendation that lifters be replaced. Further, the market for overhauled lifters has become red hot and, at least well into 2010, they may be hard to come by. Only owners who had engines built after the June date need be concerned about bad lifters and not all of them may be affected. The problem centers on tappet bodies with part numbers of 657913, 657915 or 657916, whether purchased individually or in a parts kit. (See special airworthiness information bulletin NE-10-09 and Airworthiness Directive 2009-24-52.) Engines affected are TCM O–360, O-470, O-520 and O–550 models. An estimated 600 aircraft are currently grounded. If these engines were overhauled or had the tappet bodies replaced since the June date, the airplane is grounded until the parts are replaced.

Aircraft Specialties Services, left, is currently the only source of overhauled tappet bodies for TCM engines. Contact ASSI at www.aircraft-specialties.com or 918-836-6872.

Fallout from this AD is being felt throughout the industry. In a nutshell, TCM has no means of providing replacement parts for a few months, at least, although it shipped some emergency overhauled lifter bodies obtained from Aircraft Specialties Services, Inc., in Tulsa. TCM negotiated a waiver from the FAA to use "reclaimed" lifters as replacements in new and rebuilt engines.

Aircraft Specialties has been overhauling lifters in general since 1990 and TCM lifters since 2002. ASSI is considered the leading "steel" shop in the country and has worked closely with TCM in the past. Nevertheless, TCM spent a couple of days inspecting ASSI's process and performing an accelerated engine test run to assure themselves that overhauled lifters are quality parts.

The lifter problem will affect both factory new engines and aftermarket sales well into 2010. At press time, the only lifters available are rebuilt and these will be used as replacements for recently overhauled engines affected by the AD.

YOU'RE KIDDING, RIGHT?

The initial reaction to this situation by shops was a degree of shock. Service Bulletin SB-97-6A, issued in 1997, calls for removing and discarding hydraulic valve lifters. Shops have been tossing the used parts into the trash for years. That the FAA would endorse reusing the old parts underscores the seriousness of the situation. Industry professionals know that parts integrity is a non-issue, since overhauled parts must meet stringent requirements.

At press time in early January, the actual reason for the problem has not been revealed. Tappet bodies are outsourced by TCM through Eaton, Inc., a company that does contract work for a number of industries. The parts had been manufactured in Brazil until late 2009, when production was moved back to the U.S.

The consensus is that the problem lies either in the metallurgy technique or the personnel who cast the blanks. The tappets are made of cast iron, using a chilled cast technology. This gives them hardness that's compatible with the hardened camshaft lobes upon which they ride. One problem with cast parts are voids just below the hardened surface which, if breached, can cause degradation of the hardened surface.

With this in mind, it's logical to assume that if reclaimed tappet bodies have made it through one TBO run without unusual wear or distortion, they're candidates for reuse. And that's exactly what ASSI does.

A major concern is a steady supply of cores for the rebuilding process. There's a good supply of comparable parts built by Superior Aircraft Parts, but TCM will only rebuild and certify original TCM parts. Aircraft Specialties confirmed that they have an inventory of recerted Superior parts for customers who request them.

Further, regardless of the original manufacturer, ASSI has rebuilt over 40,000 lifters for TCM engines in seven years, with no warranty claims. With that in mind, we see no downside to using the overhauled lifters. Until TCM sorts this out, there's not much of a choice to do otherwise.

Most round instruments are available with internal lighting, but you'll pay a premium to get a replacement that's internally lit.

New Cockpit Lighting: Options for All Budgets

Lighting upgrades can be big work and are electrically intensive. But you don't have to reinvent your panel to improve what's visible in the dark of night.

by Larry Anglisano

It was close to midnight and after a long day of flying we were cooked. A couple miles out something just didn't look right. If not for the landing light reflecting off the trees, we might not be here to review cockpit lighting upgrades. The instrument-panel lighting in that 70s-vintage Arrow was so poor we cranked in the wrong altimeter setting—misreading a two for a three in the Kollsman window.

There's no reason to live with (or risk death due to) substandard cockpit lighting. Panel upgrades require skill and a decent budget. The good news is there are several options to light up your night.

SOME HUMAN FACTORS

Studies continues to prove that certain combinations of instrument panel paint and lamp color play a huge role in reducing pilot fatigue during night ops. Soft blue lighting is known to combat eye fatigue and it, along with a flat grey panel, is perhaps the easiest on the eyes in a darkened cabin. While high-gloss wood-grain look-alike finish combinations are as glamorous in a Skylane as they are in a Jaguar, they might not promote a fatigue-free view in flight. We recommend thinking practically to find the proper balance between aesthetics and functionality.

The ability to dim all the lights is important. Don't underestimate the distraction even a single bright warning light can induce in an otherwise well-dimmed cockpit. A piece of black electrical tape over the annunciator isn't the acceptable remedy.

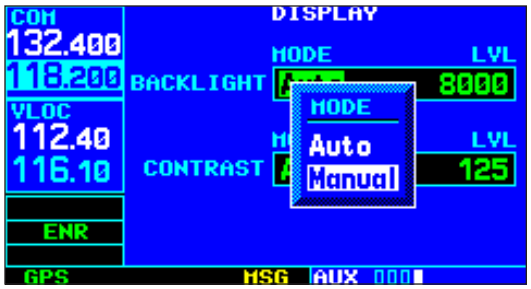
INTERNAL LAMPS AND POSTS

Internal lighting for instruments usually relies on a lamp tray seated in the upper portion of the instrument bezel. It's not the best lighting, but it works.

It also costs. The non-lighted Sigma Tek 5000B-36 gyro is $1040, while the 5000B-37 with lighting is $1230 plus a $55 lamp tray. In a world where many owners are trying to move out of round-gauge instrumentation, any added costs for replacement seems silly.

Post lamps are a common if frustrat-

Military grey with soft-white lighting is easier on the eyes than some high-gloss woodgrain patterns. Adding a glareshield light can further improve night utility.



Most big-screen displays have manual or automatic backlighting. If not adjusted properly, they can be a distraction in a dark cockpit.

ing source of instrument light. It seems there are always one or two lamps that are burned out, given their somewhat fragile design. These breakable lamps mean extra work during instrument maintenance. But if you need them, Whelen offers post lamps at $37 each.

LIT RINGS AND WEDGES

Lighting rings and wedges are a common solution for improved lighting and give the appearance of an internally-lighted instrument. Further, the light is directed inward to help eliminate the blinding effect and parallax created by some internally lighted instruments.

Nulite Instrument Lighting Systems are a popular solution. The amount of light generated by a Nulite is about the same as that of an internally-lighted instrument, with 60 percent of the illumination focused on the upper half of the instrument to reduce glare. Nulites can be mounted sandwiched between the instrument and the panel, or, if the aircraft has a "false panel" overlay, placed over the panel structure and under the overlay. Nulites can work with an existing lighting dimmer circuit and the wedges come in 5-, 14- and 24-volt flavors. Wired in a parallel circuit, a dozen lamps will draw one amp of current. The Nulites come for either 3 1/8-inch or 2 1/4-inch size instrument holes. The lights are warranted for life, which is published at 16,000 hours. Each wedge is $42.50.

Instrument manufacturer UMA Instruments has a similar lighting concept with their EL-series of light bezels. The UMA lights are solid-state electroluminescent light strips rather than incandescent bulbs. Since they require AC input voltage, a DC-AC inverter must be installed. Each inverter can handle up to 12 bezels. Lights are available in multiple colors, including aviation green, red and white. White, however, is the only color that carries FAA PMA approval. UMA says their wedges have a life of approximately 5000 hours.

Electroluminescence gives more uniform lighting coverage and, since UMA lamps have strips that provide coverage around the entire instrument, they are highly effective while generating little if any heat. Each lamp is $49.50, the lighting inverter is $53 and the dimming potentiometer (which can drive up to 12 instruments) is $20.25. Given the need for the inverter, a UMA system will cost more than Nulites. But our experience is that electroluminescent lighting is superior to incandescent.

SPT Superior Panel Technology has the Fibrelite fiber-optic lighting system. These optical ribbons can evenly illuminate a large area and create a uniform glow around instruments. A single LED can illuminate up to three 3 1/8-inch instruments or six 2 1/4-inch instruments. The lighting is sandwiched between the panel and instruments and can be connected to a solid state dimming system and a battery pack. Fibrelite has STC with AML and a lighting package sells for $254.95.

NEW PANEL, NEW LIGHTS

Fabricating a non-structural overlay, or "false panel," can modernize an otherwise dated look. But the real benefit is the custom overlay can be made with integral lighting built in. Pflueger's Custom Panels in Trinity Center, California, manufactures such custom overlays.

The process is lengthy and there's often a fair amount of effort to install the finished product. However, the imbedded recessed lighting in the overlay offers useful and uniform instrument lighting. The potential drawback is the instruments might appear recessed into the panel given the thickness of the overlay. Still, Hal Pflueger told us the lighting in his panels will last forever.

NightFly illuminated panel overlays are acrylic plastic (similar to the

Custom overlays like this Pflueger panel offers a modern metal-panel look with integrated lighting.

AC TV

For a video demonstration of cockpit lighting, log onto to our sister publication, www.avweb.com, and click the video button on the homepage Scroll to the video on improved cockpit lighting.

REDOING THE LIGHTS? REMEMBER THE PASSENGERS

Useful cabin lighting is high on the wish list during interior upgrades. Some upper-crust aircraft are equipped with overhead lighting that's integrated into the headliner components, treating passengers to effective, airliner-style reading lights. The Aveo Eyebeam Touch overhead lights are LED with an adjustable beam and dimming slide-bar for easy and straight-forward cabin utility lighting. For others, the use of gooseneck spot lamps wired through and mounted to new interior components offers a posh and practical touch to a custom interior.

Cessna T210 owner Scott Dyer offers his thoughts on his recent and impressive custom interior: "I knew I wanted to improve lighting for the pilot and passengers alike. Dennis Walter at Airmods installed Osram dimmer-controlled gooseneck lamps in the front four seat positions. The pilot light is helpful in that I am no longer tied to reading approach charts with the map light under the yoke. Passengers love their new lighting." This custom cabin lighting added approximately $700 to the cost of the new interior.

These lights are not designed specifically for aircraft nor are they provided by Airmod. It's a challenge to find a system that has full STC and PMA approvals for use in certificated aircraft. It's up to the installing agency to determine if and how they'll sign off the installation.

material used on aircraft windows). The panels attach to metal backplates usually made of T-6 or T-3 aluminum. The overlays have integrated lighting and placarding and are available in multiple color schemes. We weren't able to confirm prices as of this writing, but the NightFly web site (www.nightflypanels.com) boasts of pricing that starts at $1500 for basic panels. The company said a 337 and logbook entry are required for return to service. They also offer lighting wedges.

GLARESHIELD LIGHTING

Glareshields are more than cosmetic. They shield the panel from glare, of course, and can be a barrier between the panel and your noggin if you were to crash. Glareshield, or brow lighting as it's also called, adds more utility with light that enhances other panel lighting sources and can light up non-lighted toggle switches and controls.

Unfortunately, few replacement glareshields seem to carry FAA approval. Aircraft Spruce carries Ashby Aircraft glareshields. The model equipped with lighting to fit a Cessna sells for under $500. There will be some labor involved for installation as they just aren't an exact fit.

For add-on, SPT offers the Fibrelite Glow Strip electroluminescent system. These strips are 18 inches long by one inch wide, and provide soft green illumination. The strips are flexible so they can contour with the shape of the glareshield. The rub here is no FAA approvals are in place yet so technically, they'll need to be FAA Field Approved. The electroluminescent strips require a supplied inverter, which will need to be installed and wired. A single strip with inverter is $119.

As for avionics lighting, nearly all modern stack-mounted systems have integral lighting with displays controlled by photo-detector for automatic dimming. Some units with color screens allow for contrast and brightness adjustments for ultimate customization. Avionics, including navigational indicators, are commonly wired to an avionics lighting circuit that has a dedicated dimmer.

SEE THE LIGHT

When it comes to panel lighting upgrades, many owners leave it up to the shop to install a system that simply offers useful night lighting. Given all the options, you can do better.

If a custom overlay or new instrument panel is being fabricated, you'll want to be closely involved in the design process to be sure all the switches and instruments are arranged per your liking. Even if you're sticking with as much original stuff as practical, be sure you know just how much the shop is replacing or keeping.

Keep in mind that the type of lighting system you use isn't as important as the reliability of the dimming circuit being used to drive the lights. A modern lighting system offers nothing if the dimmer and lighting power supply fail. VAL Avionics offers the CLA500 cockpit lighting assembly, which features a solid state dimmer assembly that has four independent dimming output circuits. Each circuit has a dimmer potentiometer for mounting on the panel. It sells for $250.

Don't underestimate the value and expense of modern and reliable lighting. As we discovered one dark night, lighting upgrades can be a life-saver.

CONTACTS

NULITE
800-416-8548
www.nulite.net

Superior Panel Technology
562-776-9494
www.sptpanel.com

Pflueger Custom Panels
800-256-6845
www.pfluegers.com

UMA Instruments
800-842-5578
www.umainstruments.com

Bendix-King KFD 840: An Unremarkable PFD

The KFD 840 performs well and offers some unique features, but it fails to distinguish itself in a crowded market.

by Jeff Van West

We asked Dan Barks, Business Director for GA Operators and Dealers at Honeywell, why this was a good time for Honeywell to offer an aftermarket PFD. His response: "Honeywell has been refocusing on GA with the Bendix-King line. We have stack avionics, portables, but the missing product was a PFD."

That PFD has arrived with the Bendix-King KFD 840. The 8.5x7x7.3-inch unit replaces the traditional six-pack with a display and functionality reminiscent of the older Avidyne Entegra PFDs. That's not to say this is old technology—the hardware and display symbology is derived from Honeywell's high-end Primus Epic cockpit suite—but the philosophy behind the KFD 840 is traditional: big PFD designed to play with navigators and an MFD on the center stack.

BIG SCREEN, NO CLUTTER

The KFD 840 does offer a larger PFD attitude display than either of the two major competitors, the Aspen EFD1000 and the Garmin G500/600. The screen is 8.4 inches diagonally and backlit with LEDs rather than a CFC bulb. It's bright and easy to read in direct light. Data shown in the lower half of the display, such as waypoint info or groundspeed, is drawn in good-sized numbers against a simple black background. Overall, we liked the display, with our only beef being that some of the fine lines on the HSI and attitude ladder were thin, perhaps one pixel wide, so they didn't appear to move smoothly, in our opinion.

Two nice touches on the altitude tape are the saw-tooth markers and a dedicated minimums bug. The saw-tooth is a zig-zag line on the altitude tape makes it easier to see at a glance where you are relative to 500-foot increments of altitude. The minimums bug lets you dial in a DA or MDA for an instrument approach, and have it shown both as a value below the glidepath indicator and as a unique bug on the altitude tape. The displayed number also turns yellow at minimums.

There are two standard-rate bugs shown as triangles on the roll indicator that adjust with true airspeed. Tuck the roll indicator inside the bug and you're at a perfect bank angle for a standard-rate turn at your current true airspeed. This is definitely simpler than looking down to the turn rate vector that normally sits above the HSI on most glass panels. The roll pointer can also be reconfigured to sky-pointer mode if you prefer.

Two MFD-like tricks you can do with this PFD are checklists and weight and balance. The checklists are created by the owner and put on an SD card as text files. They can be any text you want and you can make up to 20 pages of them. The weight and balance function is still in development and is a bit more sophisticated. It's customized to the aircraft, and lets the pilot enter payload and fuel weights and instantly see a loading envelope.

NOT MUCH HARDWARE

The KFD 840 is almost a one-box solution. It contains everything except magnetometer, which must be mounted remotely to stay clear of interference from aircraft electrical systems. In aircraft that have slaved HSI systems, the magnetometer can likely be placed in the same location as the old

CHECKLIST

- ⊕ Big, uncluttered screen with easy-to-read data and some nice bonus features ....
- ⊖ ... but not as feature-rich or easy to use as Aspen or Garmin retrofit PFDs.
- ⊖ Less value per dollar than competition, in our view.

The KFD 840 can play with a variety of radios—including old analog ones. Here it's in a Cessna 182 connected to a Garmin GNS 430W.

All the data on the display is easy to read, but the datablocks are not user-configurable. The 1500 is for the dialed-in minimums. Viewing the checklist (above) slightly compresses the rest of the display.

flux valve. Line voltage for the KFD 840 can range from 11 to 33 volts, and the AML list covers most Class I and II aircraft built since 1980.

The system should play with most GPS and Nav/Coms out there, but is designed for Bendix-King avionics. For example, it connects directly with KX-155/165 Nav/Coms, but sports the standard ARINC 429 or RS-232 connections for other systems. One edge the KFD 840 has over the Garmin 500/600 is its ability to accept analog inputs from older Nav radios. Honeywell says the KFD 840 can replace the KAS altitude preselector that goes with KFC-200/250 autopilots. Compatibility and interoperability with other autopilots varies, so make sure your unit is on the list if you're thinking about a purchase.

There is no current system to offer a digital replacement to any autopilot gyros, such as the KI256, but that's in the works. So is a flight director that can replace the KI-256. Long-range plans include engine monitoring and synthetic vision.

Attitude data for the KFD 840 is not GPS or air-data dependent, but the unit cannot be reset while in the air either. While no battery backup is offered by Honeywell, the unit is compatible with the Mid Continent MD 420 emergency power supply, which retails for $2200.

LOOKING FOR MORE

While the large-area PFD might be a selling point to some, we don't necessarily see this as a benefit. Having flown behind both the Aspen and Garmin units, we feel the advantages of having an MFD display more in front of the pilot strongly outweigh any disadvantages of a smaller PFD display, especially with the Garmin G500/600 system.

Operating the KFD 840 was not as simple as we feel it should be, given the limited range of functions it offers. The right-hand knob controls the heading, baro setting, altitude bug and minimums bug while the left-hand knob controls the set course and airspeed bug. This means that setting an altitude is a combination of pushing the knob to cycle through the options and then twisting to get a value. It works, but we think it's not as obvious or elegant as some other solutions.

Five softkeys across the bottom of the display control additional functions. The left two softkeys cause a menu to pop up, with some options two levels deep and controlled by a combination of two softkeys. This caused not only us some confusion on the demo flight, but also tripped up our demo pilot. The other three softkeys cycle through sources for bearing pointers or the main CDI with no pop-up menu. While the softkeys across the bottom center of the KFD 840 look nice, we found them inconvenient behind the yoke in the Cessna 182 test aircraft we flew.

Finally, a couple features seemed half-baked, from our perspective. You can create your own checklists, but there's no provision to check off items on the checklist. We also found getting the right checklist up quickly cumbersome enough to undermine its usefulness. When we

continued on page 32

AC TV

To see the KFD 840 in action, including weight and balance and checklists, come along with us on a test flight. Log on to www.avweb.com and select the video index. Then scroll down to the video on the KMA 840 flight.

CONTACTS

Bendix/King by Honeywell
877-712-2386
www.bendixking.com

SMA Diesel Revisited: The Numbers Are Solid

A New Jersey flying club took a gamble in converting its Skylane to diesel power. An early assessment suggests it will pay off.

by Paul Bertorelli

Think of it: If you had an aircraft engine that burned two to three gallons less than the competition, delivered the same horsepower, weighed more or less the same and burned fuel that isn't threatened with extinction, as 100LL is, wouldn't you sell the hell out of it? You'd think so.

But while SMA, the French daughter of aerospace giant SAFRAN, has such an engine in the SR305 aerodiesel, buying one is at best a rarified experience. There aren't many of these engines flying, so judging their merits has been largely a paper exercise.

So when the Paramus Flying Club, a long established New Jersey co-operative, invited us to examine their SMA-converted Cessna 182, we realized it represented a rare opportunity to take the measure of this engine in the wild.

The club has been operating it for nearly a year and while it's too soon to declare it a walk-away success, the airplane has proven to be the most popular among the club's 46 members, its dispatch reliability has been excellent and the engine's initial operating costs look promising.

So why aren't there more of these things flying in the U.S.? It's a fair question and one that's not simple to answer. In this report, we'll examine Paramus's experience and you can make your own assessment.

SLOW BOIL

While the glamour boy of aerodiesels, the Thielert Centurion line, was making a giant splash that soon led to self-immolation, SMA has had the SR305 on a slow simmer for years. The engine first flew in 1998 and it appeared that year at the Paris Air Show, well ahead of Thielert's Centurion coming out of the ground. Although fully certified by 2002, the SR305 has found a lukewarm conversion market in Europe, but just a trickle in the U.S. OEMs have sniffed at the project, but in the U.S., only Maule signed on to certify it in the M7/M9-230 variants, which deliver credible performance.

The 305 is a 230-HP compression-ignition engine approved to run on Jet-A. It's a four-cylinder, four-cycle design and uses a combination of air and oil cooling, compared to the Centurion's (née Thielert) water/oil cooling. Unlike the Thielert automotive adaptation, however, the 305 is a purpose-built aircraft engine that requires no reduction. It also swings a composite three-blade MT prop.

Thielert's conversion of an automotive engine had disadvantages with regard to weight, torque curves and complexity, but the automotive world brings one large advantage: the benefit of millions of Euros in research into cutting-edge diesel technology, specifically FADEC-controlled high-pressure common rail injection. While the SMA engine has direct injection and it does have a FADEC, it doesn't have the electroni-

Paramus Flying Club's SMA-converted Cessna 182 delivers dramatically better fuel economy over the stock O-470. Giant and unmistakable placards on fuel fillers moved one nervous lineman to comment, "This feels so wrong."

CHECKLIST

- ⊕ At $80,000, the conversion is expensive, but a fuel savings of up to 5 GPH offsets it.
- ⊕ Initial operating experience suggests that routine maintenance costs will be lower.
- ⊕ Aircraft range is vastly extended compared to the gasoline version.
- ⊖ Although product support has been excellent, SMA seems ambivalent about expanding the market.

cally controlled pulse injection of the more sophisticated Centurion and Austro, so it exchanges efficiency for simplicity.

While the SMA engine will run entirely in mechanical mode and has pilot-selectable mechanical fuel reversion, the Mercedes-based Centurion and Austro rely entirely on their FADECs being kept electrically alive, thus they have backup batteries. The SR305 has no such constraints—if the FADEC quits, however, the engine won't, as long as the pilot selects mechanical fuel reversion.

THE NUMBERS

The Paramus club has been in existence since the 1950s so it knows a thing or two about aircraft operating economics. This was reflected in the club's approach to analyzing the risk of converting its 1980 Cessna 182 from the stock Continental O-470 to the SMA. So what is the risk, exactly? As the club saw it—and we agree—the risk relates to SMA's seriousness of purpose.

The fact that it hasn't aggressively marketed this engine nor sold many leads to inevitable doubts. Why hasn't it sold? What's wrong with it? Will they be there to support it?

"We actually considered that our biggest risk," said Shane Lipson, the club's financial officer and a checkout instructor for the airplane. "We really had to ask if we were buying into a Betamax," he added, noting that the decision was placed before the club's board where it didn't get a unanimous yes vote.

"The position we took is that if they go under, there's enough R and D invested in it and the technology is proven enough, that someone would support it," Lipson told us. Worst case, the club's investigation and projected timeline showed that a conversion back to the O-470 would be feasible, if not necessarily desirable.

A second aspect of the risk was more knowable: Would the engine perform and how would it be supported? To flesh this out, the club contacted current North American operators, interviewed conversion shops (three are doing the work) and even buttonholed SMA management. In short, they plugged all this data into a spreadsheet that amounted to a forward-looking economic model.

The club had one additional advantage over an individual considering such a conversion and it's huge: It could spread the $80,000 cost among 46 members who are ultimately equity share holders. Further, the sting of that high conversion invoice was mitigated because the O-470 was timed out and the club had set aside the money to overhaul it.

Second, due to some damage done to the engine prior to the work, the club had a small insurance payment to throw at the project. In the end, its investment was about $45,000, which it will finance through a $25-an-hour surcharge on the diesel. For the O-470 airplane, the club billed members $149 per hour, on wet tach time. Historically, it knew that this generated enough revenue to cover real operating costs, plus reserves for engine overhauls and avionics upgrades.

For its first nine months of operation, the SMA's real operating costs—also allowing for reserves—appears to be about $110 an hour. Add the $25 capital recovery surcharge, and the rate is $135 an hour, still less than O-470 engine. If the engine makes its proposed TBO of 2000 hours, the club is figuring on a seven-year payback, worst case.

But there are good indications it will do much better than that. "I really wouldn't gloss over this. There's a significant amount of savings in routine maintenance [over the Continental engine]. That will get you an earlier payback," Lipson says.

Further, if the engine reaches a 3000-hour TBO, which SMA proposes it eventually will, Lipson sees the economics as slam dunk. At a 2000-hour TBO and an overhaul cost in the mid-20s for the O-470, the club uses a $15-per-hour engine reserve. SMA estimates SR305 overhaul costs in the $35,000 range, but the club is actually budgeting $45,000, worst case. Based on the same 2000 hours, that's $22.50 an hour. While that's higher than the O-470, the club finds that it's easily offset by three to five gallons per hour less in fuel burn, effectively reducing the hourly reserve

The SR305 is essentially a single-lever engine, top. Stock push/pull throttle is displaced by a T-handle. The barber pole lever is for reversion to mechanical fuel control. Carb heat knob is converted to alternate air and the blue knob is a prop control for manual ground checks. Boost pressures, center, are as high as 80 inches. Winterization kit closes off gill louvers, bottom.

MEANWHILE, HOW GOES IT WITH CENTURION?

When the Paramus Flying Club was conducting its thorough research into the SMA diesel conversion, it encountered no small share of negativity, most of it attached to the name Thielert. For all its success with the Diamond line, Thielert's bumbling economics and technical missteps tarnished the aerodiesel market significantly enough that the company is still digging itself out of a deep hole.

But is it making progress? In a word, yes. To gain some sense of this, we contacted Stan Fetter, who has been operating a pair of Cessna 172s converted to the Thielert Centurion engines in 2006. He runs a busy traffic reporting business in the Washington, D.C. area and we've been following his experiences since then.

Like other Thielert operators, Fetter suffered through maintenance and reliability issues and Thielert's insolvency in early 2008. But he's still flying his two diesel 172s.

"They are both in service," Fetter told us via e-mail. "I still have one of the original 1.7 engines; it now has 1756 hours against the TAE alleged limit of 1000 hours. It had a head replaced around 875 hours or so and I'm sure that helped. It uses a little oil, but it's been doing fine."

One worry has been continuing parts availability, so we asked Fetter if the engines are remaining serviceable. "At this point, the answer is yes. They remain far more reliable than the gas engines as unscheduled maintenance needs are rare. And when something does break, it's generally a cakewalk to diagnose due to the FADEC.

"As an example, last week the 2.0L had a warning light come on in flight. That was very quickly traced to an overboost condition and finally to a leak in the turbocharger actuator. I think it took us a grand total of an hour to run that completely down. I ordered the part on Friday morning (from Germany) and UPS was sitting here with it first thing Monday (the day after all the snow over the weekend) and that was that."

And downsides? "Yes, I hate the MT props. I expect they'd do fine at a big airport where everything is kept squeaky clean, but out here in the real world of GA where the pavement isn't always A-1 and there is loose gravel here and there, they are a pain. The leading edges pick up anything within a block and a half. The good news is that it is relatively easy to fix small damage; the factory procedure for minor dings involves nothing more than bondo."

Fetter says Centurion is doing well with support, although parts prices remain high due to shipping and the Euro/dollar exchange rate. Bottom line, four years into it, is the diesel conversion looking viable?

"I think the answer is yes, but with some qualifiers. At this point, given historical costs, I think financially it's pretty much a wash. I am used to $10,000 (or less) overhauls on the O-320-H2AD engines, so the roughly $45,000 cost to replace one of these engines, plus the ongoing life extension parts costs become pretty tough to swallow.

"Thankfully I won't have to cross the replacement bridge for a while. The 2.0L is still relatively young and I acquired a complete 600-hour spare for the 1.7L that was left over when American Flyers converted theirs back to conventional power. I think the character of my operation itself fits in very nicely with these engines and makes it much easier for me to run them beyond the stated TBR.

"On the other hand, I'm consistently burning around 3.8 GPH of Jet A, which generally is cheaper to boot. I'm able to operate with one less airplane because these are so much more reliable. I cannot remember the last time one of the Thielerts didn't take off due to a mechanical issue. That was a routine occurrence with the Lycomings.

"Going forward, in the near term, the life extension on the clutch/gearbox combination is going to help as that will shave close to $10 per hour off the operating costs on the 2.0L. Hopefully, there will be further extensions for the life-limited parts and engine TBR as more experience is gained.

"TAE also has to get away from this nonsense of wanting the engines sent back to Germany. They want the 2.0L's back at 1200 hours for inspection and any 1.7L that comes up with a piston cooling nozzle failure has to go back to the fatherland as well, so you've got thousands in shipping and lots of downtime. Same thing applies to the gearboxes, pumps and so forth. Shipping that stuff back and forth individually is completely insane. Some help on the exchange rates would be nice, too.

"At present, I'm happy with them and see no reason that I can't do well with them at least as long as my current fleet of engines survives. Beyond that, we'll just have to wait and see."

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For a video tour of the SMA-powered Cessna 182, log onto www.avweb.com, then click the video button in the upper right of the home page and scroll down to the diesel Skylane flight demo.

substantially. If the engine makes 3000 hours and SMA overhaul costs prove on target, the engine reserve falls to under $12, even ahead of fuel savings. Fac tor in the lower fuel burn and the fuel savings over the O-470 may actually more than pay for the engine.

PERFORMANCE

Before we took a demo flight in the Paramus 182 with the club's Tomoharu Nishino, we compared the weight and balance figures of the SMA against the gasoline engines. The two are almost an even swap on both payload and performance. The Continental version's empty weight was 1920 pounds and with the SMA conversion, the empty weight rose modestly to 1945 pounds. This also shifted the CG forward slightly. Useful load is about 1000 pounds. The 182 retained its 88-gallon tanks so even though Jet-A is a pound heavier, this is easily offset by the lower fuel burn so real-world payload actually increases slightly for the equivalent fuel range loading.

In conversations with OEMs about why they haven't adopted the SR305, the question of temperature limitations and performance comes up. And indeed, the airplane has some temperature issues.

It's not supposed to be started at temperatures below -5 degrees C without a winterization kit and, similarly, it can't be operated below 7500 feet in temperatures below -5 degrees C. With the kit, which blocks louver gills in the cowling and chokes off the oil cooler, the operating limitation below 7500 feet is -20 degrees C.

Regardless of temperature, the airplane is hard limited to 12,500 feet. Nishino told us the ceiling limit isn't an issue for the club because members don't fly that high. A private owner or partnership might feel differently.

The morning we flew, the temperature in Caldwell, New Jersey was 24 degrees F. Although the airplane had been in a hangar overnight, it had cold soaked for more than an hour when we started it. It fired right up, but with a noticeably rough idle which smoothed after a minute or so.

Runup involves checking the FADEC warning light—it's go/no go and cycling some warm oil through the prop, which is otherwise controlled entirely by the FADEC. In place of the Cessna's push/pulls, there's a T-handle throttle on a quadrant with a lever to the right for fuel control—forward is full automatic, full aft is manual override for mechanical fuel injection.

The takeoff is smooth and quiet. In cruise, we measured a sound level of 93 dB with little discernable exhaust note. Despite the frigid temperatures, the heater kept the cabin toasty. Initial climb rate was a bit over 1000 FPM, just as the POH predicted and well in line with the O-470's numbers. Although the Paramus 182 is not equipped with fuel flow instrumentation, the POH for the SMA engine says it should deliver 134 knots true on 10.6 GPH at 5000 feet compared to 136 knots on 12.3 GPH for the O-470. We couldn't confirm the precise fuel flows, but Lipson told us club records—which give good block data—indicate that the fuel Delta between the gas and diesel engines is more than the POH suggests and averages as much as three to five GPH. One reason for this is that pilots may not have been consistently leaning the O-470 and SMA's fuel estimates appear conservative.

One operational difference that's noticeable is the manifold pressure: A turbocharged diesel needs a ton of it so max boost is in the 80-inch range, with cruise at 65 inches. Another limitation comes to light on final approach. When power is reduced during approach, it must remain no lower than 45 inches until the runway is made. The 182 is draggy enough to make airspeed control workable at this high value, but Nishino said nonetheless that to land slowly, approaches have to be high-angle affairs with all the flaps out and the runway made before power is idled.

"I've done a number of checkouts in it," Shane Lipson told us, "It's a pleasure to fly. Speed management is a little more challenging, but we're an all-Cessna club, so it's not really much of a factor."

FINAL IMPRESSIONS

Despite the big dollar risk, the club is pleased with the SMA conversion and the airplane is its most popular ride. When we asked for final impressions, Lipson had two: First, it's expensive. "I think to make the investment work, you have to be willing to look out five or 10 years," he said. Second, SMA has taken an odd, low-key attitude toward selling the conversion, something that Nishino sensed as well. "It's almost as though they're not making an attempt at marketing it in the way you expect traditional marketing to be," Lipson told us.

Nonetheless, both club members told us that SMA has done an excellent job of supporting the engine and when Nishino experienced an alternator failure, the company stepped up with whatever information was needed to get the airplane repaired away from homebase.

For its part, SMA concedes that it hasn't sold the SR305 aggressively because it plans additional improvements that might be available by mid-2010. Patrick Canivet, who operates Fly Jet-A, an SMA conversion house in Sarasota, Florida, told us these improvements will probably include higher certified altitudes and an upgraded turbocharger.

CONTACTS

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iPhone Aviation Apps: Some Serious, Some Silly

We're not about to get our pants snagged on the iPhone's pretentious preciousness, but some apps offer genuine utility. Every 50th one is brilliant.

by Paul Bertorelli

We can imagine only three reactions to the phrase, "there's an app for that." One, utter puzzlement because you're clueless about apps, two, you recoil in disgust against the overblown preciousness of Apple's iPhone or, last, "yeah, I've seen it."

Apps are, of course, modest little single-purpose programs that run on Apple's iPhone smart phone or iPod Touch MP3 players. At last count, there were more 140,000 apps and at least 195 of them are aviation applications of some kind.

In this report, we'll take a minimal survey of a handful of these but, more to the point, we'll examine the basic Zen of apps. Are they just gimmicks or are they really useful? (It's a little of each, in our view.) Worth noting is that other smart phones like the Android-based products and the Blackberries also have aviation apps. We'll get to those later.

PHONE OR NOT?

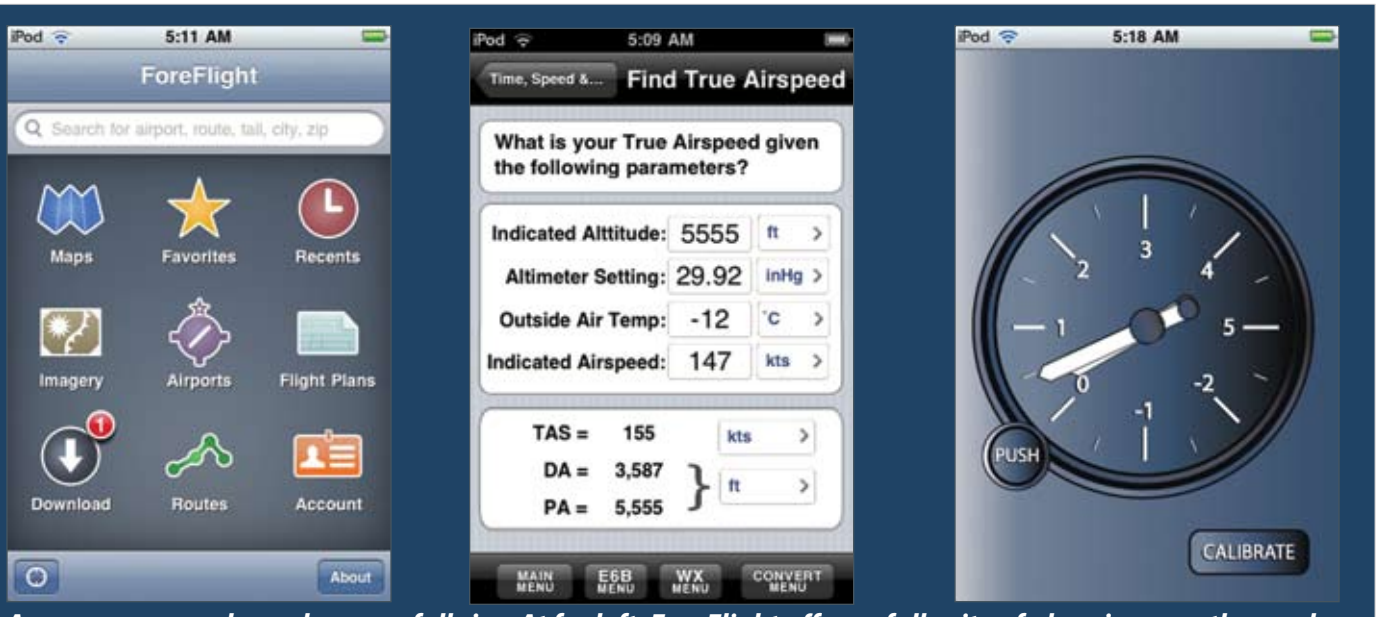
Unique to the iPhone is that Apple is a computer company that pioneered the mass market MP3 player. As a result, Apple sells both the iPhone and the iPod Touch, which is essentially the same hardware but without the phone. We tried all of the apps on the Touch, but this limits where some of them can be used.

The magic of many of these apps is that they download data in real time—such as weather reports, flight tracking data, NOTAMs, chart information and so on. The iPhone can usually do this from wherever a cell signal is available, but the Touch is limited to use with Wi-Fi networks—no Wi-Fi, no real-time data.

If you have an iPhone, the apps are there for the buying. If your cell provider doesn't do iPhones—hear the howl from millions of Verizon subscribers—you can buy a third gen Touch for under $300 and if you want a good MP3 player, plus the apps, we see this as a good value.

TAXONOMY

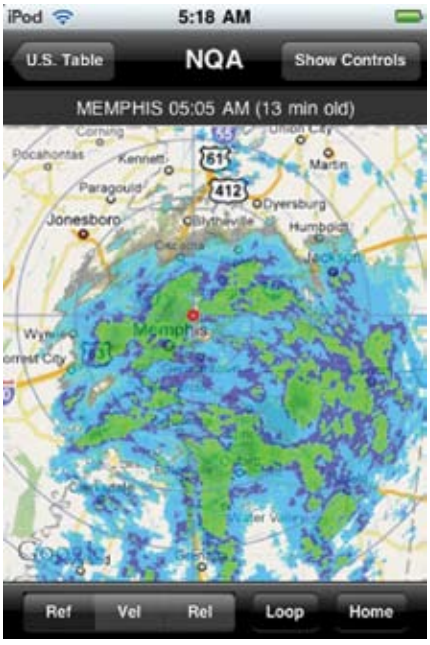
Apps break down into six general categories: flight planners, weather getters, utility programs, logbooks, reference tools and games. Some apps do several of thses functions. Reference tools include everything from



App screen caps shown here are full size. At far left, ForeFlight offers a full suite of planning, weather and utility apps. MyE6B, center, does basic whiz wheel stuff and the amusing G-meter, right is...a g-meter.

Our sweep of the iTunes Store revealed nearly 200 aviation apps. Each app has its own description, plus occasionally extensive user reviews.Installation on the iPhone/Touch is automatic after downloading.

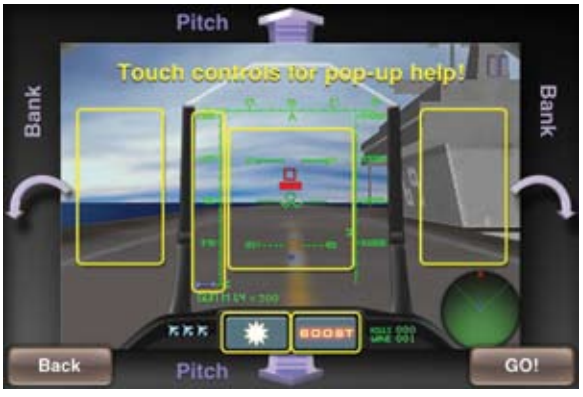
FAR/AIM compendiums to test prep programs. Apps range in price from free to as much as $99 for specialized programs such as an Eclipse 500 utility. Of the 195 aviation apps in Apple's App Store, some are specialized weather getters dedicated to a single city. Others are of questionable aviation application: The Texas Transportation code? We'll pass on that one, at $4.99. Here are some highlights.



WEATHER

This is presumably one of the more practical app categories, since checking weather on the fly is a plus. At the free end of the scale—we like free—or for under $5 are apps like AeroWeather, World Aviation Weather and U.S. Nexrad Radar. AeroWeather lets you specify a list of stations for which the app will retrieve current METARS; NexRad grabs current radar imagery from 150 sites and lets you take a peek at the big convective picture. Another variant, MyRadar Pro, does the same thing for $1.99. World Aviation Weather also grabs METARs for specified stations and also gives domestic weather reports. It will actually cache data for viewing in flight or out of cell/Wi-Fi range.

The better weather programs cost more and may require a subscription. Garmin's MyCast, at $9.99, is an example. It will grab most of the popular weather products—including NEXRAD—and overlay this information on a proposed route. It also allows you to file a flight plan, all from your phone, via DUATs. The data sub is $9.99 a month.



U.S. Radar, top, pulls up NEXRAD sites for a quick look. Flying Aces, lower, is a game app that relies on the Touch's accelerometer function.

Another popular suite of apps comes from ForeFlight, which offers charts, airport directories, flight planning and weather. As with MyCast, you key in the departure, destination and route and it collects all the relevant weather, plus NOTAMs in a crisp, logical format. This is an app with a purpose. Downside? It's a pain in the butt to key in the data with the iPhone's cheesy little virtual keyboard.

UTILITIES

Although every modern GPS navigator has E6B and unknown wind functions, evidently app developers think phones need to do this, too. Admittedly, they do it well, since they're fast-as-blazes at calculations.

We liked myE6B which, for $7.99, does all the usual E6B functions, plus hydroplaning calculations. It also has a built-in weather retriever as a nice add on. A more expensive app ($19.99) is Co-Pilot Flight Planning, which performs all the calcs for multi-leg dead reckoning. Wonder if a DPE would allow it on a checkride.

For $4.99, Flight Touch does similar E6B crunching with a cleaner visual format for inputting. We give the developer credit for getting the iPhone visual interface in a way that eases the keyboard drudgery. This app also does weather and weight and balance, which many of these utilities throw in as a gimme. Another such program with more of an international flavor is PreFlight which, at $16.99, we didn't try. A couple of reviewers gave it a lukewarm response.

And this illuminates a problem with picking an app. Many of these utilities have overlapping functions and price is no indicator of quality. Just from our scan of the aviation apps, we noted that there's wide variation in how each one handles certain tasks. Some are good weather getters, but less good at E6B functions and some are the reverse. Unfortunately, you can't really tell much from the summary description since the summaries aren't detailed enough. On the other hand, products with strong user reviews are likely to be good bets.

For apps costing less than $10, a buy-and-try strategy may be the best way to proceed. At $20 or more, buyer remorse is not only possible, but likely. Further, apps churn in and out. Some 15,000 have dropped off the radar.

Closing out the utility category are logbook functions. App developers seem to think logging is a hot topic because there are a lot of logbook utilities. Some, like the free LogTen-Basic, simply record flight and total the categories. The $9.99 Flogger adds features such as customizable summaries and sophisticated interface with computers. Color us clueless, but we don't get the big interest in filling out logbooks. A simple electronic entry with categories will suffice, in our view. But if you want more options, the app world is awash with them.

REFERENCE, GAMES

One of the coolest bits of hardware in the iPhone/Touch is the accelerometer that flips the screen from portrait to landscape mode with liquid smoothness. But many veteran iPhone users come to hate it, because certain functions are disabled in landscape mode. But the app writers have turned the accelerometer into a centerpiece.

iSmartEFIS ($9.99) uses the accelerometer and GPS to render a PFD simulator, while iHUD at $5.99 works similarly. These are intended as games, not flight-ready backups for your G1000. For 99 cents—about what it's worth—there's Aircraft G-Meter, which uses the accelerometer to make an electronic g-meter. It works, too, but is probably too sensitive to be reliable. Do the salt shaker with it and you'll see 5G, easy.

Still, the accelerometer does shine in the game apps. Flying Aces ($3.99) is a little shoot-em-up video game that gives the player a through-the-HUD view of approaching enemy aircraft. To maneuver, you tilt the device for bank and pitch. Control response is well damped and realistic.

But back to the serious stuff. Pilots and instructors have need for reference materials like regulations, manuals and charts. The apps are generally good with former, but not good with the latter. Example: FAA FARs for Pilots and AMTs at $6.99. The entire volume is there, easily searchable and bookmarkable, generally readable. For the AIM, PilotAIM has you covered for the same price. There are other versions that cover this territory.

Charts are less of a hit, in our view. ForeFlight's Charts provide the entire sectional library but the device just isn't optimized to squeeze a yard square sectional into a tiny 2-inch by 2¾-inch display. Apple's clever pinch scaling and scrolling makes them readable, but we just don't see the point. Same deal with ForeFlight's NACO airport diagrams—readable, but not especially useful, in our view. You'd likely have something better available, like an e-reader or paper.

SUMMING UP

We've barely scratched the surface of available apps, which may be just as well because in our view, many of them are about as necessary as a 500-pound ball of string. The attraction of apps is mostly novelty—cool little geegaws that don't cost much and don't do much, either.

But there are diamonds in this rough. Apps like ForeFlight's mobile series offer practical ways to get weather and file flight plans on the fly. The same applies to reference apps for FARs, AIM and other data, plus test prep helpers.

But to make any of these worth pursuing, you have to be smart phone oriented. In other words, if you're frustrated by pecking at a tiny virtual keyboard or putting up with the iPhone's quirks, apps will be things you buy, use once and forget.

Then again, at 10 bucks a pop, is that so bad?

ANDROID APPS: A DISTANT SECOND

As we go to press, Google has a tiny image on its otherwise sparse search page: It's a link that says, "Experience the Nexus One, the new Android phone from Google." In the Android op system and the phones that will run it, Google's plan is to take on the iPhone in a Goliath-meets-Goliath frontal attack.

The tech world is abuzz with what Android will really amount to, but the idea is that it will turn smart phones into the powerful Web tools that they are not now. Google's Android is an open platform, meaning anyone can write apps for it without having to be strained through Apple's approval sieve.

As far as apps in general and aviation apps specifically are concerned, we can see pros and cons. On the plus side, without Apple clamping down on what's developed and what's sold, the apps market could theoretically explode. On the other hand, one of Apple's considerable marketing advantages is its seamless marriage of iTunes software and the iTunes online store, where all the music and apps reside to be easily found. For example, our search of "aviation apps" immediately pulled up the entire list, with a detailed description of each and, in many cases, lots of reviews.

The Android equivalent is Android Market or androlib.com, which lists apps and allows search by category. It also has user reviews. When we took a sweep through androlib, we found ForeFlight apps, Aviation Weather, checklist apps and a weight and balance calculator. Larded into the list we also found Mo'sDemo and Adam's test app, plus dozens of other apps that clearly had nothing to do with aviation or efforts that looked like afterschool projects.

This should sound familiar. It's PC versus Mac all over again, with the Android representing the wild and wooly, price-driven unfettered free market and the iPhone the tightly controlled, limited-license boutique model that stunts its own growth.

At this juncture, for apps in general and aviation apps specifically, the iPhone has the clear edge. If the Android hype plays out, that's supposed to change. If so, the Android apps have a lot of catching up to do.

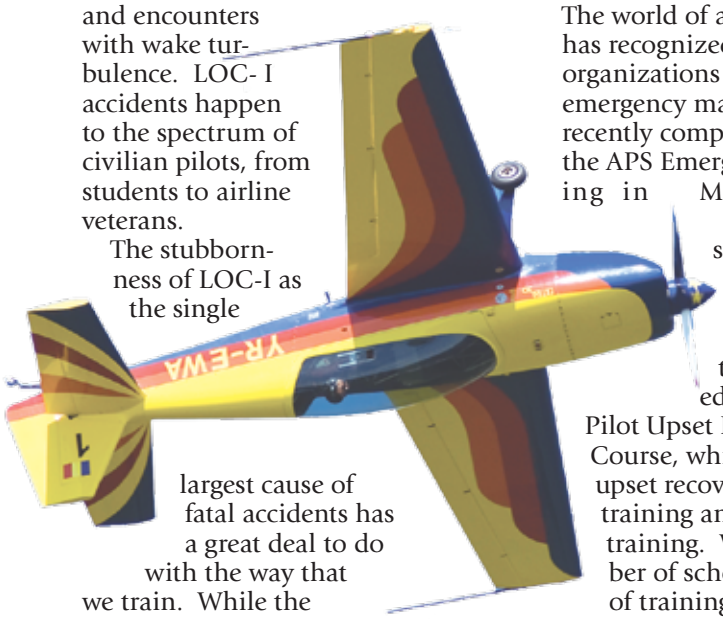
APS's Upset Training: Practical Survival Skills

Although it isn't cheap, APS's emergency maneuver training will give you the chops to recover from virtually any unusual flight upset.

by Jon Doolittle

In a 2007 study going back more than 50 years, a Boeing safety group identified inflight loss of control as the number one source of airline fatalities. The 2008 Nall Report tells a similar story for general aviation.

Loss of control inflight, or LOC-I in the argot of those who study aircraft accidents, includes a host of hazards ranging from garden-variety stalls to control surface hardovers and encounters with wake turbulence. LOC- I accidents happen to the spectrum of civilian pilots, from students to airline veterans.



The stubbornness of LOC-I as the single largest cause of fatal accidents has a great deal to do with the way that we train. While the airlines have incorporated a number of loss-of-control scenarios in their training, general aviation hasn't really addressed the issue.

The quality of GA training varies widely and most pilots have never been in a spin unless they trained to be flight instructors or took aerobatic lessons. Most stall training is aimed at avoidance rather than recovery. We fly to the horn, or if we're really feeling brave, to the buffet, and then fly the airplane out. We rarely completely stall the airplane, especially in crossed-control or other aggravated configurations. So is it any wonder that when we're confronted with a sudden loss of control of the airplane, we don't typically react well enough to live through the event?

TRAINING

The world of aftermarket training has recognized this and several organizations offer so-called EMT or emergency maneuver training. We recently completed one such course, the APS Emergency Maneuver Training in Mesa, Arizona.

APS is one of the few such schools that's FAR Part 141 approved and that's also dedicated to this type of training. We completed the APS Professional Pilot Upset Recovery Training Course, which included the core upset recovery program, spin training and instrument recovery training. While there are a number of schools that offer this type of training, we feel that APS offers an excellent value based upon the qualifications of the instructors, the quality of the curriculum and the suitability of the airplane used.

All of the APS instructors are former or current military instructor pilots and a number have airline experience as well. We flew with the company's president, Paul "BJ" Ransbury and the director of flight training, Clarke "Otter" McNeace. Both flew F/A-18s, both have thousands of hours in the Extra 300 and both have strong academic backgrounds for the material they're teaching.

Before each flight, they conducted a thorough briefing on the lesson. There was a great deal of stress on making sure that we understood the physics of the upset as well as the recovery. They also repeated emphasis on the steps of the recovery procedure. After each flight, students are debriefed. We found that the debriefings were excellent reinforcement. The instructors have almost total recall of the specifics of the flight.

The airplanes are also equipped with video cameras mounted on the right wing, vertical stab and inside the cockpit. Particularly after the spin flights, video was used for the debriefings along with the instructors comments. Each student goes home with CDs of all of the flying that he did during the course.

We found the curriculum to be a good balance of academics and a rote building block approach to use in the airplane. We were furnished with the course manuals months before arriving and were urged to read them and re-read them before starting the course. We found that this helped speed up our learning substantially.

Everything that we were taught in the classroom sessions was carefully related to what we would see and do in the airplane, but there was a considerable underpinning of aerodynamics. None of this is rocket science, but we came away with a much better understanding of the fundamental importance of angle of attack, as well as the effects of G-loading, roll-yaw coupling and negative roll damping.

ALL-ATTITUDE TECHNIQUE

In addition to the academic side of things, APS provides a building block approach which they call the "All-Attitude Recovery Technique,"' a five-step procedure which allowed us to proceed one step at a time from total chaos to recovery of the airplane to an upright attitude. As the name implies, this technique is used for almost every situation except for fully-developed spins. For spins, APS uses the NASA spin-recovery technique. An important parts of the training is the "say and do"

approach, which forces the student to name each step of the recovery process as he does it. We found that if we could say it, we could eventually do it as well. By the end of the course, the combination of increased understanding and repeated practice with the techniques made us feel that we would have the chance "to fly another day," which is the APS motto.

For upset and spin training, APS relies upon two Extra 300Ls, complete with shark's teeth. While the point of the training is to learn to recover within the limits of standard or transport category airplanes, the Extra's unlimited aerobatic capability and limit load of plus or minus 10 Gs make it an ideal airplane for this type of training.

There is no maneuver that can't be recovered and your internal organs will probably fail before the airplane does. The huge margin between the G's that you pull in the course and the G-load the airplane is capable of enduring made us feel comfortable. And if you haven't flown an Extra before, that opportunity alone is worth the entry fee.

Aside from the light stick forces, which took us about 15 minutes to get used to, there are few surprises. It goes where you point it and does what you think it will. If you have never flown with a stick, you'll find the transition painless.

TACTICAL FEEL

APS has a military feel to it and it is noticeable throughout the course. The instructors and some of the students wear flight suits. Most flights start as a formation flight of two airplanes out to the practice area, then break up into north and south working areas. At the end of the lesson, they rejoin for the brief flight back to the airport. If you are interested in trying your hand at formation flying, this is a good time for it. Missions, as APS refers to them, are crafted so that no time is wasted and yet we never felt that it was a problem if we wanted to see a given maneuver another time. And if we didn't do it correctly, the instructors would point out our errors so we would keep doing it until we had it right.

A number of maneuvers are put into the syllabus as demonstrations and we thought that these were well chosen and great teaching tools. Our personal favorite was the zoom maneuver, which basically consists of pulling the nose up to about 30 degrees and then pushing till you are light in the seat—about ½ G. The airplane flew a gentle arcing parabola and as airspeed dropped, we were encouraged to move the controls in order to see that when unloaded, the controls remained effective 20 knots below the published 1-G stall speed. This was an excellent graphic reminder of the effects of G-loading on angle of attack and stall speeds.

ENVELOPE EXPANSION

The greatest benefit of the course is that the student, accompanied by an experienced instructor in a capable airplane, is able to safely explore areas of the envelope well beyond what he will see in normal operations, or what he could live through if he saw it by himself for the first time.

The skidding turn stall is performed by starting a turn and then feeding in increasing amounts of inside rudder, while gradually adding aileron against overbank and back pressure in an attempt to keep the nose from falling.

When the stall comes, it is spectacular and it happens at a speed well above the published stall speed, rolling the airplane onto its back briskly and leaving you looking down at rocks and desert; no blue sky, the proverbial face full of dirt. Using the all-attitude upset recovery technique, the student goes from step to step, fixing the upset by saying and making one control input at a time.

Another unusual attitude covered in the course is the spiral dive. When our instructor gave us the controls, the airspeed was almost 200 knots, and the G-load was about 3.8, well beyond what you would want to do intentionally in your own airplane, but not so different from what might happen in the real situation.

We liked the businesslike approach that the instructors took toward the training. They carefully briefed the flight and then flew the mission as briefed. In case we missed anything, we then sat down and debriefed. We felt that there was a good balance of academics and the rote learning that must be at the heart of any emergency procedure where the pilot is not likely to be thinking clearly.

We think that the experience we gained during the course is invaluable. Our sense is that in order to remain proficient in the recovery procedures, we would have to return every two years or so.

The APS courses are not cheap. The two-day, three-flight Basic Upset Recovery course lists on the Website for $2415. The Standard Emergency Maneuver course lasts three days and includes five flights and lists for $3290. APS also offers training in formation flying, aerobatics and simulator training as well.

We felt that given the experience of the instructors, the curriculum and the airplane, that the price of the courses we took was an excellent value. We would recommend this school to any pilot who is interested in learning more about upset recovery. We will certainly be back next year.

Jon Doolittle owns Sutton James Insurance in Hartford, Connecticut. Contact www.suttonjames.com.

CONTACTS

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ACTV

For an in-depth video on the kind of accident EMT training is designed to prevent, log onto our sister publication, www.avweb.com, then click the video button in the upper right of the home page and scroll down to the Cirrus stall video. Here's a direct link: http://snipurl.com/u0iil. For a wide-ranging podcast discussion on stalls and stall accidents, see http://snipurl.com/u0ij5

Cirrus SR20

The "baby" Cirrus comes in many different flavors, but all offer good speed, comfort, economy and, of course, a parachute.

Only 10 years ago, the idea of a certificated, "plastic" airplane had many old-timers shaking their heads in skepticism. It looks kind of interesting, but no "real" pilot would want of those things—it's got a parachute, fergawd's sake! Today, the Cirrus SR20—and especially its big brother, the SR22—have upended traditional ideas of what a personal airplane should look like, how it should be used and how it should be equipped.

The SR20 could be thought of as the product that started changing how the industry thinks of a modern personal airplane. Those changes have been evolutionary, not revolutionary. For example, the early SR20s, in fact, retained the too-familiar vacuum-powered "steam gauge" flight instruments, albeit complemented by a large multifunction display. Today's copies have eliminated the vacuum system and gone all-electric, with full glass panels; steam gauges are only there for backup. And even if the SR20 responds respectably for its horsepower, performance didn't break new ground, either.

Though living these days in the shadow of its big brother, the SR20 has a lot going for it: It is comfortable, is relatively economical to acquire and operate, has simple systems, comes with a well-defined support network and is faster than much of its direct competition. Later models feature the most-modern technology available in personal aircraft. Refinements continue to be applied, not just to the instrument panels but also to major airframe components. Oh, and it has an airframe parachute, too.

Ten years in the making, the market for used SR20s is mature enough to make it a very real option for buyers considering more traditional designs offering less.

HISTORY

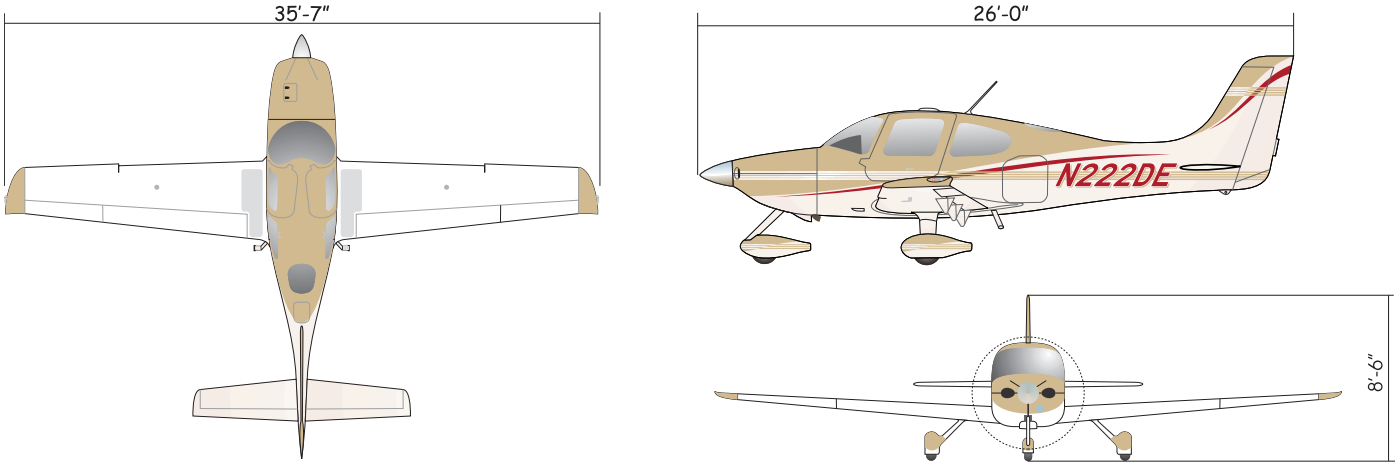
Cirrus Design began life offering a kit for the VK30, a composite piston-single pusher seating five. By 1993, company founders—and brothers—Alan and Dale Klapmeier announced kits were a dead end for them. Even so, they maintained traditional airplanes from Cessna, Piper and others were too hard to fly, lacked intelligent safety features and failed to push the technological edge in both design and manufacturing. "We have to lose a lot of this macho stuff," Alan Klapmeier told us in a 1997 interview. "Making it too hard to fly is not a good value."

What eventually became the Cirrus SR20 emerged from that philosophy and, from the beginning, was a different airplane. In addition to the materials used for construction, its side-stick controller, swing-up doors and then-state-of-the-art multi-function display immediately set it apart from the traditional airplanes coming from Wichita and Vero Beach.

The most innovative detail, however, and the one garnering all the attention in the months and years leading up to the SR20's certification, was the Klapmeiers' insistence every Cirrus sold would come with an airframe parachute as standard equipment. Their desire stemmed from a 1985 mid-air collision involving Alan Klapmeier, which resulted in the other pilot's death. Based on that experience, the Klapmeiers realized no matter how well-trained or experienced one might be, there were situations where there was nothing a pilot could do to save the airplane, himself or his passengers unless some kind of "whole-plane" parachute was developed.

The Klapmeiers gambled the

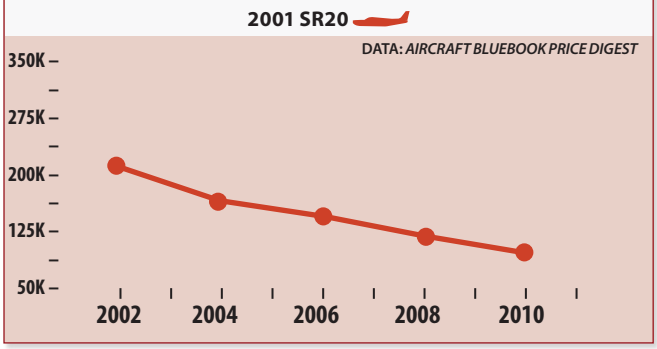
CIRRUS SR20



CIRRUS MODEL HISTORY

MODEL YEAR	ENGINE	TBO	OVERHAUL	FUEL	USEFUL LOAD	CRUISE	TYPICAL RETAIL
1999-2002 SR20	CONTINENTAL IO-360-ES	2000	$28,000	56	1000 LBS	150 KTS	±$120,000
2003-2004 SR20 (ALL ELECTRIC)	CONTINENTAL IO-360-ES	2000	$28,000	56	1000 LBS	150 KTS	±$150,000
2004-2006 SR20 G2	CONTINENTAL IO-360-ES	2000	$28,000	56	1000 LBS	152 KTS	±$175,000
2007-2008 SR20 G2	CONTINENTAL IO-360-ES	2000	$28,000	56	1000 LBS	152 KTS	±$200,000
2008-PRESENT SR20 G3	CONTINENTAL IO-360-ES	2000	$28,000	56	1000 LBS	155 KTS	±$332,000

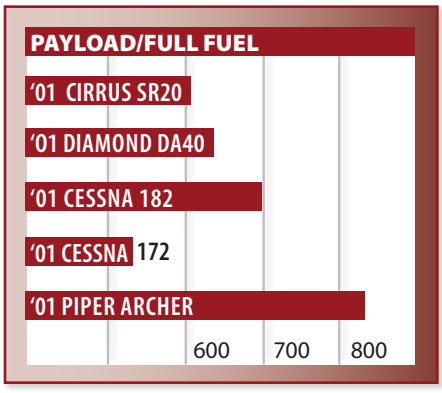
CIRRUS RESALE VALUES

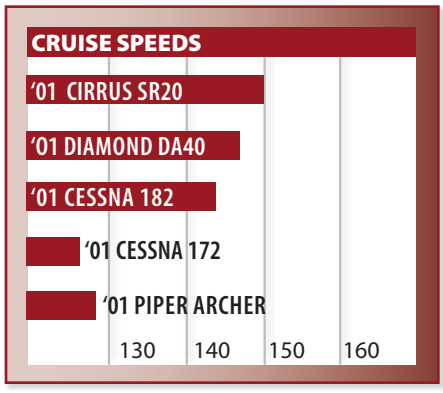


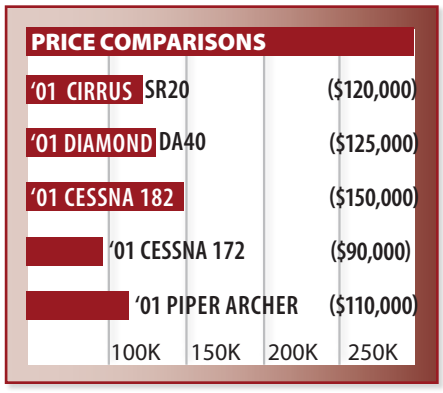
SELECT RECENT ADs

AD 2009-05-05	Inspection of PFD for correct air data performance
AD 2008-14-13	Upper cabin door rod ends and hinge replacement
AD 2008-11-18	Heat exchanger inspection and possible replacement
AD 2008-03-16	Rudder-aileron interconnect rigging check and correction

SELECT LATE-MODEL COMPARISONS







The whole-airframe parachute remains a compelling selling point for many, but it requires an expensive repack every 10 years.

parachute would make their brainchildren stand out on the market and resolve much of the anxiety many passengers (and more than a few pilots) associate with personal aircraft. At the time, no one had proposed equipping an airplane as large and fast as the Cirrus with a ballistic parachute. Reaction was mixed, with many predicting the FAA would never sign off on the idea.

They were wrong. Cirrus worked with Ballistic Recovery Systems through a number of designs for what came to be known as the Cirrus Airframe Parachute System, or CAPS. The system exacts an 85-pound useful load penalty—and a recurring maintenance expense.

There is a six-year replacement on a pair of line cutters used in CAPS deployment that costs approximately $1200 total. That's cheap compared to the 10-year CAPS repack, which is $9385 in parts, plus 30 hours of labor for pre-2004 aircraft and 8 hours for later ones. The difference comes from a CAPS access panel added in the G2 revision of the design.

The CAPS system has proven successful in our mind at what it was designed to do: lower an airplane and its human cargo to the ground, giving both a chance to fly again. To date according to Cirrus, there have been 20 CAPS events, involving five SR20s and 15 SR22s. In total, Cirrus points to 35 lives saved aboard the 20 airplanes. Notably and despite lore to the contrary, deploying the 'chute does not automatically total the airplane. One of the first deployments involved an airplane whose aileron detached in-flight. The pilot escaped without injury while the airplane was recovered, repaired and returned to service. In at least two other CAPS events, the airplanes were expected to be repairable.

The FAA granted a type certificate in late 1998, and the first airplanes were delivered as 1999 models. Cirrus initially offered the SR20 in three option tiers, originally designated A, B and C, which we'll explore in a moment. Today's offerings continue that theme, with the S, GS and GTS versions, escalating in both features and price.

Borrowing a page from Henry Ford, customers initially could order their Cirrus in any color they wanted, as long as it was white. This lack of color choices stemmed from an FAA-imposed limitation borne from fear that darker, heat-absorbing colors would hasten the composite structure's deterioration. As experience was gained, darker colors have been allowed. Most early Cirri come in a white or ivory base paint, with multi-colored striping. Both the SR20 and the SR22 carry a 12,000-hour airframe life limit.

MODEL DIFFERENCES

Trimble bailed out of the light aircraft avionics market before the first Cirrus was shipped and Cirrus wisely adopted Garmin for its panels. The A-spec airplanes came with a GNS430, a GNC250XL, an audio panel and GTX320 transponder, plus the ARNAV ICDS 2000, a then state-of-the-art multi-function display, or MFD. For autopilots, the "A" aircraft have S-TEC System 20s, upgradeable to System 30s, which include altitude hold. All of the early aircraft used vacuum instruments but had an electric back-up vacuum pump. Rounding out the panel are analog engine and systems gauges clustered on the far right.

Meanwhile, "B" airplanes have a GNS420 in place of the GNC250XL, the System 30 is the standard autopilot and a Century NSD360 vacuum/electric HSI is fitted in place of a vacuum-powered directional gyro. The C-spec airplanes have dual GNS430s, System 55 autopilots, dual alternators and a Century NSD1000 electric HSI. Options for the "B" included dual alternators, leather seats and three-blade propellers, with roughly 70 percent of SR20s being loaded "C" models.

Beginning with serial number 1268 and the 2003 model year, Cirrus did away with vacuum systems and introduced the all-electric airplane. The A, B and C designations evolved to 2.0, 2.1 and 2.2, respectively. The all-electric airplanes have dual alternators—a 75-amp main alternator and a 35-amp secondary unit—plus dual batteries. There also are two busses, a main bus and an essential bus for critical load items such as nav and comm functions, and lighting.

The 2.0 airplane didn't change much over the old A airplane except in the case of the ARNAV ICDS 2000: Cirrus switched to the Avidyne EX3000C, a higher resolution MFD widely acknowledged as more sophisticated than the one it replaced, but—since it won't accept external sensors such as data from a remote-mounted Stormscope—one intended for the VFR or IFR-lite pilot. The all-electric 2.0 offered a DG, but most buyers opted for the NSD1000 HSI. The 2.1 airplanes have an Avidyne EX5000C and NSD1000 as standard while the 2.2 airplanes featured a pair of Garmin GNS430s, the EX5000C and a Sandel SN3308 electronic HSI. Most airplanes delivered have the 2.2 package.

In early 2004, Cirrus introduced the G2 models of both the SR20 and the SR22, featuring a new door design, better interiors, a redesigned firewall for improved crashworthiness and other upgrades. Cirrus says G2 airplanes have slightly less drag and are thus a knot or two faster than previous models. Later that year, Cirrus began offering the SRV,

a VFR-only model intended for the training and low-end market. For 2008, the G3 SR20 variant was introduced, featuring the wing from the SR22 G3, redesigned landing gear and a 50-pound useful load increase, among other changes. The new wing added a few knots to the airplane.

Many would-be buyers might wonder if an early SR20 can be retrofitted with a PFD or if a vacuum model can be converted to an all-electric model. Cirrus says these upgrades aren't possible, but kits are available to replace the ARNAV ICDS 2000 with the more-capable Avidyne EX5000C, and many of the early aircraft have already had this upgrade. This change accommodates state-of-the-art options like displaying remote Stormscope and Skywatch data, incorporates EMAX engine monitoring, XM WX datalink and CMAX, Avidyne's electronic approach plate system.

Current SR20 models start with a Garmin G1000 panel using 10-inch PFD and MFD screens, dubbed Cirrus Perspective, and then add options like larger screens, XM WX, enhanced vision, lightning detection, traffic or terrain warning. Avidyne's Release 9 PFD/MFD also is available.

That's a somewhat dizzying array of configurations over the SR20's 10-year production run, during which 1025 copies have been produced so far, according to the company. Of the total, 417 are in the original "A/B/C" configuration, 462 are G2 models and 146 are G3s.

ENGINE AND SYSTEMS

All SR20s have been fitted with the same engine since production began: the 200-HP six-cylinder Continental IO-360-ES. It's a somewhat unusual choice but one yielding sufficient power and remarkable smoothness. The engine's TBO is 2000 hours, but overhaul costs are on the high side, at about $28,000. Throttle and RPM control are done via a single lever that moves both cables. Full throttle will yield 2700 RPM. A reduction of power brings 2500 RPM where it will stay until power is so reduced it can't be maintained.

This is done through a cable-and-cam arrangement that works well enough, but there's no way to find an RPM sweet spot, and some owners have complained about rigging difficulties and trouble getting precise power settings. Most of these airplanes have three-blade props but those with two-blade props (especially in the early years) may have better weight and balance numbers without a hit to performance.

With the exception of aluminum control surfaces, the airframe is entirely composite. The wing is constructed with a beefy, continuous spar. Control surfaces are activated via cable from side controllers mounted on the cockpit walls. Trim is electric only, with coolie hat buttons on each stick, a sore spot for some owners, who say they would like a manual trim wheel for back-up and fine-tuning.

The Cirrus wing has a stepped leading edge that's supposed to stall the inboard section first—allowing roll control throughout—and be resistant to spinning. The airplane is not approved for spins, nor did it undergo official spin testing. If a spin develops, the first anti-spin response is roll input with ailerons, but the official response is deploying the parachute.

Cirrus airplanes are designed with crashworthiness in mind. The SR20's fuel supply, for example—60.5 gallons total; 56 gallons usable—is stored between the wing spars and well outboard of the cabin, providing significant crash protection. The landing gear is designed to absorb energy and flex into the wing inboard of the fuel cells, thus leaving them intact in the event of hard landing or crash. The seats are 26G-impact designs and each has four-point harnesses with inertial reels. If the worst does happen, the airplanes come with a crash hammer so occupants can extract themselves. One major safety feature is the lack of yokes to impale front-seaters during a head-on impact.

PERFORMANCE, COMFORT

Performance-wise, the SR20 should be examined as both a high-performance airplane and as a fixed-gear cruiser. As a fixed-gear cruiser measured against the likes of the Cessna 172 or 182 or the Piper Archer, it's respectably fast. Although Cirrus initially claimed 160-knot cruise speeds, 145 knots for the older models to 155 knots for a G3 SR20 is more like it. Cirrus notes that a slow SR20 should be checked for proper rigging.

Although the SR20 is adequately powered, it's not overpowered. At 3000 pounds, it's heavier than most airplanes with 200 HP. At moderate weights, expect 700 to 800 FPM initially, falling off to 500 FPM above 4000 feet. Given its weight and the

The most common panel layout you'll find is the Avidyne Entegra suite with dual Garmin GNS 430s. Look for one that already has the WAAS upgrade and watch for signs of wear and impending screen failure (color problems, solid lines) on the PFD and MFD.

power available, expect the airplane to be somewhat of a dog in high-density altitude situations. Owners say the POH is on target for fuel burn at about 10.5 GPH for typical cruise, although some report higher fuel burns. Still-air range is about 675 miles, with 45-minute reserve, when planning to use the full 56 gallons legally available. Down-fueling to the tabs allows more cabin load but dramatically cuts endurance to less than two hours.

Initial max weight for the SR20 was 2900 pounds but a later service bulletin, if complied with, allowed a gross of 3000 pounds. The SR20 G3, meanwhile, has a max gross of 3050. Cirrus initially claimed a standard empty weight of 1875 pounds for a useful load of just over 1025 pounds.

Not really, say owners. Empty weights are typically 2000 pounds or more with useful loads of just under 900 pounds. With full fuel, that leaves 560 pounds for people and stuff. CG tends forward rather than aft. This requires heads-up flying, for the airplane is not blessed with an over-abundance of elevator authority.

Both the front and back seats of the airplane are exceptionally comfortable by GA standards. With no yoke to obstruct the view, the front seats are like flying from an easy chair, with an expansive view out the generous side windows. The side-yoke controller is easy to adapt to by using a rest provided for your forearm. The airplane generally rivals the Bonanza in handling ease.

MAINTENANCE, SUPPORT

Cirrus largely achieved its goal of building a low-maintenance airplane. There are 11 ADs on the airframe, two or which relate to minor issues with the parachute firing mechanism. Initial problems with hard starting of the IO-360 and failed starters were addressed with tweaks to the fuel system. Early models had landing lights mounted on the cooling baffling in the air inlet, which caused them to fail frequently. The mount was reworked and newer models have the light in the cowling.

One complaint involves failures and frequent repairs for the Century NSD1000 HSI, something not unique to Cirrus aircraft. We would consider replacing this with a used Sandel or a Bendix/King system. Service difficulty reports show several incidents of cracked crankcases due to vibration in the alternator bracket, which Cirrus has addressed. Another area of complaint is poor fit of the doors and in-flight openings. Cirrus concedes that the design and fit of the early (pre-G2) doors isn't the best. However, the company insists that doors on any model can be made to close securely, if adjusted correctly.

A third area involves electrical connectors, which generally are taken from the automotive industry. Especially for an all-electric airplane, they might be a poor choice. They can be the source of system failures or intermittent gremlins. Maintainers often apply liberal doses of corrosion-preventing lubricants—along with harsh language.

Another issue, and one resulting in AD 2006-21-03, involves the brakes. Since all Cirrus models have free-castering nosewheels, directional control at low speed is done via differential braking. Some pilots may have used the brakes to control taxi speed instead of reducing power. The predictable result: overheated brakes, leaking fluid and the occasional fire. Depending on serial number, the AD calls for a one-time O-ring or caliper replacement, plus trimming the wheel fairings, installing temperature indicators and inspection holes.

An AD issued in 2008 (AD 2008-11-18) requires a 100-hour pressure-test inspection of the exhaust systems installed on early SR20s, serial numbers up to 1815. Carbon monoxide can leak into the cabin from cracked components, potentially disabling the pilot. We're not aware of an alternative method of compliance.

None of the owners who have been through a couple of annuals and contacted us reported unusual costs. Note, of course, the ADs issued against the airplane so far have not involved the composite structure but, instead, involve systems or accessories. It's still too soon to say that composite airframes are less maintenance-intensive than their metal forebears, but indications so far are positive. Certainly, corrosion will not be an issue, but problems unique to composites may take decades to surface.

SERVICE HISTORY, TYPE CLUB

In 2006, we tracked down the first SR20 in private hands to learn how it had fared. At seven years old and on its second owner, SR20 serial number 1005 had 1146 hours on it when we tracked it down. Gary Hudnall, the director of maintenance at the owner's shop, summed up his experience with that mechanic's shrug. "It's just like any other airplane," said Hudnall. "They (Cirrus) had a lot of little problems at first, which is to be expected, but they've been really good about addressing those problems."

The SR20 excels when it comes to interior space. It has the same 49-inch-wide cabin as the SR22, with good headroom and visibility from all four seats.

Wear and tear is inevitable, however, and the airplane had a few age spots. There was a small crack, for instance, in the finish of the leading edge of the right horizontal stabilizer. The owner was concerned enough to send photos to Cirrus for assessment; he was assured that the crack was a surface flaw and not a delamination of the composite material. His paint technician will sand out the crack and repaint the area.

By far, the most vexing problem on this aircraft involved premature vacuum pump failures. In all, Cirrus paid for seven replacement pumps in 17 months. An attitude indicator and two directional gyros also were replaced. Finally, the owner, Cirrus and engine maker Continental agreed it was time for drastic action: Cirrus and TCM replaced the entire engine with a new one, with the cost pro-rated.

At the time, we wrote, "The number of ADs, service bulletins and service difficulty reports (49) is surprisingly low for a clean-sheet airplane and none are major worries. With seven ADs and more than 300 SDRs, Cessna's re-heated 172S hasn't done quite as well as the SR20 in this regard. On the other hand, Diamond's DA40 Star, also a clean sheet design, has no ADs at all." In all, the SR20 seemed about average in durability, representing no major breakthroughs in either long-term durability or reliability.

As for type-club support, you can't get much better-organized than the Cirrus Owners and Pilots' Association (COPA). The organization maintains an excellent Web site (www.cirruspilots.org) with both public access and members-only forum sections. It's a must for any would-be Cirrus buyer.

OWNER COMMENTS

I purchased a 2006 SR20 new from Cirrus in November of 2006, and traded it in for a demo SR22 this past November. I had just received my private pilot license when I bought the SR20, and it was my first airplane. I went on to get my instrument rating in the airplane, and flew it 100-150 hours a year.

Most of my flying was for pleasure—training, $100 hamburger runs, and up and back from Connecticut to the Adirondacks in the summer on weekends. Although I did go back and forth to North Carolina a number of times, and to Louisiana once for a Cirrus Pilot's Proficiency Program (CPPP) training weekend.

The plane had a few squawks at delivery, but everyone at the factory worked hard to get it right and I trained on a loaner. The transition training was thorough. After I brought the plane back home (at the time HPN), I had a series of minor electrical squawks, that resulted in an MCU being replaced twice. After those initial kinks were worked out, the airplane was relatively squawk-free during my ownership.

I found the plane perfect for my missions. Comfortable, relatively simple to fly, terrific situational awareness with a sophisticated avionics suite (Avidyne/Garmin), and I loved having the XM weather. I ran the plane lean of peak at cruise, and could always plan on 140 knots and 8.9 GPH, and would often beat that by a few knots.

Climb performance was fine in the cooler months, but in the summer it could take some time to get to altitude (well under 500 FPM after 5000 feet). Useful load with full fuel (56 gallons) was 484 pounds, which was plenty for most of my missions. And at only 8.9 GPH, it had reasonable range at even less than full fuel. I had the ventilation fan, but in the summer, even at altitude, it could get pretty warm in the cabin due to the large windows.

My annual operating costs were $3161 for insurance (with $300K hull value), $1375 for subscriptions (Jeppesen—included CMAX charts for the MFD) and XM at $685. My annual inspection typically ran around $3000.

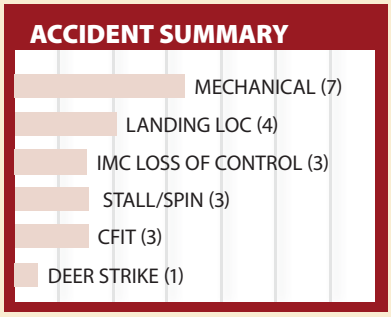
I really loved the plane, but a new business requires significant travel over greater distances, and the SR20 was just not suited for those trips (slower speed, lack of ice protection, range, etc.). I traded in the SR20 for a FIKI turbo SR22. But the only reason I did was because my mission changed. For a typical pilot with shorter trips and living in the east where climb performance isn't as important, the SR20 is a terrific plane.

Andrew Barnard
Via e-mail

ACCIDENTS: MECHANICAL PROBLEMS AND LANDING FOIBLES

With only 10 years of production history and less than a thousand SR20s in service, it's not surprising our sweep of the NTSB database returned only 24 accidents and incidents in the SR20. This was about 25 percent of all the Cirrus accidents shown. Considering that the SR20 accounts for about one quarter of the Cirri out there, we suppose this indicates the light Cirrus is no more or less likely to get in trouble as its heavier stablemate.

A mere 24 events doesn't make for compelling statistical analysis, but the fact that mechanical problems were the primary cause of almost a third (29 percent) of the accidents does jump out. There didn't seem to be a pattern to these—other than they led to some of the SR20's ADs and SBs. Two of these were control jams, including the accident that killed Scott Carpenter, Cirrus' test pilot at the controls of the first production SR20. The cause was too tight a tolerance between the aileron and the wing, which was changed before the first Cirrus was even delivered. The other jam was due to the aileron-rudder interconnect (only installed on G1 and G2 Cirri) and was corrected throughout the field by an AD.



Another mechanical that caught our attention was a throttle-control jam that was caused by chafing of the number-two alternator cable. It arced and spot welded the throttle in place. The only takeaway here may be that a new design will have issues that only reveal themselves over time. Most have probably surfaced by now for the SR20, but some certainly have not.

There was a crossover between mechanical and landing loss-of-control with this report of an instructor doing touch-and-goes with a student: "The airplane bounced two or three times before he took control of the airplane and taxied clear of the runway. During the next landing, performed by the instructor, the nose landing gear collapsed. Post-incident inspections conducted by the operator revealed that the nose landing gear strut weld mount had cracked. The incident prompted the flight school to inspect their entire fleet of Cirrus SR20 airplanes, of which nine others exhibited cracking in the same location."

We're not sure which is chicken and which is egg—did bad landings lead to cracks or vice versa? Porpoising or bouncing on landing was a theme with the few landing accidents we saw. The Cirrus SR20 has a reputation for this (rightly or wrongly), but, as with most every clean airplane, proper speed control and patience on landing is the fix. The gear cracking led to an SB.

There has been much speculation if the high-tech cockpit of the Cirrus leads to greater risk taking. These few accidents don't clarify that at all, but there were three CFIT wrecks where pilots flew into terrain they couldn't see despite the gadgets for position and (if installed) terrain awareness. There were also three loss of control accidents in IMC, two of which may have involved icing. In one of those cases, the pilot told ATC he was instrument rated but actually wasn't. He then got to tell them he was descending under the parachute.

Three accidents involved stall/spin, two of which were in flight training and involved low-level maneuvering. The third was a stall on takeoff attempted with the flaps up. The Cirrus requires 50-percent flaps for takeoff. These are proof that even an advanced wing design is no match for the limits of angle of attack.

And neither is the parachute a panacea for all woes—especially if not deployed. Some fatals might have been averted by a pull of the big red handle, assuming the pilot is prepared to do so. One NTSB report noted, "The airplane's parachute system was not deployed, and the parachute's safety pin with the red colored 'Remove Before Flight' tag was found in the activation handle, still in the handle holder."

We acquired the airplane in 2000 after a close study of the Cirrus and competitive airplanes. The airplane was placed in service on a leaseback to a flying club and it flew between 250 and 400 hours a year, of which our use accounted for perhaps half.

The airplane was delightful to fly but expensive to maintain. Problems with wire crimps, vacuum pumps, the master electrical control box and high and low temperature engine starts pushed the new Cirrus service capability to the limit. Parts shortages and erratic troubleshooting support continued for 2-3 years.

When Cirrus upgraded their support service business these problems moderated considerably. Still, ownership costs for the airplane continued to be higher than we expected, with the electrical and mechanical systems causing most of the difficulty.

We normally saw 145 knots (not 160) with fuel burn about 10 percent above the book. We created our own performance database for flight planning. Airplane speed is sensitive to dirt and contamination on the wing, washing and waxing before a long trip improved cruise speed several knots, at least until bug contamination occurs.

On long flights the airplane provides good comfort and excellent flight information for the IFR or VFR pilot. As with any high performance airplane, planning, practice and attention to detail are rewarded with

safe and exhilarating flights.

We owned the airplane for nearly seven years and now fly a 2006 SR20 with Avidyne glass and GPS-WAAS. Maintenance costs for this airplane appear to be significantly lower than we experienced with our first airplane.

Peter Morton
Langley, Washington

My wife and I owned a 2006 SR20 we bought directly from Cirrus. The factory certified aircraft was not well maintained at all. We got home and found several things wrong with it. We had them all fixed, such as a leaky fuel pump, alternator belt chafing, brake fluid leak, etc.

The doors are hard to shut, the parking brake is hard to engage and the circuit breakers are hard to see. Then we were constantly bringing it in for some new AD and AD reversal so things could be altered. We also realized how bad the stall characteristics are with this aircraft. The wing falls off sharply in a power-off stall.

The only really nice thing about this overpriced airplane, besides the avionics, is the lean-of peak performance, whereby we were able to cruise at 132 knots at 7.6 GPH.

We sold it and bought a Grumman Tiger, which we love.

Brian and Ruth
Via e-mail

I purchased a 2003 SR20 in April 2009. I live in Riverside, California, where it tends to get hot from spring to fall and a major expense has been the easy overheating of the engine. Solutions offered from other Cirrus owners included increasing the fuel flow, leaning aggressively right after takeoff, climbing at over 100 knots, not flying on a hot day. I tried all of these without a complete solution to the overheating problem.

Procraft at the Corona Municipal Airport was great in attempting to solve the overheating solution. We tried putting gills in the lower cowling. This gave a 30-to-50-percent improvement in cooling but wasn't the complete fix. Then, I came across a remote oil cooler from Steve's Aircraft in Oregon, which was installed under a field approval and solved the problem. The cost for all of this was around $5000; expensive but much less than a new engine.

About the same time I was working on my problem, the shop next door had an SR20 getting a top overhaul because of overheating.

The SR20 is a little underpowered. Attempting to fly the downdrafts can produce a slight pucker factor. The airplane is challenged to get above 12,000 feet.

The weight and balance limits do not allow full fuel and four full-size people. I usually get 135 knots burning between 9.5 to 10 GPH. Both EGT and CHT probes need regular attention: Either a connection loosens or the $160 probe dies.

My airplane has the all-electric steam gauges. An upgrade to the Avidyne software was expensive, and I still have to upgrade the Garmin 430 to WAAS, but haven't done so yet because of cost.

While not the fastest plane I have owned, nor the most capable, it is the most comfortable. I like the CAPS system, but am not looking forward to the 10-year repack expense.

Clarke Prescott
Via e-mail

I purchased a new SR20 in October 2005 and traded it in for a Turbo SR22 in June 2009. In the 3.5 years we owned the SR20, we put 720 hours on it and loved every minute of the experience.

It was a steady 9.7-GPH plane and cruised at 150 knots, as advertised. The insurance on the plane at one million liability and replacement hull value for two instrument-rated pilots was only $2600 per year. With our fixed costs, the '20 averaged $125 per hour to operate. I know of no better value in aviation.

Once you go glass you'll never go back. With the Avidyne avionics and the XM on-board weather it was safe and a dream to fly. We all know how nice the interiors are, which makes it a great family and friend flyer.

I would recommend this plane to anyone that it fits their mission profile. With the increased costs of flying the Turbo FIKI SR22, I do miss our SR20.

Brian Bailey
Via e-mail

The Aviation Consumer

KFD 840 PFD

(continued from page 13)

shut down after our test flight, we were surprised to see the PFD go dark when we killed the avionics master. A check of the installation manual showed this was perfectly acceptable—but it's not the way we'd want it wired in our own airplane.

TOUGH TO RECOMMEND

While the KFD 840 does everything you need from a PFD, we think it would be a tough sell at $16,985 plus about 70 hours labor for a typical install. Compare that to the analogous functionality of an Aspen EFD1000 Pro at $9995 or getting a PFD/MFD combo in a G500 at $15,995. (Those are retail prices, with street prices often two or three grand less.)

When we asked Dan Barks why a consumer would pay more for the Honeywell product, he suggested the ADHRS derived from the high-end Primus suite would be an attraction, as well as the large display. We don't agree. Garmin and Aspen have adequate time in service to show their products are up to the task, and, as we've already said, we see the advantages of a smaller display combined with an MFD beside it as outweighing the drawbacks.

Honeywell calls this the Apex Edge series, suggesting there are more products in the pipeline. The only one we know about is the KSN 770, which is in an all-in-one MFD/GPS/Nav/Com and should retail for $13,995. We're told the KSN 770 will be introduced next fall, but we've seen similar promised dates come and go with no announcement.

We'll let you know if the combination of these units changes the picture once we fly them together. But unless Honeywell readjusts its pricing for the duo or adds some compelling features—including autopilot gyro emulation—we think Honeywell waited too long to plug the PFD gap in its GA avionics lineup.

Letters

(continued from page 3)

like many in aviation, I also have an interest in boating. While Lowrance is the largest marine electronics supplier, any guess as to my future purchases?

Bill Massey
Corning, California

Flight Planning

Interesting article in the latest issue concerning flight planning. I'm eagerly awaiting the follow-up article about in-flight software.

I fly a Europa XS experimental which has a fairly small cockpit. While I have a Grand Rapids Technology EFIS installed, I still prefer to have a sectional chart or low-altitude enroute chart available and of course I use approach plates.

None of these are available on the current versions of EFIS. Having a chart with the aircraft position shown real time would be a bonus!

I have looked at the planning software and the in-cockpit features they offer and most seem to have what I'm looking for. But the tablets are a little big for my cockpit. About the best at this time is a Samsung Q1.

However, there is a new tablet on the market, the Viliv X70 (see http://snipurl.com/tyhdw) which is small and looks very attractive for this use. Recent ads by Anywhere Map show a similar tablet in use.

So my question or request is please address this application in the follow-on article and please include the Viliv X70 or any other new tablet in the review.

Jim Butcher
via e-mail

We'll look into it when we get around to EFBs again.

FEEDBACK WANTED

CESSNA 310

For the May 2010 issue of *Aviation Consumer*, our Used Aircraft Guide will be on the Cessna 310, the favored ride of Sky King. We want to know what it's like to own these unique 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 310 by March 1, 2010, to:

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