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## EDITOR

Larry Anglisano

## SENIOR EDITOR

Rick Durden

## EDITORIAL DIRECTOR

Timothy Cole

## EDITOR AT LARGE

Paul Bertorelli

## SUBSCRIPTION DEPARTMENT

P.O. Box 8535

Big Sandy, TX 75755-8535

800-829-9081

[www.aviationconsumer.com/cs](http://www.aviationconsumer.com/cs)

## FOR CANADA

Subscription Services

Box 7820 STN Main

London, ON SW1

Canada

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

**B** AVIATION CONSUMER  
(ISSN #0147-9911) is published monthly by Belvoir Aviation Group LLC, an affiliate of Belvoir Media Group, 535 Connecticut Avenue,

Belvoir  
Norwalk, CT 06854-1713. Robert Englander, Chairman and CEO; Timothy H. Cole, Executive Vice President, Editorial Director; Philip L. Penny, Chief Operating Officer; Greg King, Executive Vice President, Marketing Director; Ron Goldberg, Chief Financial Officer; Tom Canfield, Vice President, Circulation.

Periodicals postage paid at Norwalk, CT, and at additional mailing offices. Revenue Canada GST Account #128044658. Subscriptions: \$84 annually. Bulk rate subscriptions for organizations are available. Copyright © 2018 Belvoir Aviation Group LLC. All rights reserved. Reproduction in whole or in part is prohibited. Printed in the USA.

Postmaster: Send address corrections to AVIATION CONSUMER, P.O. Box 8535, Big Sandy, TX 75755-8535. In Canada, P.O. Box 39 Norwich, ON NO1J1PO, Canada. Publishing Agreement Number #40016479

## FIRST WORD

### A NEW AIRPLANE FROM DYNON AVIONICS?

Not exactly, but close. The airplane pictured below is the Vashon R7 Ranger S-LSA and it has an intriguing story, an inviting price and the latest Dynon avionics. First, the story. Several years ago Dynon's founder and CEO John Torode had an idea to build and sell a new airplane model and although it wasn't necessarily supposed to be an LSA, it fell within the price point he was after. After years of listening to pilots describe what they might want in a modern LSA, Torode figured out that the obvious stuff potential buyers wanted was something he could offer. It had to have plenty of cool factor, an affordable price and capable avionics. The avionics, of course, would be easy. Dynon enjoys much success in the experimental avionics market with a proven product line that remains on the cutting edge.

With the help of Ken Krueger, who spent over 16 years on the engineering team at Van's Aircraft (he later became the chief engineer), the Vashon R7 Ranger was born, flew and is now certified as an S-LSA. The company plans to build at least 20 R7 Rangers this year and a lot more next year. The starting price is \$99,500, but the flagship version could

max out at around \$120,000. In my estimation, Krueger's involvement (and subsequent Van's DNA built into the Ranger) steps the plane up a few notches.

The R7 Ranger is different from many LSAs because it has an all-aluminum fuselage and interestingly, a 100-HP Continental O-200-D spinning a Catto fixed-pitch propeller. Where lots of other LSA models are powered by some kind of Rotax, Torode decided that the R7 had to have a small Continental even if means a weight penalty because he thinks it's iconic, easily serviced in the field and would be more accepted by flight schools and also older pilots. The aircraft has a 445-pound useful load, a 430-NM range and a top cruising speed of 117 knots.

Vashon's Amy Bellesheim (a flight instructor who comes to Vashon after working with Boeing on its 777) told me the company is doing everything possible to save on manufacturing costs, including manufacturing many of its own parts. Aside from doing in-house avionics (the aircraft factory is a few steps away from Dynon's facility on Paine Field in Woodinville, Washington), Vashon is using pre-drilled and prepainted metal, which eliminates the need to put a paint job on the airplane when it's assembled. Graphics are done with vinyl wrap and Bellesheim said there's no end to the custom schemes customers can design for their Ranger.

At first blush, the R7 Ranger has a pretty utilitarian cabin dwelling. There's no fancy leather seating and plush sidewalls. But if a stark interior helps keep the cost down, I'm not complaining. As I eyeballed the R7 I couldn't help but think of how I would use the aircraft. As a cyclist who loads my bicycle in my vehicle to travel to regional events, the Ranger—with seats that fold down 90 degrees—could easily accommodate my full-size road bike. The 445-pound useful load would be plenty for this 170-pounder, and 117 knots beats my Nissan truck.

The base model is called the Yellowstone and includes the Dynon Skyview Touch avionics; upgraded models will have the HDX system. There are currently two R7s flying and four in assembly line to be ready for sale this April. If Vashon can stick to its under-\$100,000 price, we might finally see an LSA for which the category was intended: That's budget-minded pilots like me with adventurous flying plans who need limited utility. The Dynon glass avionics sweeten the deal. We're planning a flight evaluation of the R7, so stay tuned.—Larry Anglisano



## FBO WILD PRICE SWINGS

I read Larry Anglisano's editorial on FBO price gouging in the March 2018 *Aviation Consumer* and have some

thoughts. Like Larry, I don't mind paying for good FBO service when I avail myself of it, but these days with venture capital firms consolidating ever-larger chains of glitzy and highly profitable FBOs even at relatively

small airports around the USA, it is getting increasingly difficult to avoid both sky-high fuel fees and onerous ramp charges.

Last fall, for example, a friend of mine flew me up from Rocky Mountain Metro across the Front Range of the Colorado Rockies to Eagle Airport west of Vail. He taxied in to the legal outer edge of the Vail Valley Jet Center ramp, where I hopped out, then he immediately taxied back out for take-off. I strolled across the ramp toward the main exit gate to public ground transportation, but a line guy came running up and made me come in to the front desk, whereupon I was handed a \$65 bill for "drop-off" service.

If you browse [www.airnav.com](http://www.airnav.com) to check all the fuel prices around the country as I just did, you'll be pleased to note that, in quite a few spots, 100LL is back down to the mid-\$3 range just like the good ol' days, but there are still some egregious FBOs that are charging over \$8 per gallon. For example, Jet Aviation in Teterboro, New Jersey, is currently charging \$8.39 for 100LL while just 31 miles southwest, Central Jersey Aviation Services at Manville is somehow managing to eke out a fair profit by charging only \$4.30.

Down in Texas (where gas should be really cheap due to all the local supply and refineries), Tetar Aviation at Dallas Love Field is currently charging \$7.83 for 100LL, while just 22 miles east-northeast F46 Aviation Services at Rockwall Municipal Airport is making a profit at \$3.80 per gallon, and the price drops to only \$3.30 at Haskell Municipal Airport only 168 miles further west.

Fortunately, most of us can still vote with our feet, at least when we are flying for pleasure, by carefully researching prices on Airnav.com and

then shunning overpriced FBOs like the plague.

It will be interesting to see how effectively (or even if) the FAA can ratchet down the price-gouging at greedy corporate FBOs on many larger-city airports.

Barry Stott  
Chadds Ford, Pennsylvania

*As Anglisano pointed out in the commentary, it isn't just about fuel prices. The real issue at a lot of airports is getting to the other side of the airport fence when you don't need the services of the FBO. At many places, you have to first pass through the FBO's doors and that's where you're slapped with a facility fee, whether you use its services or not.*

## ENGINE SHOP SURVEY

I read your engine shop survey article in the March 2018 *Aviation Consumer* and want to describe an experience with a specific shop.

I used to be the proud owner of a 1978 Bellanca Super Decathlon, sporting a Lycoming AEIO-360-H1A engine. A bit over four months into owning the airplane, the 200-hour or so engine ground itself to bits in our local practice area. Short story is that I successfully dead stuck the airplane into a private strip a couple miles south of the practice area.

Not having experience in overseeing engine overhauls and making cold-calls to various shops, I ended up choosing Barrett Precision Engines in Tulsa, Oklahoma, to overhaul the engine. BPE was one of only two shops that held my inexperienced hand and offered a detailed description of how they would proceed. My old engine was so bad off that about the only part they could salvage was the accessory case. The shop recommended (and I agreed to) installing Lycoming factory cylinders.

Barrett sent me a wonderful engine that I flew for the next six years. I



called them on a couple of occasions to inquire about a couple of different crankshaft ADs. Barrett was very responsive and friendly. I never had an issue with the engine during my ownership. I sold the airplane in 2011.

Today I'm flying an Extra EA-300 with an engine that was overhauled by Penn Yan Aero Services in the early 2012 time frame. They too have been responsive to any questions I've had about the engine including the recent AD about the connecting rod bushings.

I'm very happy with BPE and also Penn Yan. Both shops have provided a solid engine and great support.

Farrell Woods  
via email

## ELT OR ADS-B?

Our maintenance guy suggested we look into buying a 406 ELT system at the next annual. Since ATC can locate any ADS-B aircraft via tail number, does this lessen the need for a 406 ELT?

Laton Allison  
Stanberry, Missouri

*We think not because a battery-powered ELT can continue to transmit long after the aircraft hits the dirt. An ADS-B Out system needs aircraft input voltage.*

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## CONTACT US

**Editorial Office**  
860-614-1987 (EDITORIAL ONLY)  
Email: [consumereditor@hotmail.com](mailto:consumereditor@hotmail.com)

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

**Online Customer Service:**  
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# Budget Autopilots: Growing STC Approvals

*The lower-priced autopilot market is finally turning the page as installation approvals expand. You can now get the latest digital tech for under \$10,000 installed.*

by Larry Anglisano

Second to engine replacements, autopilots top the list of the most expensive aftermarket retrofits you can make to the aircraft. Until recently, pricey entry-level systems didn't offer much more than basic wing-leveling functions.

## AVIONICS MARKET SCAN

But thanks to a welcomed switch in FAA regulatory mentality, the certified market has recently seen no fewer than three new budget-based and full-featured autopilots (priced under ten grand) trickle down from the experimental aircraft world. This includes the Garmin GFC500, the Trio Avionics Pro Pilot and TruTrak Vizion, which all earned STCs last summer.

Still, the buying decision is muddy mostly because of their limited STCs and third-party interface potential (although that's changing for the better). In this article we'll take an updated look at all three systems to help ease a complicated buying decision.

Since we covered the Garmin GFC500 extensively in the September 2017 issue of *Aviation Consumer*, we

won't dive too deep in it here, other than taking a fresh look at interface potential, required instruments and an update of its STC approvals.

### TRIO AVIONICS

California-based Trio Avionics has been building autopilots for the experimental market since 2003, but it was the outside firm The STC Group (founded by Paul Odum) that earned the initial STC for the Cessna 172/182, and recently announced approvals for the Cessna 175, 180, 182 and 177. There's also the Piper PA28.

The STC Group is currently knee-deep working on other STCs, including ones for the Piper PA32, Grumman AA5, Cessna 195, plus older Beechcraft Bonanzas and Debonairs. Trio and The STC Group are separate entities; Trio sells the autopilot, while The STC Group sells the installation kits and permission to use its STC, although orders are coordinated seamlessly through Trio.

The Trio Pro Pilot is a rate-based autopilot, but unlike other designs that use a mechanical turn coordinator for roll input (S-TEC and

**C H E C K L I S T**

- +

Both Trio and TruTrak have the most STC approvals with more in the works.
- +

Garmin's GFC500 has external EFIS display and crosscheck through the G5 instrument.
- ~

But this bumps the total price of the GFC500 system to around \$9200.

BendixKing's KAP140), the Trio has self-contained solid-state inertial rate sensors. It also receives position data from panel and portable GPS navigators, providing automatic corrections to the sensor data to correct for drift due to thermal shifts, inherent sensor drift and noise errors. In panel-mounted navigator interfaces the system uses serial and Arinc 429 data input, while portable interfaces use NMEA serial data. The autopilot also uses pitot/static air input for computations.

Worth mentioning is that given the age of some pitot/static systems, expect to pay for additional labor (and parts) to get the system back in shape. Of course, you should be addressing problems in the system (mainly leakage) when shops perform the two-year FAR IFR inspections.

The Pro Pilot, which is completely digital, has three lateral modes including nav track, course/track command and wing leveling. In Track mode, the autopilot follows the flight plan coming from the GPS (including GPS roll steering). In WAAS-equipped installations, the autopilot can fly precision LPV approaches, but it won't fly raw nav ILS or localizer approaches. This is a GPS-functioned autopilot only, at least in terms of course tracking. Forget about connecting it to your old King KX155 nav radio for tracking.

At this point, the Pro Pilot doesn't interface with third-party directional gyros or HSIs for flying a commanded heading, although Trio's Chuck

*Garmin's STC'd GFC500 shown at the top started life in the experimental market and has full envelope protection.*



*We like that Trio offers multiple versions of the autopilot control head—radio stack or instrument hole mount, top images. That's the 2-inch instrument cutout and rectangular flat-pack version of the TruTrak controller in the lower photos.*



Busch told us the company is pursuing interfaces with popular EFIS systems, including the Aspen PFD. Technically, it would be an easy interface to accomplish, but we're told the FAA is treading cautiously when it comes to interfacing with external third-party flight instruments. While any pilot-initiated directional changes are done through the autopilot by selecting a desired course, we'd still like to see external mag heading command from a DG or EFIS.

Installation is flexible because the Pro Pilot is offered in two configurations, including a version that fits in a standard 3-inch instrument cutout and also a flat-pack style control head that mounts in the radio stack. Both versions are covered under the existing STC and offer the same functions, just packaged differently.

The systems ships with a complete wiring harness and two servos for the autopilot's pitch and roll axes. At this time the STC'd autopilot has no electric pitch trim option. Instead, the system has trim prompting, which triggers an annunciator so the operator can manually trim the aircraft in the pitch axis.

Speaking of servos (they weigh 27 ounces each), we like that the digital smart-servo installation is traditional and attaches via pushrod to an aileron or elevator bell crank, but without bridal cables. This means less upkeep and less worry about loosening bridal cable tensions, which degrades performance. In a Cessna 182/172 application, the roll servo is installed in the wing, while the pitch servo is in the tail. The servos are failsafe, with slip clutches and feedback circuitry. In some experimental applications, the system comes with an elevator pitch trim servo and Trio

says this could be a future offering for certified aircraft, too.

As for advanced functions, the Pro Pilot has altitude preselect, vertical climbs and descents, plus stall and overspeed protection. There is also an automatic 180-degree turn feature to back away from inadvertent IMC, and it's nearly impossible to take off with the system engaged because the sensed GPS groundspeed during the takeoff roll will make it disengage.

The experimental version of the autopilot has a fuel endurance computer built in, but the current STC doesn't yet cover the function.

The Pro Pilot has a list price of \$3495, and installation kits are between \$2500 and \$3000.

### TRUTRAK PMA VIZION

To differentiate it from its experimental line, Arkansas-based TruTrak calls its STC'd system PMA Vizion. The company partnered with the Experimental Aircraft Association (EAA) and earned a growing number of Vizion STCs, plus PMA approvals, initially for the Cessna 172. Recall that EAA was instrumental in the STC for the Dynon D10A experimental EFIS display (it owns the STC), which incidentally got the ball rolling for the swift FAA approval of Garmin's low-cost experimental G5 flight instrument, which is the backbone of the company's GFC500 autopilot. More on that coming up.

In addition to the Cessna 172, current PMA Vizion autopilot STC approv-

als include the Cessna 177 Cardinal, Cessna 175, Piper PA28 and PA32. As we got to press, TruTrak says it's finishing the STC for the Cessna 182 and will pursue an STC for retrofit in Mooney models.

Providing an autopilot for the Virgin Atlantic Global Flyer, TruTrak has been building autopilots for the experimental market since 1999 (it has sold over 10,000) and the STC/PMA version of the Vizion system is a rework of the company's most popular autopilot, the Digiflight II.





*Digital servos are the backbone of all three systems. That's Garmin's GSA28 in the top left and Trio's at the right. The GFC500 interfaces tightly with the G5 flight instrument, bottom. It has mode display and pitch and roll pickoffs for the autopilot computer.*

When TruTrak redesigned the system as the Vizion, it retained nearly all of the features that worked well for experimentals but added altitude select/altitude preselect as well as an emergency level button.

We've installed TruTrak systems in experimentals and after removing some inspection plates on a PMA Vizion-equipped Skyhawk, remain impressed with the TruTrak's installation hardware and components. Even more, we like that the installation is technician friendly.

In the Skyhawk, the pitch servo mounts up front between the two sets of rudder pedals rather than in the confined space of the tail sec-

tion. And like the Trio and Garmin, the servos ride the controls directly without the use of bridled cables.

TruTrak's servo technology doesn't have built-in software. Instead, it's a simple slip/disengage-clutch design and has velocity limited torque. This means the faster the drive motor spins, the lower the torque output. In the early days of autopilot design, servo runaway and hardovers was an ugly failure mode, made

even worse by heavy control forces. TruTrak says such failure is impossible with its PMA Servos because of the wave form design that works in unison with lower torque outputs. The servos attach to the control systems via pushrods and each servo (pitch and roll) weighs 3.4 pounds.

Like the Trio, the TruTrak Vizion can interface with both panel-mounted and portable GPS systems for flight plan tracking (and GPSS roll steering), a feature TruTrak calls GPS Nav. The published GPS interface list is fairly substantial and includes the Garmin GNS430/430W and GTN650, the vintage Garmin GNC250XL and Avidyne IFD550 with version 10.2.0.0 software. Portable models include the Garmin 496, aera 500/510/550/560 and the newer aera 660.

A word or two on software is in order. While you might rely on your avionics shop to alert you of available software updates, we suggest taking a proactive approach and staying current with firmware updates. The latest software is often critical to successful third-party interfacing and in the case of autopilots, it's specific to the STC.

The PMA Vizion has a shallow feature set with limited bezel controls. Three versions are offered and include a 3-inch instrument mount, a 2-inch instrument mount and a rectangular flat pack, all with the same functionality.

TruTrak added a feature called AEP, for automatic envelope protection. It's a gotta-have capability because any modern autopilot is simply lacking without it. When AEP is armed in the background, the flight computer monitors the bank angle and if it senses anything greater than 45 degrees, sends a command and subsequent corrective input to the roll servo. TruTrak said its AEP is different than in other autopilots because it doesn't take command of the flight controls. The idea is to get the pilot's attention with an automated input on the controls.

There's also a push-of-the-button emergency wing leveling mode, control wheel steering, vertical speed select for programmed climbs and descents, altitude hold/select/preselect, plus LPV approach coupling when connected to select WAAS GPS navigators listed earlier.

As for external interfaces, the TruTrak (which isn't analog compatible) won't work with round-gauge directional gyros or HSI systems for heading command. TruTrak told us it's working on an approved interface that would connect the TruTrak with Aspen EFD1000 series PFDs. The system doesn't require external pitch and roll input. In the experimental world where almost anything goes, TruTrak systems connect with a variety of EFIS systems (including

## CONTACTS

Garmin  
800-800-1020  
[www.garmin.com](http://www.garmin.com)

Trio Avionics  
619-448-4619  
[www.trioavionics.com](http://www.trioavionics.com)

TruTrak Flight System  
479-751-0250  
[www.trutrakflightsystems.com](http://www.trutrakflightsystems.com)

BUDGET AUTOPILOTS COMPARED		
MODEL	PRICE	CURRENT AND PLANNED STC APPROVALS
<b>GARMIN</b>		
GFC500	\$9144 including G5	Cessna 172 F through S, plus F-series models Cessna 182 E through T, plus T182 T, P, Q models Future: Piper PA28 150, 160, 161, 180, 181 models Beechcraft Bonanza S35, V35A, V35B
<b>TRIO AVIONICS</b>		
PRO PILOT	\$5995-\$6495	Cessna 172, 175, 177, 180, 182 (all models) Piper PA28 (all models) Future: Cessna 190, 195, 210, Beech 35 to S35, Debonair Grumman AA5
<b>TRUTRAK</b>		
VIZION	\$5000	Cessna 172 (all models), 175 (all models), 177 (all models) Piper PA28 (all models), PA32 (all models) Future: Beechcraft Bonanza, Mooney

Garmin) for heading select. When asked if the system will someday work with Garmin's G5 electronic directional gyro, TruTrak told us it's working on it. There's no analog raw nav data interfacing. That means the interface is limited to GPS navigators with digital outputs.

The list price of the all-inclusive TruTrak (for all approved airframes) is \$5000 and includes a wiring harness and install kit.

### GARMIN GFC500 UPDATE

Since we've already covered it, we won't look at the Garmin GFC500

*Garmin's G5 electronic directional gyro shown below isn't required with the GFC500 unless you want heading select.*



user feature set, but it's worth reviewing the interface because an installation will affect the existing flight instruments. Where the other two autopilots are almost entirely self-contained, a required element of Garmin's GFC500 is the popular G5 electronic flight instrument. It channels in pitch and roll reference to the GMC507 electromechanical mode controller.

Think of the G5 serving as the autopilot's main source of mode annunciation and also for inputting flying commands like altitude changes and setting vertical speed and indicated airspeed holds. The GFC500 has a flight director function, so the magenta-colored command bar cues are placed over the G5's attitude display. The G5 electronic DG provides heading command to the autopilot.

The G5 DG can work with third-party autopilots (maybe you have an existing S-TEC or King autopilot), which requires the GAD29B adapter, but it's not yet approved.

The Garmin GFC500 system has a base price of \$6995 for the two-axis configuration and doesn't include the G5 attitude and G5 directional instruments. The primary attitude indicator is \$2149 and the G5 heading indicator is \$2449. Add all that up and the system comes in at around \$12,000, without installation. It goes up from there with major options. If you want the pitch trim kit, it's an additional \$2100, including the installation kit, plus the yaw damper is \$1500. But if you can live without heading

command, you can skip the G5 DG, which puts the system a touch under \$10,000.

As we go to press, the aircraft that are currently approved for GFC500 installations via the STC are limited to a wide range of Cessna 172 and 182 models. Garmin says it's working on STC approval for Piper PA28 models, in addition to S- and V-series Beechcraft Bonanza models.

### COMPETITIVE MARKET

As you can see by the STC list for each of the three systems, the market has become refreshingly competitive. Trio has the most approvals to date, followed by TruTrak, while Garmin comes in last, at least for now.

We're not sure why it's taking so long for manufacturers (and the FAA) to secure STC approval for interfacing with external heading systems. It's an option we think most buyers will want. Garmin has a distinct advantage because it makes the G5 electronic directional gyro/EHSI, which is approved under the GFC500 STC.

Given the popularity of Garmin's G5, we think it would be foolish for Trio and TruTrak to not pursue approvals with this instrument and it appears this is in the works. The Aspen EFD1000 is also on Trio and TruTrak's radar for future interfacing and there are a lot of Aspens flying around.

Since Garmin's GFC500 requires the G5 electronic attitude indicator as part of the STC, its autopilot is the most expensive of the three. Add a G5 DG for heading command and the system is priced north of \$10,000 not including installation.

As for installation, none of the manufacturers would offer labor estimates, which is understandable. We've been involved in enough autopilot projects to know there are plenty of variables that effect downtime and the price, especially when removing old systems and wiring. Use one working week as a reference.

For certain, any of these budget-based autopilots will be a much cheaper investment with more performance than any aftermarket system we've seen to date. That's something buyers have waited a long time for.

**YouTube** See a video overview of budget autopilots at <http://tinyurl.com/j95ht2a>

## S-TEC 3100: KEEP THE SERVOS, GO DIGITAL

If you have an S-TEC autopilot, you probably won't pull it out to install one of the budget systems. But Genesys Aerosystems bets there are plenty of buyers who might consider upgrading to the all-digital S-TEC 3100.

For years the S-TEC brand has dominated the market with a complete line of rate-based analog autopilots, mostly because of an impressive STC library that covers thousands of applications, plus a sleeping BendixKing that abandoned the retrofit autopilot business. Essentially this made an S-TEC the go-to system, although Avidyne has enjoyed success with its solid-performing DFC-series autopilots, which use existing S-TEC servos and wiring. There's also Century with the Triden and 4000-series rate-based systems, but it sells in smaller numbers.

But in a competitive market that's turned digital, we think Genesys had no choice but to get the think tank cranked up for something fresh. The results are the S-TEC 3100.

The 3100 is capable of being a two- or three-axis (the third axis is yaw) system and is attitude based. That's a giant step ahead of current rate-based, turn coordinator-driven S-TEC systems, which have limitations in turbulence and in totally analog interfaces.

There's also the expense of turn coordinator repairs and overhauls, not to mention having to keep a mechanical round gauge turn coordinator in the panel after modern glass upgrades.

Better is that the MEMS-equipped (microelectromechanical) 3100 doesn't require pitch and roll pickoff from an external attitude indicator because the sensor is self-contained, although

it can accept AHARS input for second-channel data crosscheck and comparison. Unlike the older flagship model 55X (it's still in the lineup), the 3100 has automatic electric pitch trim as standard, and is optional in the 55X. The only option for the 3100 is yaw control, which requires the installation of a yaw servo, for a total of four.

Speaking of servos, Genesys made a smart move when it designed the 3100 to work with existing healthy S-TEC servos. The bulk of the work in any autopilot installation is the servo installation and 3100 buyers with existing S-TEC systems will save.

The 3100 mounts in the radio stack and is slightly thinner than the 55X, but since it can drive the existing servos, it won't require a ground-up installation, although there will be some wiring changes. When the system is transplanted into other existing S-TEC interfaces (it can drive the servos used for any other S-TEC autopilot as long as the servos are up to current specs), the installation will be more complex and will require panel/radio stack work, plus wiring changes.

Genesys made it clear that the 3100 is designed for go-places IFR flying, as opposed to other systems intended for lighter duty. Moreover, it sees two markets for the system.

"One demographic is owners with existing S-TEC or other autopilot brands who want more of an IFR-capable flight profile—not just a wing leveler—and we've brought the price down to a point that's good for that kind of upgrade," said Jamie Luster, who is the sales director at Genesys. And that price (with a 55X trade-in) seems to hit the under-ten-grand

sweet spot, not counting the installation. Other buyers might use the 3100 to replace aging analog systems.

As for features, the 3100 has nearly all of the capabilities we would expect in a freshly designed system. There's envelope protection for inadvertent stalls, unusual attitudes, overspeeds and excessive bank angles. Allow the airspeed to deteriorate to the point of stalling while the autopilot is engaged and the 3100 will apply a pitch-down force, while audible and visual alerts tell you to get back in the game. There's also the expected LVL (straight and level) button, which overrides previously engaged autopilot inputs.

One feature we've grown to appreciate with Garmin's G1000-integrated GFC700 is indicated airspeed hold, and the 3100 has it, too. Set the power, set the trim and press the IAS button to hold the current indicated airspeed. There's also altitude preselect.

Genesys says the 3100 is designed with open architecture to integrate with legacy analog systems (older nav radios for VHF nav coupling), plus GPS navigators and EFIS displays from Garmin, Aspen and Avidyne.

Genesys is working on its first group of STC approvals and that includes the Cessna 210 Centurion, the Cessna 182 (all models), the Piper PA32-series Saratoga and Beech Bonanza series. "We're also going to put a strong focus on the Cessna 177 Cardinal because many of its owners have been vocal in wanting to upgrade their autopilots," Luster told us. Genesys expects the system to be available starting this spring.

Contact Genesys Aerosystems at [www.genesys-aerosystems.com](http://www.genesys-aerosystems.com) and at 817-215-7600 in Mineral Wells, Texas.



# LSA Float Rating: A Flight Review Excuse

*Under the sport pilot rule, seaplane training can net a single-engine sea class add-on or seaplane privileges for light sport airplanes.*

by Paul Bertorelli

**A**viation writers love to heap undiluted praise on the sheer fun of flying seaplanes. OK, I get it already. Float and boat flying is a ton of fun and you haven't lived until you've done it. The question is, how to do it without spending a fortune and what to do with it after you've got it.

A rating course I recently completed, to be blunt, sheds light on neither, but it did serve to illuminate a poorly understood fact about the sport pilot rule: It has a gap in it that allows an easier path to getting your sea legs without the commitment of lots of training and an FAA checkride.

Over a couple of days, you can buzz around the lakes and rivers and then at the end of that, decide whether

*In the Searey, getting used to landing with your knees near the waterline is an act of faith, below.*

you want a formal FAA single-engine sea rating or a light sport seaplane endorsement. I went for the latter, although the training is identical. I did the couple of days with Jones Brothers Air and Seaplane Adventures on Lake Dora at Tavares, Florida. I flew a Searey Elite rented from Progressive Aerodyne, one lake over.

## FLOAT OR BOAT?

When the push-pull Cessna 337 appeared in 1962, the old-school FAA thought it was sufficiently different to require its own limited rating, the centerline thrust multi-engine ticket. Oddly, it makes no such distinction between floatplanes and flying boats, although the two are quite different. Earn a rating in either, and you can fly the other.

It's best to think of a float rating as an extensive checkout. While the Airman Certification Standards for the

private pilot rating has a section on water and seaplane operations, there's no dedicated ACS. It's just a class add-on or, in the unique case of the sport pilot rule, an endorsement similar to the tailwheel or high-performance endorsement. But there's one odd twist.

Those endorsements don't require a checkride nor does the FAA issue a new certificate. You get a one-time logbook endorsement from an instructor and you're good to go. But when adding seaplane privileges, there's a bifurcation. If you want the class add-on—airplane, single-engine sea—you complete the training and take a checkride with a designated examiner. Both the training and ride can be done in a light sport floatplane or flying boat such as the Searey. A few weeks hence, you get a new plastic certificate that confers both the class rating and, by extension, seaplane privileges in light sport aircraft.

Alternatively, you can opt for sport pilot seaplane privileges, in which case you ride not with a DPE, but with another instructor who signs an endorsement. What's different about the endorsement, however, is that you do submit the standard FAA Form 8700-1 and, in a few weeks hence, you get a new plastic certificate. Since the training is the same, the primary difference between the SES and sport pilot add-on is the price of the checkride. This varies with operator, but at Jones Brothers, the sport pilot CFI proficiency check costs \$300, the FAA checkride as much as \$600, variable with examiner.

## PACKAGE DEAL

Like other companies plying the training biz, Jones Brothers offers tiered package deals on ratings with costs varying by aircraft type. A full package—aircraft rental, hotel right on the lake and lunch—costs \$2495 at Jones Brothers. For \$1295 (plus the checkride fee), you can do the rating in the company's Cessna 140 on floats. In the Searey, Jones charges \$1795 for the full program, plus the ride with the choice of SES or the sport pilot endorsement.

Jones' owner Rob Galloway advises customers to plan for three days of flying. "It can be done in two days, but we like to have people plan a third day in case there are weather issues," he says. And the weather is likely to be wind, which can stir up even





an inland lake like Dora with waves beyond the Searey's one-foot limit. A stiff breeze also complicates docking and ramping, as I would find out when trying to ramp the Searey with a strong quartering tailwind.

It's little exaggeration to say that seaplane training—at least amphibious seaplane training—rightly concentrates on not turning the airplane into a submarine. The training is necessarily obsessive about remembering to have the gear up for water landings and down for pavement landings. Galloway uses GIFFT as a mnemonic, for gear, instrument check, fuel, flaps and trim.

The principle skills are learning to read the water for wind direction, judging flyable sea conditions and the ever-challenging glassy water operations. The area around Lake Dora is appropriately called the Lake District and during my training with Galloway, we hopped from one to the next searching for and once actually finding glassy water.

Landing on glass is challenging because if the surface is truly glassy, it will reflect the color and shades of

a cloudy or blue sky so perfectly as to give the appearance of flying into a featureless, horizonless bowl.

With no visual reference for depth perception, the glassy water technique for both float and boat airplanes is to set the airplane up in the landing attitude and then find a power setting that allows it to settle at about 100 FPM. That part is easy. Developing the excruciating patience to await contact with the water isn't. It may take a mile or more to ease into a satisfactory touchdown.

We practiced the technique repeatedly over two days and five hours of flying. Ironically, when there's wind—and at times, we had a lot of wind—the technique is difficult to master because the stirred up water offers good depth perception and even a light breeze spoils that perfect descent rate, requiring deft but tense throttle work.

## WIND AND WATER

For landlubber pilots, seaplanes involve learning an intriguing combination of sailing and flying, for once on the water, a floatplane or flying boat's handling characteristics are disorientingly unfamiliar. Jones Brothers teaches in both types and although Galloway told me he doesn't see much difference between floatplanes and flying boats, my view is that a floatplane, especially a

*In an amphib, left, every lake is a runway. The Searey, lower photo, has electrically retractable gear that swings up next to the pilots' ears. It's hard to miss when it's down or up.*

big one, has more windage than a low-lying boat like the Searey. Floatplanes also have water rudders, which boats don't. Further, you can dock a high-wing floatplane at a pier or a float intended for the purpose, but an amphib boat will generally have to be ramped or moored, requiring skill more related to sailing than flying.

On our second training day, a weak cold front pushed through, stirring up a nearly 18-knot breeze and whitecaps on the lakes. Naturally, this was a quartering tailwind when ramping and I learned how difficult it is to keep the airplane aligned with the ramp in such conditions.

Like a taildragger, once it departs, it weathervanes off heading with a will and the hapless pilot who fails to catch it might snag a wing or float on the dock or ramp. Paddling in isn't always an option, although the well-prepared float pilot always has one at hand.

## WHY DO THIS?

Is there any point in adding this rating if you're not going to own a floatplane? That depends. Although Jones Brothers has a club arrangement to provide access to its aircraft, renting seaplanes otherwise is, for insurance reasons, a fantasy.

My rationale was more practical. I needed a flight review and since stoozing around in a 172 for one of those cost close to \$350 the last time I did it, adding a new rating offered more flying time and, ultimately, more proficiency. I'm not one to pretend that learning to fly a seaplane makes you a better pilot, it just makes you a seaplane pilot. And that makes it worth the bucks.

For more information, contact Jones Brothers at [www.jonesairandsea.com](http://www.jonesairandsea.com) and for more on seaplane ratings, see the March 2016 issue of *The Aviation Consumer*.



**You Tube** See a video of the float rating course at <http://tinyurl.com/j95ht2a>.

# Airtext Cabin Router: SMS, Voice, Textual WX

*The Iridium-based Airtext system reliably connects to multiple smartphones running a simple messaging app, while FBOlink communicates with ground crews.*

by Larry Anglisano

It's fair to say that reliable cellular coverage in the cabin is non-existent above a few thousand feet AGL. That's disappointing to passengers glued to their smartphones and tablets, and inconvenient for pilots who want to stay connected with the ground on long hauls. The only real option is connecting to a cabin satcomm system and the latest comes from Georgia-based Send Solutions Airtext, which has FAA approval for its new Iridium-based Airtext transceiver/router.

We evaluated the Garmin InReach Explorer portable communicator (May 2017 *Aviation Consumer*) and while we thought it was a good performer and offered decent utility, it won't connect multiple users. But

the Airtext, which is a permanently mounted transceiver/router, can connect up to 16 users, plus it has some advanced features that cater to flight crews and FBO staff. We've been using a demo system and prepared this field report.

## SIMPLE HARDWARE

The system is offered in two versions and you'll have to choose whether you want voice capability. The base Airtext model is \$9750 and is intended for SMS messaging, while the \$14,995 Airtext+ model adds voice functionality for phone calls. With it, simply connect your smartphone to Bluetooth-equipped headsets.

The Airtext system is two pieces includ-

## CHECKLIST



Sending and receiving is reliable and fast thanks to the Iridium network.



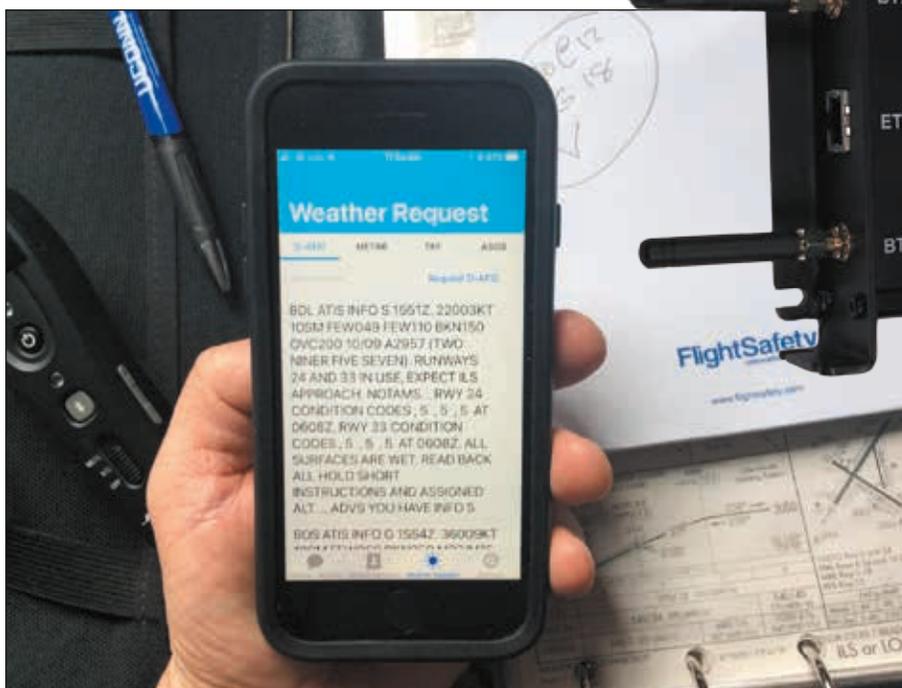
Airtext can accommodate more users than most GA aircraft have for seats.



But with a starting price of \$10,000, it might be limited to higher-end pistons and turbines.

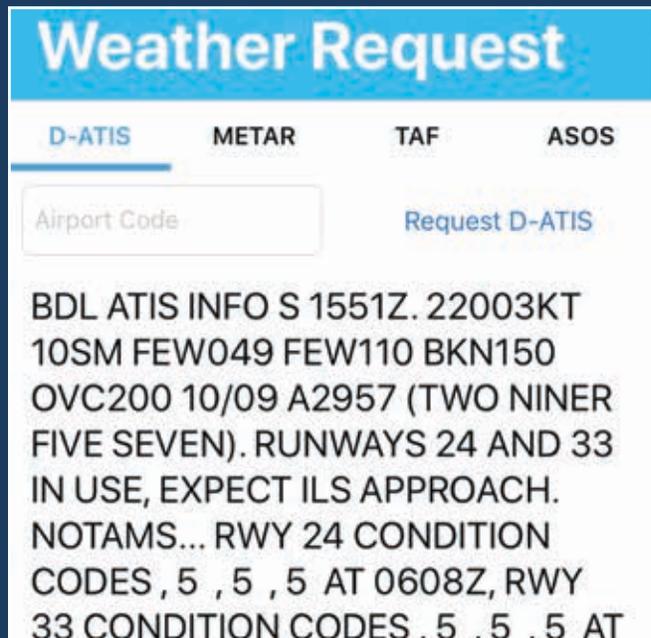
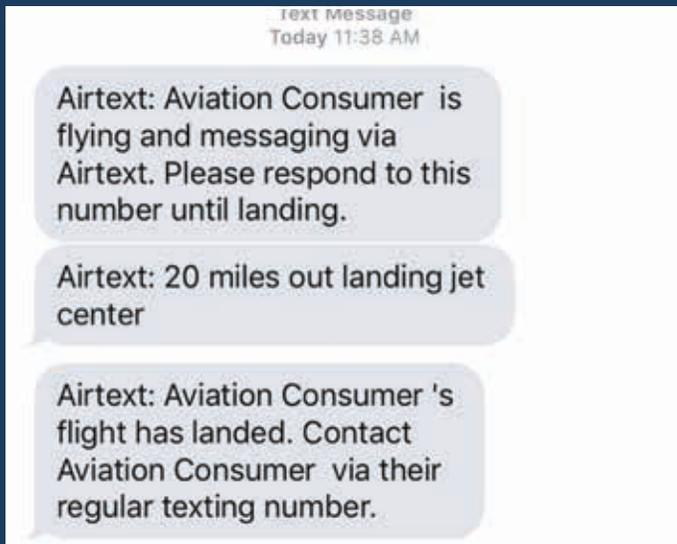
ing the remote-mounted transceiver/router and an external Iridium satellite antenna. We like the transceiver's compact footprint and flexible mounting. The one-pound device measures 7.5 by 4.6 by 1.4 inches and is installed in an avionics bay or inside of the interior. The installation manual says it has to stay inside the heated structure (and within the pressure vessel in pressurized aircraft), and since it has dual Bluetooth transceivers, best performance is had when it's as close to the passenger cabin as possible.

The Airtext router has dual Bluetooth antennas that screw into the unit and the company offers several antenna options depend-



*The Airtext satellite transceiver/router is small enough for flexible mounting options, but powerful enough for connecting up to 16 smart devices via low-power Bluetooth 2.0. That's the FBOlink companion messaging app on an Apple iPhone in the main image.*

## AIRTEXT FEATURE SET AT A GLANCE



Counterclockwise from upper right: No more struggle to receive the airport ATIS when inbound from a distance. The Airtext app's WX Request feature displays digital ATIS (D-ATIS) anywhere. Just enter the airport code. That's the digital ATIS for Bradley International in Connecticut. There's also real-time METARs, TAFs and ASOS text data. Your contacts on the ground will know when you're airborne and back on the ground, and are given your reply-to number when you're on the Iridium network. FBO ground crews know there's an airborne message waiting via the FBOlink app with an attention-getting LED message indicator.

ing on where the router is mounted and how much structure it needs to penetrate to work reliably. Dual Bluetooth antennas allow the router to serve more users simultaneously and offers failsafe. The Bluetooth (Class 2.0, which has a 33-foot unimpeded range) is low power to help conserve battery life of the connected device.

The router has an Ethernet port for future use, but no USB port. That's a good thing because all firmware updates and system configuration are accomplished wirelessly. That's a huge time- and cost-saver. An Iridium satellite antenna is required (and connects directly with the router) and there are several offered by third-party antenna manufacturers. Existing antennas left over from early-gen Iridium transceivers will work with the new Airtext.

For trip data display within the Airtext's app, the transceiver takes an

Arinc 429 position data input from a panel GPS (yes, Garmin GNS and GTN models are compatible).

We're impressed with the Airtext's build quality, interface connectors and installation hardware. It currently has an STC-AML (approved model list) for all King Airs and the Pilatus PC12, plus an STC for the Cessna Citation X. The company told us it's adding more aircraft approvals and previous installations have been approved via FAA field approvals and even with a logbook signoff.

### USING IT

Since the Airtext is designed to use an existing smartphone or tablet for messaging, you'll first download the free Airtext app. This serves as a messenger and you simply type, send and receive just as you do with the messaging utility on an iOS or Android device. There's not much

to it. We evaluated the system with an Apple iPhone 7. The app is smart enough to grab your existing contacts, so you won't have to add them all over again.

As long as the Bluetooth is turned on in your smart device it will automatically connect with the Airtext modem, which is confirmed with an onscreen beacon symbol. You can check the status of the Iridium datalink signal in the More menu at the bottom of the app.

To initiate a text message, click the text area at the bottom of the screen to enable the keyboard on the smart phone or tablet, type the text and then press the send button. A small check mark appears on the message to show that the data was acknowledged by the router. The message is generally sent to the ground-based recipient in a few seconds. In our trials, we found that sending and

receiving was fast and reliable.

Recipients receive a message that you are messaging them via Airtext and to respond using the airborne number shown at the top of the text. When you land, recipients are notified as such and are instructed to contact you via your regular texting number. Each system ships with a set of dedicated phone numbers.

### **FBOLINK, DIGITAL WEATHER**

Developed by Airtext, the companion FBOLink is a messaging program that provides flight crews direct real-time communications with FBO service reps. The beta service was launched with Las Vegas-based WilsonAir Center, which is using FBOLink at its Memphis and Chattanooga, Tennessee, locations, at Charlotte, North Carolina, and in Houston, Texas.

The idea behind FBOLink is to provide more convenient FBO call-aheads in flight regimes where workload is low, rather than waiting until the aircraft is within VHF radio range, where crew workload may be higher. When the crew sends an FBOLink message, it includes the preprogrammed aircraft's tail number, type and pilot/company name. The FBO is alerted of a new message with a computer pop-up and a flashing LED message light on the FBO counter. The light is programmed to change colors or flash at different rates after a predetermined time. The text dialogue can be shared until the aircraft has landed.

The Airtext+ model has recently been enhanced for high-speed data-link for sending and receiving images and documents. No, you can't download large files and there's no web browsing. While the Iridium bandwidth isn't yet where it needs to be, the company has been working to replace its aging satellite network with the Iridium Next, which promises to improve bandwidth performance.

The FBOLink app has the D-ATIS (digital ATIS) function for tex-

*We give the Airtext modem high marks for its rugged connector interface. There's a single 25-pin main connector and an input for the Iridium antenna, top. Those are the dual Bluetooth antennas and an Ethernet port for future use, bottom.*



tual display of the specified airport's ATIS. There's also textual display of METAR, ASOS and TAF data.

### **A BLOSSOMING MARKET**

So that we didn't have to permanently install the system, Airtext sent us a prefabricated wiring harness with a cigar lighter plug and portable antenna (which worked fine for reliable reception). An external antenna should work even better. Still, the Airtext's favorable performance got us thinking about a potential portable version of the system, and Airtext's principal David Grey suggested it isn't out of the question. He's exploring the system's utility in the marine market.

At a starting price just shy of \$10,000 (not counting installation and an antenna), we think the Airtext is a serious player for high-end pistons and turboprops. We think this market will see an increase in competition.

As we go to press, Gogo Business Aviation is launching the Iridium-based Avance L3 low-cost inflight connectivity system, with a starting price of \$40,000. Targeted at the lower-end turboprop market, it has text and talk service plans, plus it can be connected with the Gogo Biz data network that delivers 3G connectivity speeds.

Garmin's GSR56 Iridium transceiver starts at \$10,000 and works with



the GTN navigators and with the Flight Stream wireless system. We'll wring it out in a separate article.

Moving forward in a growing market, we think Send Solutions is the company to watch. It has advanced the Airtext system in a short amount of time and has tall plans for future enhancements and more features. PlaneSense, with its fleet of Pilatus aircraft, is the launch company for the Fleetlink, a flight tracking and dispatch program that uses the Airtext+ transceiver for automatic take-off and landing times, flight hour reports and other dispatch duties.

The data plan for the Airtext and Airtext+ is \$300 per year and the first 1000 text messages are free, while additional messages are 5 cents each. Voice calls on the Airtext+ are \$1.60 per minute with a prepaid Iridium sim card.

### **CONTACT**

Send Solutions (Airtext)  
678-208-3087  
www.airtext.aero

# Three-Blade Props: Good-Looking, Smooth

*When it's time to replace your two-bladed prop is it worth spending the extra bucks for a three-blade? We think the decision boils down to emotion.*

by Rick Durden

As the general aviation market slid downhill in the final 15 years of the last century, propeller manufacturers Hartzell ([www.hartzellprop.com](http://www.hartzellprop.com)) and McCauley ([www.mccauley.txtav.com](http://www.mccauley.txtav.com)) were faced with vanishing demand. Their response was to break away from their historic reliance on aircraft manufacturers and invent new products that would appeal to owners of existing airplanes via STCs.

Hartzell came out with its sharp

Top Prop line at about the same time McCauley developed its aggressive-looking Black Mac line of three- and four-blade propellers. Both began getting STCs for as many airplanes as their budgets allowed.

The timing proved fortuitous as ADs, notably on Hartzell propellers, caused many aircraft owners to be confronted with mandatory prop overhauls. According to propeller overhaul shops, the rejection rate on props flown under 100 hours

## CHECKLIST



Three-blade props have a lower vibration signature than two-blade units.



A three-blade prop may improve performance, but not by much.



A composite prop may make long-run economic sense.

per year ran in the 60 to 70 percent range, due to corrosion and repeated filing until the blades were under-size. Often, the only solution for the aircraft owner was a new fan.

McCauley and Hartzell reacted by pricing their new three-blade props at or below the price of the replacement two-blade that had been on the airplane when it rolled out of the factory. Combined with the pure visual appeal of a three-blade over a two-blade propeller, the pricing led to the sale of a lot of new three-blade props. Because an extra blade meant three-blade props were some 10 pounds heavier than the factory original, some owners also bought lightweight starters to compensate.

## RAMP APPEAL

Prop shops told us that the initial competitive marketing by Hartzell and McCauley also resulted in owners buying new three-blade props just because they looked cool—sometimes in connection with new paint and interior.

We were also told that when the shop did the prop install, it wasn't unusual for the technicians to observe that the old prop was frighteningly close to failure from long-term neglect. It's one of the few times we've observed selling good looks also sold safety.

There were good and not-so-good side effects reported by owners who replaced their two-blade props with the three-blade version. On the good side, vibration went down—noticeably. As the three-blade prop was usually shorter than the two-blade it replaced, there tended to be reduced

*A McCauley three-blade prop on a Cessna 206.*



*A Hartzell three-blade, scimitar Top Prop on a Cessna 206, above. Keeping with the more-is-better mode—a four-blade, composite MT prop on a Piper Malibu, below.*

prop erosion in service. In addition, most owners reported slightly reduced takeoff runs and improved rates of climb.

On the not-so-good side of the ledger, adding an extra blade didn't do anything to improve cruise speed. The extra weight forward meant slightly more tail-down force to compensate and slightly increased drag—as is expected when the center of gravity is moved forward. Few owners did before and after cruise speed analysis, so what we learned when we first looked at early three-blade prop upgrades was based on anecdotal information. Overall, for airplanes with engines putting out more than 200 to 230 HP, cruise speed was unaffected. For those with smaller engines, the airplanes appeared to lose from one to three knots in cruise.

By the time the millennium rolled over, the prop manufacturers had ended their aggressive pricing for three-blade props but had also started to develop scimitar-shaped blades with more complex airfoils that got rid of the reported cruise speed loss and, in some cases, improved cruise speeds.

Over the next few years MT Propeller ([www.mt-propellerusa.com](http://www.mt-propellerusa.com)), long maker of lightweight composite props for aerobatic airplanes, branched out into the non-aerobatic piston airplane world in a big way.

MT also went the route of adding a blade to its props—if the OEM hung a two-blade up front, MT built a three-blade version for the airplane (or even four). As MT composite props have no life limit and are field repairable, they have proven attractive those owners looking to step up from their two-blade prop. Not to be left behind, Hartzell also developed a line of lightweight composite props.

## **MATURE MARKET**

We consider the prop upgrade mar-



ket to have matured now that the manufacturers are generally not pricing three-blade at a level below two-blade. While MT Propeller USA's Peter Marshall told us that MT continues to see solid demand for its aftermarket props, we noted that a number of three-blade props that we'd seen offered in the past are gone from McCauley's website. Accordingly, given that the "new" has worn off the market, what are the benefits, if any, of switching to a three-blade prop?

The answer isn't simple, so we'll approach it from several directions and we'll say up front that the bottom line is probably going to be emotion—rather than cold, hard economics.

Moving to a three-blade composite prop means a weight savings of from 5 to 20 pounds over an aluminum three-blade prop—and a slight weight savings over the weight of an aluminum two-blade prop. Composites allow more subtle and precise shaping of the blade, which often means better performance—although propeller engineers pretty much knew what they were doing by the 1940s, so any performance increase is generally subtle and



measured in the single digits when it comes to percentage improvement.

From an efficiency standpoint, the fewer the blades and the lower the RPM, the better. Piston general aviation airplanes have relatively low horsepower engines, so it doesn't take a lot of blades to absorb it and convert it to thrust. Although a single-blade prop is the theoretical max performer, we don't think there's been one on a production airplane since well before World War II. By and large, two-blade props proved to be the best compromise between efficiency, thrust, weight and avoiding cavitation—where one blade advances into the turbulence generated by the previous blade during rotation.

Once three-blade props became

SELECT NEW PROPELLER PRICES			
AIRCRAFT	McCAULEY	HARTZELL	MT PROPELLER
CESSNA 177B	\$9300—ALUMINUM, TWO-BLADE PROP \$11,100 WITH SPINNER	\$10,800—ALUMINUM, TWO-BLADE PROP AND SPINNER \$11,925—ALUMINUM, THREE-BLADE SCIMITAR PROP AND SPINNER	\$13,950—COMPOSITE, THREE-BLADE PROP AND SPINNER
CESSNA 182F	\$9000—ALUMINUM, TWO-BLADE PROP	\$9600—ALUMINUM, TWO-BLADE PROP \$12,588—78-INCH, ALUMINUM, THREE-BLADE SCIMITAR PROP AND SPINNER \$12,588—82-INCH, ALUMINUM, THREE-BLADE SCIMITAR PROP AND SPINNER	\$12,450—COMPOSITE, TWO-BLADE PROP AND SPINNER \$13,950—COMPOSITE, THREE-BLADE PROP AND SPINNER
MOONEY M20K	\$9300—ALUMINUM, TWO-BLADE PROP	\$14,567—ALUMINUM, TWO-BLADE PROP \$12,827—ALUMINUM, THREE-BLADE PROP AND SPINNER	\$12,500—COMPOSITE, THREE-BLADE PROP AND SPINNER
BEECHCRAFT B55 BARON	\$32,200—TWO, ALUMINUM, THREE-BLADE PROPS AND SPINNERS	\$24,949—TWO, ALUMINUM, TWO-BLADE PROPS AND SPINNERS \$28,828—TWO, ALUMINUM, THREE-BLADE PROPS AND SPINNERS \$29,600—TWO, ALUMINUM, THREE-BLADE SCIMITAR PROPS AND SPINNERS	\$35,300—TWO, COMPOSITE, FOUR-BLADE PROPS AND SPINNERS

available for airplanes originally equipped with two-blade versions, owners bought them simply because they looked so good. They happily opened their wallets to buy a sexy prop. Initially they didn't care what they weighed or did to the airplane's performance.

For all props, tip shape is an important variable. Square tips gave way to elliptical tips for reduced drag. As interest in three-blade props for modest engines increased, more R&D went into addressing the cruise speed problem. That led directly to the development of the scimitar blade, which, along with a blended airfoil, has proven to give the best thrust and least drag—and, in some cases, bumped up cruise speeds.

## OPTIONS

We use \$3000 as a rule of thumb price for overhauling a constant-speed, aluminum prop. The price goes up from there, especially if the airplane is not flown regularly. Prop shops told us that if it's been a long time since the prop has been in the shop, there's a good chance there will be enough corrosion in the hub to require replacement of internal components.

We were also told that aluminum prop blades generally will make it through three or four overhauls unless the prop is operated regularly on gravel. If a blade needs to be replaced

plan on a minimum of \$1600 for a used, serviceable blade and \$3500 for new.

Composite blades can last indefinitely as they are never filed down as are aluminum blades. Where a nick in an aluminum blade means filing and changing the size and airfoil of the blade, the same damage to a composite blade is fixed by removing the glass, inspecting the area and rebuilding it to the original dimensions.

The economics of the replacement decision for a two-blade prop are such that if there are problems at overhaul time, the price of repairs and/or blade replacement can rapidly add up to the price of a new prop.

When we compared prices of replacement props for four popular airplanes we were interested to note that for less than 50 percent more than a new two-blade prop, you can have your choice of aluminum or composite three-blade props—and in one case, the three-blade prop was cheaper than a two-blade unit.

## CONCLUSION

As with most aircraft upgrades, spending the extra bucks for a three- or four-blade prop will not increase the resale value of your airplane by a like amount. If you are going to sell the airplane in the next few years upgrading the prop probably doesn't make sense. However, if you are

going to keep the airplane and have been regularly upgrading various systems and components, we think considering upgrading to more blades up front may be the right thing for you. We cannot predict what parts aren't going to break because of the reduced vibration, but our experience is that the increased smoothness is noticeable.

We can't put a number of the value of appearance, but we note that most pilots like the way airplanes look when they have more propeller blades. After all, we're willing to pay a premium for an attractive paint job, why not for a cool-looking prop?

We also like the weight savings that comes with composites and the performance increase that comes with their being able to hold a more precise airfoil. For someone intending to fly regularly and keep an airplane for several years, the longevity of composite blades may make them cheaper to maintain than aluminum.

Finally, we think that the cruise speed losses noted with some early three-blade props have been erased with the scimitar and composite fans.

We think the prop upgrade decision boils down to emotion. And that's OK. That's what got a lot of us into airplanes to start with—they are way cool. So making them even cooler may be worth the price of admission.

# The FAA 709 Checkride: Protecting Yourself

*Don't Panic. If the FAA demands that you take a 709 re-examination checkride, some flying and evaluation time with a CFI should pay big dividends.*

by Rick Durden

Somehow we don't think *She's real fine, my 709* will ever be the intro lyrics for a hit rock song. Even though the improbable idea of a big-block Chevy engine as a Beach Boys' muse proved wildly popular, we suspect the concept that someone would pen an ode to what is probably the FAA's least-liked and most misunderstood checkride is probably too far out there.

What is colloquially referred to as the "709 checkride" is technically a re-examination of a pilot's certificate by the FAA because the pilot was involved in an incident or accident that triggered some question about her or his competence or ability to meet the qualifications of the certificates and/or ratings held. It's triggered by a federal statute, 49 U.S.C. 44709(a). It states that the FAA may "at any time ... re-examine an airman holding a certificate ..." That's pretty broad.

The FAA interpreted the statute in its massive Order 8900.1 *Flight Standards Information Management System* and established limits on the discretion given to it by Congress. Put simply, the FAA's questioning of a pilot's competence has to have some reasonable basis in the facts and circumstances of the incident. It has to be more than suspicion. Ground-looping and damaging the aircraft or forgetting the gear on landing are considered sufficient justification for requiring a 709-re-examination ride.

Our research and experience over the years with cases challenging 709 rides have led us to the conclusion that a pilot is not going to get far by refusing to take a 709 ride on the basis that the FAA did not have a reasonable basis for demanding it.

## THE PROCEDURE

When the FAA decides that a pilot

should be re-examined, it sends a certified-mail letter informing her of the fact and demands that she take a checkride with an FAA inspector within 15 days. The law gives the FAA the power to enforce the requirement, so blowing off the letter will, almost assuredly, result in a revocation of the pilot's certificate and ratings—all of them.

According to pilots and FAA inspectors we spoke with (none of whom would allow their names to be used for the record), so long as the pilot gets in touch with the FAA within a few days of receiving the letter, the FAA will give the pilot more than 15 days to schedule and take the checkride.

If a pilot is unwilling to take a 709 checkride, his sole option is to surrender his certificate. By regulation—FAR Part 61.27—the surrender of a certificate must be in writing and contain the specific language set out in the regulation. We recommend that any pilot considering surrendering his certificate consult with an aviation attorney before doing so.

The areas to be re-examined on the 709 must relate to the underlying incident. In our experience most involve landing incidents—so the 709 ride involves takeoffs and landings. The standard to which the pilot is held is the currently published Airman Certification Standards for the certificates the pilot holds (or Practical Test Standards if there is no appropriate ACS). If the FAA demands demonstration of tasks not reasonably related to the underlying incident, it's grounds for objecting to that portion of the 709 ride.

Once the checkride is complete and the pilot passes, the inspector issues a letter of results and wishes the pilot a happy aeronautical life.

## FAILING THE RIDE

If the pilot does not pass, the inspector sits down with the pilot and details the specific areas where the pilot didn't meet the standards of performance. If the inspector believes the

*Following an incident that causes the FAA to question the pilot's competence, it can require that the pilot undergo a re-examination checkride.*



*Two actions we recommend prior to taking a 709 re-examination checkride: some dual instruction, above, and hitting the books on regs and procedures, below.*

pilot can meet the standards after some dual instruction, she will, almost always, allow the pilot to take another checkride within 30 days. FAA inspectors we spoke with said that they always make sure that the new checkride is with a different inspector because they do not want to be accused of having it in for the pilot.

If the inspector does not feel additional instruction will help or if the pilot fails a second time, the FAA initiates action to revoke the pilot's certificates and ratings. There are procedures for the pilot to fight the revocation. Our observation is that that effort is almost invariably futile.

## THE REAL WORLD

Every FAA inspector we spoke with said that almost every pilot they flew with came in to the checkride terrified about the ride and embarrassed about the underlying incident. They said that they did their best to make the pilot feel at ease. Every pilot we spoke with expressed how appreciative he was that the FAA inspector was polite and empathetic about the pilot's situation.

We were told by the FAA inspectors we spoke with that 95 percent of the time the pilot could meet the appropriate performance (and knowledge) standards and passed the 709 ride on the first try. They said that the other 5 percent demonstrated that they not only could not meet the performance standards—it was by a fairly wide margin. Most of those pilots realized it during the course of the ride and admitted they had lost a step—usually because of age—and it was time to stop flying. Those pilots surrendered their certificates, although with significant sadness.

The FAA inspectors we spoke with said that the "bad" situations were the pilots who clearly could not meet objective performance standards and also did not have the ability to self-evaluate or had some issue that caused them to believe that the FAA was out to get them. They told us



that they always arranged for another checkride with a different examiner. In every instance, the pilot failed the second checkride, sometimes spectacularly. Even then, the pilot refused to admit she couldn't meet performance standards, coming up with excuses and blaming everyone but herself. The second failure and refusal to accept it led to revocation actions against the pilots—all of whom lost. A few of those pilots sued the FAA for not giving them a fair checkride. All lost.

## REAL WORLD 709

For nearly two years, the FAA has had its "Compliance Philosophy" in effect. Put simply, the FAA's position is that a pilot who inadvertently violates a regulation and draws the attention of the FAA is more likely to follow the regulations in the future if he receives counseling from the FAA rather than getting smacked with a certificate action and suspension.

Accordingly, the number of violation actions filed against pilots operating under Part 91 has fallen through the floor into the fourth subbasement. However, when a pilot inadvertently violates a reg or damages an airplane, the counseling he receives from the FAA may include a demand that he take a 709 ride. In our conversations with FAA inspectors we got no indication that the frequency for the number of 709



rides was up as a result of the FAA's Compliance Philosophy.

From what we can tell the chances of a pilot being required to take a 709 ride after an oops haven't changed.

That being the case, if the fickle finger of FAA fortune points at you and demands that you take a 709 ride, what do you do?

- First, take a deep breath. The odds are that your recent episode triggered a fairly mechanical decision-making process leading to the 709-ride demand—the FAA isn't out to get you. There is not a nefarious plot to keep you from flying.

- Second, call an aviation attorney and discuss the situation. We've long recommended joining AOPA's Legal Services Plan as it is inexpensive insurance for aviation legal issues. Even if you are not a member, calling them up can get you the names of some aviation attorneys in your area who can assist you. The idea is to



*An incident that causes significant aircraft damage may be enough to trigger a 709 checkride, above. Once you land after passing the checkride, the FAA considers the matter closed.*

make sure you understand the law, what you are facing and your options.

- Third, it's likely that your next call should be to the inspector who sent you the letter. We recommend in the strongest terms that you arrange to take some dual before going for your 709 ride, so tell the instructor you are planning to do so. The inspector should allow you a reasonable period of time to get that done and schedule your ride accordingly. Before you terminate the call, make sure you understand the flight operations on which you will be examined so that you can tailor your dual.

- Fourth, schedule and fly at least twice with an instructor. Fly as many times as the instructor feels is necessary to get you up to speed to meet the ACS requirements on the flight operations you're going to have to demonstrate. Get a blunt evaluation of your skills and judgment from the instructor. There's no signoff for a 709 ride. However, if the instructor feels that you can't pass it, make sure

you know why. If you get into such a situation, a session with another instructor for another perspective is probably wise. We recommend that you keep your aviation attorney in the loop with your instructor so that you can make an informed decision as to whether to go forward with the 709 ride—or potentially surrender your certificate.

- Fifth, assuming your instructor and you are confident you can pass the 709 ride, go fly with the FAA.

We understand that it will be a high-anxiety event. That being the case, there are two things to keep in mind: First, the fact that you took dual will be a strong positive in the inspector's mind (we got that from every inspector) and second, your odds of passing are in the 95 percent range.

### IT'S OVER

Some pilots told us that, oddly, they enjoyed the checkride because it was low key and the inspector shared some information that turned the session into a good learning experience.

While we are not claiming that a 709 ride is happiness and light, it should be far less intimidating than your private pilot checkride. We think that the overall experience will be that you'll learn that your skills have degraded a bit—which resulted in the incident that started the whole thing—and that you should remain cognizant of the risks of skill deterioration. We also think that the com-

bination of the dual you seek out and the give and take you have with the inspector will result in flaking a lot of the rust off of those skills. In our conversations with FAA inspectors all said that they couldn't recall a single pilot who passed a 709 ride and later messed up again enough to come to their attention.

Finally, if you do fail a 709 ride, take it as a red flag that you've lost a step or two and it may be time to hang up the scarf and goggles. Talk frankly with the inspector—and schedule another ride. Then talk with your instructor, your aviation attorney and your family and do your best to stay objective. You may have just had a bad day and you'll pass the next time you go fly with the FAA.

However, in our experience, the odds are that failing a 709 ride means that you've kept flying a little too long. It may be that the FAA has caught things before you hurt yourself or, worse, someone else. If you fail a second 709 ride and are convinced that it was someone else's fault and/or the FAA was out to get you, we probably aren't going to be able to convince you that maybe the problem lies with you. We recommend an article in our sister publication on an attorney's perspective on when it's time to stop flying at <https://tinyurl.com/ycqzjn7e>. It's a tough decision, but all of us will have to face it.

### CONCLUSION

Getting a letter demanding that you take a 709 re-examination ride ranks high on the unpleasant aviation experiences scale. However, if you approach the situation professionally and outline a strategy for preparing for the ride—including taking some dual—the odds are that you'll do fine.

*My dual-quad, posi-traction, FAA-mandated 709. Hmmm, a little problem with scansion, but hit songs have evolved from worse ...*



# MiraCheck Copilot: A Checklist That Listens

*Our search for the ultimate speak/listen electronic checklist finally turned up a winner with the MiraCheck Copilot app for smartphones and tablets.*

by Frank Bowlin

In the market survey article on electronic checklists (August 2016 *Aviation Consumer*) I concluded that the checklist utilities in panel-mounted avionics and most EFBs were no better—possibly worse—than paper checklists in terms of effort to use them. Sure, a few of the dedicated checklist apps for tablets and smartphones were better than paper, but none were as good as the challenge/response checklist method I was accustomed to in my airline flying job.

## COCKPIT APPS

As promised, I continued to watch the market for a follow-up report and ultimately began using the MiraCheck Copilot. While it's still maturing (rapidly), I think it's the best the market has to offer. Here's an overview.

## JUST WHAT I WANTED

Like many GA pilots, I diligently used checklists on the ground, but even in the mighty Cessna 150 I used in training, in the air things seemed to get too busy. I always figured there had to be a better way.

When I joined an airline I discovered the challenge/response method was precisely the better way. The pilot flying would call for a checklist, "After takeoff check," and the pilot monitoring would state the title and read each item, waiting after each for the proper status from the pilot flying: "Landing gear?" "Up." "Flaps?" "Up." "Power?" "Set" and so on.

In this way, the pilot got a thorough checklist without having to divert attention. He didn't have to grab the card, find the right place, then keep his place as he read each item. Instead, it only took a tiny bit of mindshare to confirm and verbally answer the challenge from the other pilot.

Jeff Bonasso at MiraCheck read the *Aviation Consumer* checklist article and turns out he was a disciplined programmer who was also a seasoned pilot who was writing a checklist app. Bonasso asked if I would be interested in consulting with him on the program's design and testing. Figuring it was another kludgy tablet app, I ignored him, but he persisted and ultimately impressed me. In full

disclosure, I have an interest in the success of this app for reasons of my participation, but I have absolutely no financial involvement.

Initially, the MiraCheck Copilot could speak checklist items, but it couldn't accept an answer verbally. My bottom line was that an app had to be verbally interactive, so he went to work. A few days later, Mira could hear me say, "check." We then had a discussion on "check" versus status (see the sidebar on page 22.) I wanted Mira to actually respond to a status, not just the word "check," and a few days later she had that option.

Since MiraCheck was being designed to work the way I thought it should, I liked it enough to write a follow-on article, this one appearing in the December 2017 issue of sister publication *IFR Magazine*. In the few months since, and without my further participation, Bonasso took MiraCheck far beyond what I envisioned.

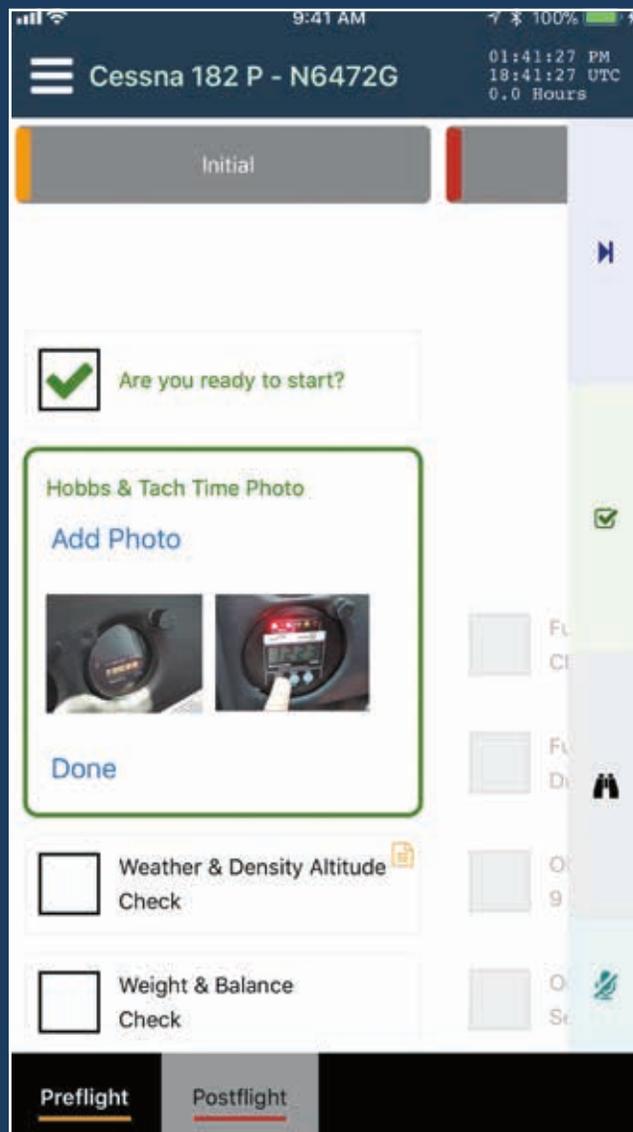
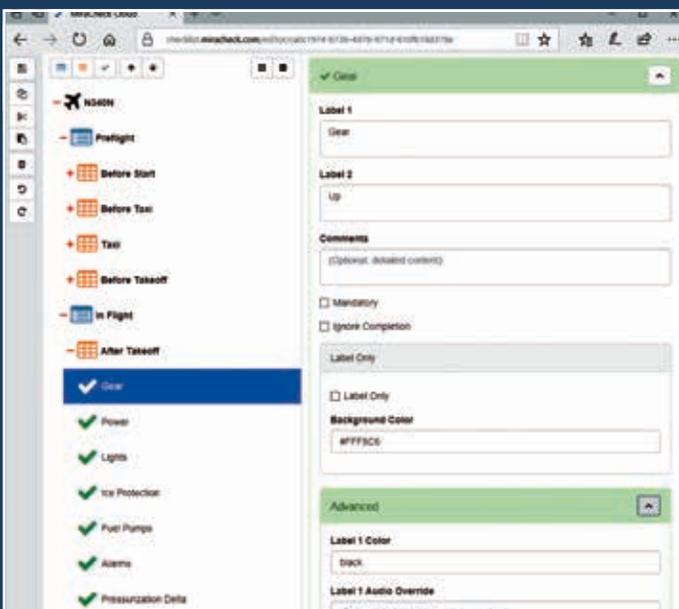
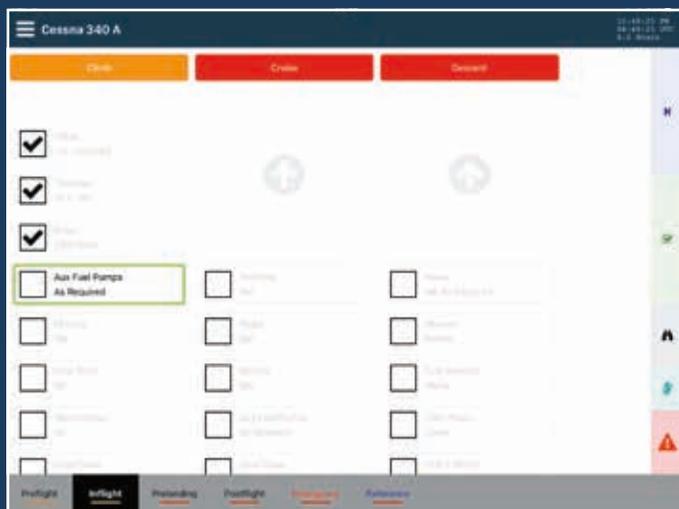
## THE BASICS

MiraCheck Copilot runs on iPads, iPhones and works with an Apple Watch, plus a somewhat less capable version works is available for Android. You get basic functionality for free on one device, including a brief trial of the Pro version. You can buy the Standard version for \$29.99 to get a few more features and support for three devices. The full Pro version is what I evaluated. It adds verbal interaction, web history and a more useful features. Pro costs your choice of \$4.99 per month, \$49.99 a year or \$129.99 for life.

MiraCheck can function stand-alone, but working online, it's easier to create and maintain your checklists. The web interface also stores all your activity so you can review any flight. Of course, once you go flying, you can't reach the website without an internet connection. You can create a checklist from scratch, import one from Excel, use one provided by the user community (vet that carefully), import a full POH from one of dozens of aircraft or you can use one of CheckMate's commercial offerings.

A single checklist can be thought of as everything you need for a particular aircraft. You'll divide each into lists for phase of flight: preflight, inflight, postflight, etc. Each list contains sections. For example, your inflight list might contain sections for takeoff,

# MIRACHECK AT A GLANCE



Clockwise from upper left: The default screen layout puts phases of flight across the bottom. Select one and the sections are at the top with the current one displayed on the left. Individual items are on the left, so scroll to keep the current one in the middle. Your input to an item can even be to upload a photo to reference later from the online history. You can create/edit checklists in the app, but you might find the web tools easier.

climb, cruise, etc. Then, each section contains the individual items—the task you’ll perform or the setting you want to confirm.

By default, each list (phase of flight) remains visible in a sequential ribbon across the bottom. The sections in the current list scroll across the top with the active section left-most. Completed sections are off screen to the left.

Items in the active section scroll vertically on the left side to keep the current item in the middle. This way, you can keep your left thumb poised in one position and never move it as you work through a menu. Similarly, there’s an acknowledge button on the

right side that you can repeatedly hit with your right thumb.

Or, you could turn just about the whole screen into one big acknowledge button that you could find and hit even when bouncing in severe turbulence. Many other configuration options illustrate the thought and usability that’s in this program.

If your device is running iOS 10 or newer (the last couple years), Mira-Check Copilot will multitask so you can use it alongside your favorite EFB app—a big convenience.

## CHATting WITH MIRA

Mira can read to you and you can

touch the screen to acknowledge.

Or, you can configure Mira so that she talks and you answer (configurable to listen for “Check” or the desired status). She then moves to the next item. As each section in each phase of flight is complete, Mira goes on to the next in sequence.

She’ll allow you to skip items. But, when you do, Mira can be configured not to let you leave a section until you’ve completed the skipped items. Even so, if you try to leave twice, she’ll let you.

Of course, to converse with Mira, you’ve got to be suitably connected. You can use a wired connection be-

## DO LIST VS CHECKLIST

General aviation primarily uses “Do” lists, popularly called checklists. Let’s differentiate. Think of a do list as a sequential list of instructions of individual tasks to perform.

A true checklist in this context, on the other hand, is designed as a sequential set of verifications that steps have been performed, systems are in the desired state, etc. A checklist should make no attempt to instruct the pilot on what to do, but instead helps the pilot confirm that it’s been done. A checklist would never contain a V-speed, for instance, while the instructive nature of do lists will commonly tell the pilot to rotate at the specified speed.

In the classic “Do” list format, an item is mentioned, then its state is given. Munging the concepts of a do list and a checklist, the do list is commonly used as a checklist. This has given rise to “Check” as the response to each item and state: “Landing Gear—Down, three green—Check.”

This kind of a do/checklist is useful for student pilots and infrequent or casual pilots. It begins to get cumbersome with serious, active pilots. For those who typically follow

a flow, a pure checklist is sufficient. In a pure checklist, it’s probably sufficient to merely mention the item or the task and have the response be “Check” because the mere mention of the item or task prompts the

experienced pilot to verify the correct state. However, retaining a bit of the ancestral “do” list ideas, the professional pilot’s checklist most commonly today consists of an item—a system, switch or task—that is thought of as the challenge, and the desired state is the response. Thus, “Landing Gear—Down, three green—Check” becomes “Landing Gear—Down, three green.” Of course, using a challenge-response format can initially feel unnatural with only one pilot. You’ll get over it.

What you use is up to you; it’s a personal choice. If you’re comfortable with one way of doing things and you’re successful, you might keep doing it. However, if you find the basic item-state-“Check” do/checklist format is becoming unwieldy for you, experiment with the challenge-response checklist more commonly used by professional crews. You’ll probably like it.



tween your iDevice and your aviation headset. More likely, you’ll use Bluetooth. In both cases you’ll use the music input on your headset; be sure to disable any muting of that input during other audio. Best results are obtained by connecting a top-quality aviation headset directly to your iDevice (not through an audio panel, even with Bluetooth). MiraCheck uses the speech recognition service provided by your device—which has gotten good but isn’t perfect.

You can jump around using touch or voice. Say, “Mira, Engine Failure,” for example, and she’ll read your engine-failure section. In this way you could toss your iPad in the back seat and use MiraCheck hands off.

### QUITE VERSATILE

Each list, section and item has a variety of controls when you build your checklist. By default Mira will read the text for the name. So, when my Cessna 340 checklist starts, she’ll awkwardly say, “Cessna three hundred forty.” You can specify alternate text to be read. So I specified the text to be read and she now says, “Cessna three forty.” While this example uses the checklist name, the same ability exists for lists, sections and items.

When something is displayed,

you have the choice of font color, icon color, background color and border color. This way, you can color-code your checklist, like red for emergencies.

Each item can be normal fixed text, which is the most common and what we’re used to. But you can also specify an input, either free-form or selected from a variety of formatted pick lists: yes/no, date, time, address, etc. So, for example, in your preflight section you might want an item where you record the Hobbs time. The response could be as simple as “Check,” the default, or it could be a response you specified, like “Recorded.” Or, it could be a blank on the screen where you type in the Hobbs time. (Remember, the full history of your use is on the website.) You can even configure it so you can upload a photo of the Hobbs meter that you take with your device right then.

In more sophisticated aircraft, there’s often a large set of emergency do lists. Often those do lists will branch off in one direction or another, based on the circumstances at that moment.

Take the example of a Citation’s emergency checklist for smoke in the cabin. Different actions might be taken based on whether smoke is from a known or unknown source, or if your actions are decreasing the smoke or having no effect. So, the item gives

you a choice and takes you to the next portion of the list based on your answer.

Another useful capability is that a “section” can actually be a form you’ll fill out. You might design a form to allow you to enter the ATIS, a PIREP, a clearance (CRAFT) or anything else you might want. Similarly, you can use an item to display a specific bit of information. For example, during your Before Takeoff List, you might want to review your speeds. The item looks like a normal “Check” item, but when you touch it, you get a table of speeds to review.

I’m giving you only a brief glimpse into what MiraCheck Copilot can do. The biggest drawback I’ve found is that the app’s flexibility, power and, yes, complexity are barriers to entry. I initially avoided using MiraCheck for fear of going down a rathole of learning and configuration.

But, once I got my basic checklist in there and saw how easily and well it worked—even skipping the fancy features—I was hooked. So, don’t let Mira’s capability keep you from giving her a try and benefiting, even from the basic assistance she can provide.

*Contributor Frank Bowlin is the editor of sister publication IFR Magazine.*

# Flight Tote Update: We Can't Break 'Em

*We sentenced three top-pick compact flight totes to a year of hard duty. MyGoFlight, Sporty's and Flight Outfitters impress with durability and usability.*

by Larry Anglisano

**W**hen I rounded up over a half dozen compact flight totes for a shootout in the January 2017 *Aviation Consumer*, the Sporty's iPad Bag and MyGoFlight PLC Sport Bag were easy winners. They were just the right size for housing the stuff I typically take flying—mainly action cams and accessories, a Bose headset and an iPad Mini. Plus they have enough compartments for stuffing in other small items like chargers, snacks, wallet, keys and glasses.

The real test was to see how the bags hold up after hard use and abuse so I planned this follow-up. I wasn't gentle. As it happens almost every time I head to the airfield, the flight tote is stuffed to the max almost to the point of not being able to close the zipper. While I fully expected to break at least one of the three I use the most, I'm happy to report all are

holding up surprisingly well.

As I expected it would, the \$69.95 Sporty's HP iPad bag became the permanent storage tote for all of my action cam gear. This includes a GoPro, two Garmin Virbs, a set of USB chargers and cables for each, plus a stabilizer, a few mounts and a compact tripod. The Sporty's HP ultimately became my full-time headset storage bag because I continue to like the built-in headset hangar that keeps my Bose A20 from getting crushed when I overstuff the main compartment. The padded tablet pocket is just the right size for the iPad Mini with a case. Sporty's included the custom embroidery option on my demo and it's held up perfectly.

These compact totes are small enough that I'll often carry two of them, which includes the \$139.99 MyGoFlight PLC sport. It proved to



*The Flight Outfitters Folio (top photo) turned out to be a new favorite for storing tablets and manuals. The others below are better suited for headsets and action camera gear.*

be incredibly durable after it took a hard hit with a rolling nosewheel one night. I'll often stuff a change of clothes and some toiletries in it, which puts considerable stress on the zippers, but they haven't broken yet. It measures 14 inches high by 13 inches wide and 6 inches deep. I wish it had a pocket for storing a water bottle.

One bag I initially dissed because I don't care for sling pack designs is the Flight Outfitters \$79.95 Thrust bag, but it turned out to be an excellent day-trip bag. It does accommodate a water bottle and is deep enough for stuffing in a sweatshirt, has a sunglasses pocket that's easily accessible, plus the mesh organizers are good for housing cables and other small stuff.

Flight Outfitters recently sent me the \$139.95 Bush Pilot Folio. It measures 18 inches high by 11 inches wide and 6 inches deep and has two leather-strapped organizer pockets. It also has a rear strap for attaching to a roll- aboard. What's cool about the Folio is you can take it into a business meeting and not feel like Joe Pilot—good if you use your airplane for work travel. It also makes for a capable logbook storage bag.

But what I like best about Flight Outfitters is its obsession with getting its new products in the hands of aviation pros for real-world feedback. Any time the company releases a new product, it's on my doorstep in short order for evaluation. That makes my job easier, plus the quality makes it easier yet to recommend most of its products. Contact them at [www.flight-outfitters.com](http://www.flight-outfitters.com) and at 513-688-7300.



# Aviat Husky

*It's powerful, rugged and big-time fun to fly. But managing all of its performance means bringing your A-game.*



**W**hile doing the research for this month's Used Aircraft Guide, we noticed a trend we've seen before: There are plenty of low-time and late-model Aviat Huskies on the market and there might be an underlying reason.

As capable and well built as the Husky is, we've seen plenty of owners (many who were new to tailwheels) unload beautiful, hardly used ones simply because the airplane had, dare we say, too much performance. Yes, groundloops will scare the hell out of you. But in the hands of the well-trained qualified pilot who respects it and their own skills, a Husky does a whole lot pretty darned well. It's all about the built-in utility.

Backwoods utility airplanes are optimized to use short, unimproved fields without drama or damage, carry lots of stuff, require little maintenance and be field-repairable. A Husky fits that description, but it certainly isn't alone.

Over the years, types like Piper's Super Cub, the Maule series and the American Champion Scout have come to exemplify a utility, niche airplane. All three were originally designed decades ago and have changed little since, fully depreciating their design

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***For most of its life, the Husky has been on a constant improvement program.***

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and engineering costs.

Into this niche came the Aviat (formerly Christen) Husky, unapologetically designed with the Super Cub firmly in mind. The result is a Part 23-certificated, well-built and good-performing airplane successfully competing against its forebears. In fact, its success is all the more remarkable since it was designed and certificated in the 1980s, something of a dark age for new general aviation designs.

Utility airplanes, of course, are

put to many different uses, including romantic bush flying, plus more mundane pursuits like pipeline patrol, law enforcement, ranching and even training. By all accounts, the Aviat Husky tackles all these challenges with equal aplomb, making it worth consideration by anyone looking into buying a durable utility airplane.

## **HISTORY**

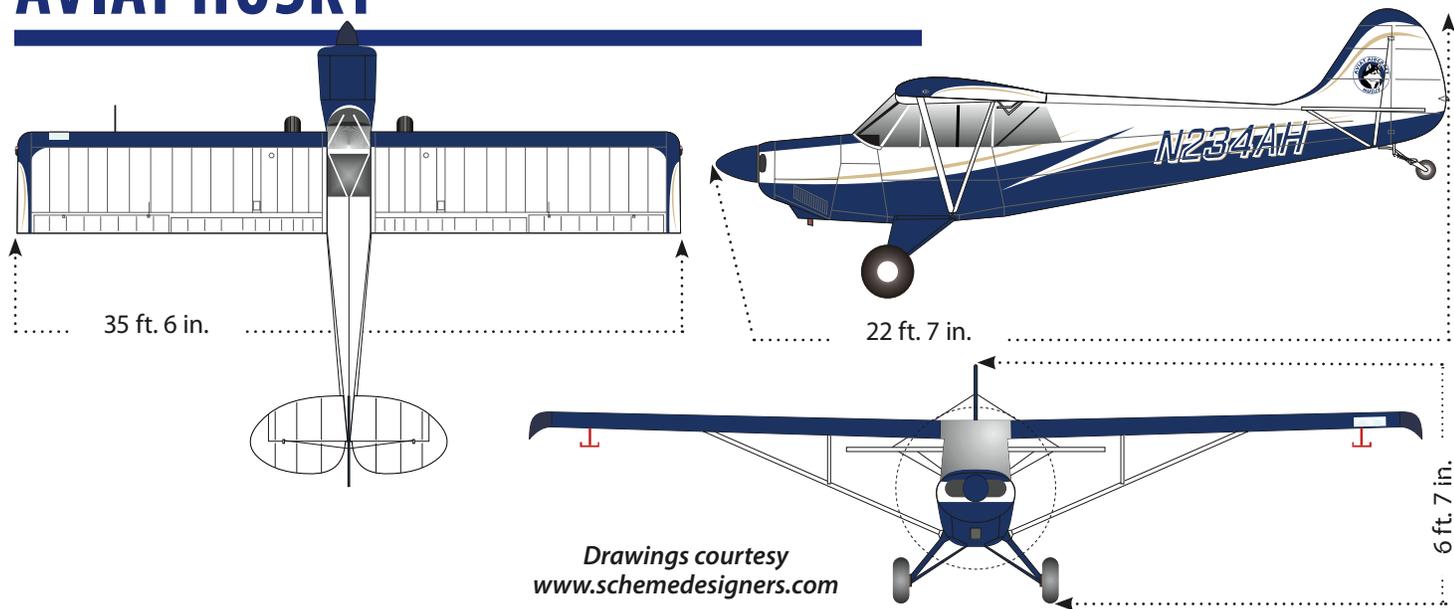
Christen entered the market in the early 1970s, making specialized accessories—inverted oil systems, fuel pumps and restraint systems—for aerobatic airplanes. The company's products have been of uniformly high quality. Lycoming liked the inverted oil system so much it bought the system and offered it as a factory part.

But building aerobatic airplane

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***The fit and finish of late-model Huskies are impressive. The one in the lead photo is a 2013 A-1C.***

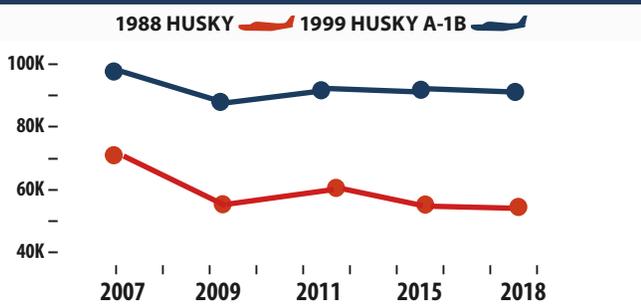
# AVIAT HUSKY



## HUSKY MODEL HISTORY

MODEL YEAR	ENGINE	TBO	OVERHAUL	FUEL	USEFUL LOAD	CRUISE	TYPICAL RETAIL
1988-89 HUSKY	180-HP LYC O-360-C1G	2000	\$21,000	52	610	122 KTS	±\$55,000
1990-93 HUSKY A-1	180-HP LYC O-360-C1G	2000	\$21,000	52	610	122 KTS	±\$64,000
1994-96 HUSKY A-1	180-HP LYC O-360-A1P	2000	\$21,000	52	610	122 KTS	±\$69,000
1997-99 HUSKY A-1	180-HP LYC O-360-A1P	2000	\$21,000	52	610	122 KTS	±\$79,000
1999-02 HUSKY A-1A	180-HP LYC O-360-A1P	2000	\$21,000	52	610	122 KTS	±\$84,000
1999-01 HUSKY A-1B	180-HP LYC O-360-A1P	2000	\$21,000	52	610	122 KTS	±\$87,000
2002-05 HUSKY A-1B	180-HP LYC O-360-A1P	2000	\$21,000	52	610	122 KTS	±\$108,000
2006-08 HUSKY A-1B	180-HP LYC O-360-A1P	2000	\$21,000	52	610	122 KTS	±\$130,000
2007-15 HUSKY A-1C	180-HP LYC O-360-A1P	2000	\$21,000	52	925	122 KTS	±\$195,000

### RESALE VALUES



### SELECT RECENT ADS

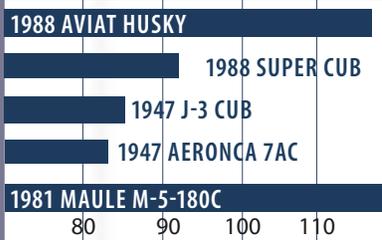
- AD 1991-23-02** CARBURETOR AIRBOX REPLACEMENT
- AD 1990-20-25** FRONT SEATBACK WELD INSPECTION
- AD 97-04-03** HARTZELL PROPS EDDY CURRENT INSPECTION
- AD 88-22-07** LYCOMING O-360 TYPE CYLINDER FROM ECI

### SELECT MODEL COMPARISONS

#### PAYLOAD/FULL FUEL



#### CRUISE SPEEDS



#### PRICE COMPARISONS





*The Garmin G500 flight display and GNS navigator combination, top photo, is a high-end \$75,000 factory-installed IFR avionics suite. The VFR panel in the lower photo has a Garmin portable GPS mounted in a panel dock.*



the Pitts/Eagle domination of aerobatic competition's upper end is no more. But, the Pitts was star of the show for a time; it remains viable and continues in production. Recognizing the market for aerobatic airplanes is small, Chris-

tensen nonetheless had a factory, a workforce skilled in building tube-and-fabric airplanes and a family of solid, proven products. But, he needed a new product and saw opportunity in the bush plane market.

components wasn't enough; Christen branched out into the homebuilt market with the Christen Eagle, a highly capable kit-built aerobatic biplane in the mold of the Pitts Special. The Eagle was significant in many ways, not least for its highly professional, complete and detail-oriented kit packaging, complete with an extensive, step-by-step manual. This approach to building airplanes—packaging them as extensive kits—is now commonplace. At the time, however, homebuilding was generally a matter of buying plans, renting a hangar, ordering materials and figuring it out yourself.

In 1982, Frank Christensen purchased the Pitts type certificates, along with the factory, effectively cornering the contemporary market for aerobatic biplanes. Thanks to better-performing monoplane designs from builders like Extra and Sukhoi,

At the time, the only competitor being manufactured was the Maule and—despite that company's seeming immunity to the ills plaguing the rest of the industry from time to time—precious few of them were rolling out the doors. After trying to buy rights to the Super Cub, the Champion line and the Interstate/Arctic Tern, Christensen reportedly considered the asking prices (including the assumption of product liability for previously produced airplanes) unrealistic.

The answer? Build an all-new airplane. Christensen and designer/engineer E. H. "Herb" Andersen Jr. determined they could develop and certify their own design at lower cost

and in less time than buying and producing an existing product. So that's what they did, bringing the initial A-1 Husky from conception to FAA certification in 18 months.

Since the costs of development and certification have stopped many would-be aircraft manufacturers dead in their tracks, this tale says something about the company's management. Equally revealing is the amazingly short time it took to bring the Husky to market. Even so, the Husky didn't set the world on fire: Only 68 were produced the first year and an average of 30 to 40 annually since.

The initial 1800-pound A-1 model was replaced by the A-1A and A-1B in 1999. The Husky A-1A featured a 90-pound gross weight boost, to 1890 pounds, while the A-1B's gross was 2000 pounds. To this point, all three models mounted a carbureted 180-HP Lycoming O-360 engine, turning a Hartzell constant-speed prop. That's in contrast to an unmodified Super Cub, with its 150 HP and a fixed-pitch prop.

Both the A-1A and A-1B were produced until the 2002 model year, when the A-1A was discontinued. In 2007, Aviat obtained FAA certification of the A-1C Husky, which features a 2200-pound gross weight, an increase of 200 pounds over the A-1B. Structural modifications included new landing gear, a five-leaf tail spring, a new wing with extended flaps and spade-less ailerons, plus a new wing-flap control handle.

Additionally, according to the FAA type certificate, the new model's CG envelope was "reduced forward and expanded aft." The A-1C comes with a choice of the standard 180-HP O-360 or a fuel-injected IO-360 Lycoming pumping out 200 HP. The A-1B was discontinued as of the 2008 model year, ushering in the current-production A-1C.

## KEEPING IT SIMPLE

When designing their new airplane,

Christensen and Andersen kept one eye focused sharply on the Super Cub. The pair's design objectives included good short- and rough-field performance; ruggedness, accessibility and serviceability to simplify support in primitive conditions; outstanding slow-speed handling coupled with docile stall characteristics; good endurance and reasonable cruise capability.

By all accounts, they succeeded: The Husky is a conventional two-tandem-seat taildragger that, frankly, looks just like a Super Cub. That's not a bad thing: The Super Cub has remained popular for decades, for good reason.

In terms of materials and structure also, the Husky is straightforward. The fuselage is welded 4130 chrome/moly tubular steel with a full-depth aft fuselage for greater strength. Except for the A-1C-200, the aircraft is powered by either a Lycoming O-360-C1G (early models) or an O-360-A1P (1994 and later models). This Lycoming is widely acknowledged to be almost indestructible. The engine cowling and forward fuselage are skinned with aluminum. The aft fuselage and flying surfaces are covered with polyester; the seams are taped with cotton and fastened to the structure by oversized pop rivets.

One clear advantage new-airplane designers have is the ability to examine similar designs and correct any shortcomings cropping up over time. For example, rather than the problematic wood spars Champion used, the Husky's wings employ dual aluminum spars and aluminum ribs. They are supported by fore and aft struts, which were designed to eliminate corrosion and other problems encountered over the years in a large number of strut-braced airplanes, including certain Piper and Taylorcraft models, for example.

To facilitate maintenance, a Husky's nose bowl is split to permit its removal without touching the propeller; the cowl has large doors on either side for easy engine compartment access (good for preflights). Moving aft, the fuselage is metal-clad to the end of the cabin and features several removable panels. The aft fuselage, which includes the battery bay, is accessible through a large panel on the port side. (A baggage door was optional, so not all have one.)

The landing gear is conventional



*A Husky's Lycoming powerplant, top, gives the airplane a reliable reputation. That's a three-blade composite prop fitted to a Husky in the middle photo. Tundra tires, bottom, are a popular option.*



in more ways than one: It uses reliable, proven bungees for shock absorption, and mounts them inside the fuselage to reduce drag. The brakes are good and the track wide, which helps ground handling. Tundra tires are a popular add-on, making soft-field and rough-country operations much simpler.

For other terrain, all A-1s are built with float attach fittings installed. The only additions required for straight or amphibious float operations are lifting rings and a ventral fin. For the same reason, dual-puck brakes—required for the tundra tires—are standard on all aircraft. These brakes are quite good and offer plenty of stopping power. Meanwhile, the Husky is approved for both retractable and wheel-replacement skis, as well as for banner or glider tow hook installation.

Changes made to the line since the first A-1 rolled out the door have been incremental improvements, largely as a result of real-life service experience. To its credit, Aviat has designed all improvements to be field-retrofitable to existing airplanes. Since early models can be updated with the later



improvements, there is no better or worse model year. As a result, one of the keys for any prospective buyer is ensuring all desired mods and any mandated changes have been performed, and to be careful of overall condition.

## REAL-WORLD PERFORMANCE

For a while Aviat was running an ad bragging about the Husky's 200-foot takeoff capability. It's since pulled the



*Load 50 pounds of your stuff through a baggage door (on late models) that accesses the area behind the aft seat, top photo. Getting yourself into either seat of a Husky, bottom photo, is about as graceful as climbing into a Piper Cub—it isn't.*



of attack flight.

Counterbalanced aerodynamic spades hang from the bottom of the aileron leading edge on models through the A-1B; they were eliminated on the A-1C. Borrowed directly from the four-aileron Pitts, the design permits full roll authority well into the stall.

Of course, any airplane designed

ad—something we applaud in the name of safety. For a report in the February 2016 *Aviation Consumer*, we flew a newer one and found that unless the airplane is stripped to minimum weight and flown by an expert, the claimed 200-foot takeoff distance is a stretch, especially on unpaved surfaces at higher elevations.

The Husky's non-tapered wing comes with Fowler-type, slotted flaps hinged to move aft as they are deployed. Even at full—30 degree—deflection, they provide more lift than drag, making for good short-field performance. Elsewhere on the wing, attention has been paid to the ailerons, as well. They are symmetrical in section, and the leading edge has a larger radius than the wing trailing edge it abuts to maintain attached airflow during low-speed and high angle

for utilitarian purposes should be a straightforward, forgiving airplane to fly. Although we think the Husky demands extra effort to extract all its performance, the Husky meets these objectives by all accounts. Thanks to the good aileron and rudder authority, combined with the Fowler flaps, the pilot really has to provoke the Husky to get it to bite.

Anything resembling proper stall technique results in very mild stalls and near-instant recovery. Spins are virtually impossible to get into with flaps deployed. But, when flaps are retracted, it will reward uncoordinated control input with a snap over the top in power-on stalls. It won't spin, but the resulting spiral or corkscrew maneuver can be attention getting.

Speed builds very quickly during this exercise, and must be attended

to immediately. However, almost any reaction leads to recovery. Also, during cruise in turbulent air, speed control is important at most altitudes, since indicated airspeed is fairly close to the  $V_{no}$  of 103 knots indicated. ( $V_{ne}$  is 132 knots.)

After exploring stalls, a new Husky pilot will find slow flight and STOL performance are areas where the Husky really shines. Takeoff distance with full flaps is around 400 feet; landings require only 350 feet. Figure about 500 feet total over an obstacle.

Even at high density altitude, liftoff speed is reached quickly and the effective brakes help make short stops easier. The best technique for ensuring the airplane will stay on the ground is to retract the flaps during the brief landing roll.

Even max-performance takeoffs result in continuous climb. There is no sagging-off even while flaps are retracted. It is a credit to the airplane that, once a pilot is familiar with it, such performance does not require superior technique.

No-flap takeoffs require more ground run, naturally, but taking off in the three-point attitude produces a short run and healthy climbout (1500 FPM at sea level at the best rate of climb speed of 63 knots). We found that for a 2200-pound gross weight A-1B at sea level on a standard day, the ground roll portion of a normal takeoff (no flaps) is 775 feet. A max-performance takeoff with 30 degrees of flaps can result in a 580-foot ground roll on dry, paved surfaces.

Wing loading is light at 9.8 pounds per square foot, so the ride in turbulence can be bumpy. It's an inevitable tradeoff for STOL performance. On approach, precise control of airspeed and vertical speed are important to achieve this kind of performance. Just as when flying any airplane close to its performance limits, the correct combination of alignment, sink, airspeed and attitude can be elusive at first, but once mastered results in truly impres-

sive STOL performance.

In the hands of a qualified pilot, the Husky can be a good neighbor even at busy airports with a mix of traffic. Recommended approach speeds are very low (52 knots), which would give your typical Westchester County controller fits. But it can be flown at an indicated 100 knots right to the threshold and slowed easily to proper touchdown speed.

The best recovery technique for bounced, poorly aligned or otherwise botched approaches, at least initially, is to add power and go around. The Husky will bounce mightily and can easily get sideways—not a good way to re-contact the ground.

With full power, the airplane leaps back into the air; with just a touch, it still flies.

Otherwise, handling is typical for this class of airplane: It likes lots of rudder input, and it's not overly twitchy. Transitioning pilots are at risk of groundloops until they have some taildragger experience. Control harmony is fairly good, which is sadly uncommon in this class of airplane. Rudder and aileron forces are linear in relation to airspeed.

Because of the bungee trim system, elevator deflection forces are fairly high, even at low speed. In fact, it trims like a heavy airplane—a little bit at a time and almost always in response to any power or attitude change. Rudder authority is good right down through low-speed flight, and the aileron spades work to maintain control at low speeds.

For a lightly wing-loaded airplane, the Husky is quite well mannered in cruise. Properly trimmed, it does not require a lot of attention to maintain course. This makes it a better instrument platform than many of its peers and some owners fly Huskies in IMC. However, that's not the Husky's primary mission.

The big virtue of the Husky is that even during slow flight, properly configured, the attitude of the aircraft is flat; it is flying on the wing rather than hanging on the prop. This is a big safety advantage for spotting, patrol and other low-altitude, low-speed operations, since at these speeds the Husky is not flying on the edge of a stall and the airplane very largely takes care of itself so that the pilot can safely look elsewhere. Power-on stall speed is only 33 MPH with flaps.

Tailwheel steering authority on the Husky is good, which makes ground handling simple except in high winds. A touch of differential brake swings the aircraft around briskly. The brakes are powerful: At slow taxi speeds, their overenthusiastic application will bring the tail off the ground.

Ground handling, by the way, is aided by convenient handles on both the aft fuselage and elevator. These give line personnel little excuse to mishandle the airplane when moving it around on the ramp.

As already mentioned, slow flight is the Husky's strong suit. It was not designed as a cross-country hauler, although owners go places with it. That's because the airplane also has a reasonable cruise speed, quite competitive with other fixed-gear airplanes of similar power.

Cruising at 55 percent power should yield 113 knots true; at 75 percent, 121 knots. Top speed at sea level is 126 knots. Listed fuel consumption at 55 percent is 7.7 GPH; at 75 percent it is 9.3 GPH. Still-air range at 55 percent is 695 miles. With power set for an airspeed of 96 knots indicated, endurance is an impressive seven hours.

Of course, going slower boosts endurance. Just ask Kris Maynard, an A-1A Husky owner. On March 1, 2008, Maynard took off from Indianapolis, Indiana, and flew his Husky along a triangular course of 753 miles, burning only 190 pounds of fuel (30 gallons) in the process and setting an internationally recognized record in a new efficiency category.

Then, Maynard flew the Husky 15 hours, three minutes and 20 seconds without refueling, covering more than 1200 statute miles. On this flight, he burned only 3.156 GPH—for 25.26 MPG—and landed with 90 minutes of fuel remaining. But after a long flight, you still have to land. With some practice, you can operate a Husky from a football field. The factory number for landing is 250 feet. Plus, it performs well on floats.

Part of this is attributed to attention to the relative angle of incidence between the floats and the wing. Float-equipped cruise at 5000 feet is a quite respectable 106 knots true.

When loading a Husky, center of gravity is rarely an issue, since the bias is toward the front end of the range with just one aboard due to the

relatively large engine and constant-speed prop.

Standard useful load is 610 pounds. A full load of fuel—50 gallons usable, or 300 pounds—leaves 310 pounds of payload available. The baggage compartment behind the rear seat—reached by folding the rear seatback forward—is rated at 50 pounds. An access door is a factory option on newer aircraft.

## COCKPIT/CABIN COMFORT

Like many of its peers, getting into a Husky is hard to do elegantly. If you're not willing to mount up properly, you shouldn't be flying an airplane like this. Rather than sliding in like in a car, the pilot and passenger more or less hoist themselves aboard.

For a conventional-gear airplane, forward visibility is very good for pilots of average-to-tall height, despite the large, high wing (shorter pilots can adjust the view by using thicker seat cushions). A skylight in the overhead helps spotting traffic in turns.

Long missions in other light utility aircraft can be fatiguing, both because of the constant need to keep the airplane right side up during low-speed operation, and also because control forces—especially roll control—are high and therefore fatiguing. The Husky ranks favorably in this category, especially after pilots learn to adjust pitch forces by anticipating trim input.

One of the biggest shortcomings of the Husky, at least for tall pilots, is the front seat. It is a fixed part of the structure. All adjustments are made by changing cushions. But after an hour or two, discomfort becomes the most noticeable element of flight, overwhelming the good performance, fine visibility and relatively low control effort.

Visibility and comfort is better in the rear seat. The seat is wider, the angle of the back rest is better and there is more legroom fore and aft. One shortcoming is the lack of heat for the back-seater—not an issue in warmer climates—but certainly one to consider in colder ones. With relatively little soundproofing the noise level is high, but not so much so that owners complain about it. Headsets are, of course, a must.

## MAINTENANCE/TYPE CLUBS

The Airworthiness Directive picture

## HUSKY MISHAPS: LOSS OF CONTROL

Over the years, Aviat has advertised its rugged Husky series airplanes as go-anywhere machines, notably asserting “No Runway. No Problem!” in a 2015 ad that also boasted a 200-foot takeoff distance. Our review of the 100 most recent Husky accidents indicated to us that a fair number of pilots may have taken the hype a little too literally.

Fortunately for the vast majority of those who did such things as landing in tall grass on a mountain-top and discovering that the grass hid a landing-gear-eating hole or decided to touch down in snow of uncertain depth and flipped over, the airplane is tough enough that usually the most severe injury was to pride.

We’ll come back to pilot-induced prangs after taking a look at the truly good news shown by the accident reports. First, the Husky series demonstrated what we consider to be an outstanding fuel system design. We found only two fuel-related accidents, neither of which was the fault of the machine.

Also in the positive news department: Seven accidents due to engine issues was well below what we expect to see.

No matter how macho pilots claim to be, tailwheel airplanes eat their lunches on landing and takeoff. The Husky is no exception with 30 runway loss of control accidents—nine were on takeoff—as well as five hard landings causing damage, three crashes when going around and 11 incidents when the airplane flipped after the pilot got on the brakes too hard. (We had a lot of sympathy for two of those as animals ran onto the runway.) Forty landing-related accidents out of 100 is in the mid-range for a tailwheel airplane.

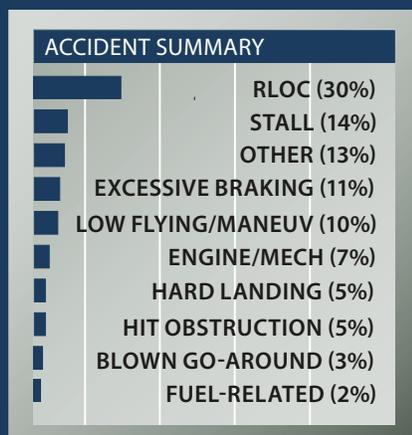
Twenty-four accidents involved loss of control while maneuvering at low altitude or a low-altitude stall—often just after takeoff. We recognize that Huskies get flown at low altitude, often by pilots who

have not had formal training for that hazardous activity. One pilot who was shooting coyotes from his Husky had his gun jam, so he rolled into a steep turn to reposition for another shot. He hit his own wake turbulence, lost control and flew into the ground.

We are concerned by accidents we reviewed in which a violent or dramatic roll was reported shortly after takeoff, followed by the nose pitching down and a crash, often fatal.

In evaluating the Husky’s performance in the February 2016 issue of *Aviation Consumer*, we outlined our concern with the factory’s claims of its takeoff performance and handling. The manual calls for keeping the airplane on the ground until reaching 53 MPH (which requires raising the tailwheel to stay on the ground)—and to leave the flaps up on all crosswind takeoffs.

However, the manual calls for full flaps for a maximum performance takeoff—and the airplane will fly off in three-point attitude at 40 MPH, near the power-on stall speed. At that speed roll control is challenging, with lots of adverse aileron yaw. Based on interviews with people we consider to be Husky experts, we are of the opinion there is a risk of uncommanded roll when taking off with full flaps in a crosswind. We recommend following the Husky manual by making all crosswind takeoffs with the flaps up and keeping the airplane on the ground until reaching 53 MPH.



for the Husky is a good one. Only two ADs are specific to the airframe, with the remainder targeting either the engine or the prop.

One, 90-20-5, applies to 1988 to 1990 models and calls for inspection of welds on the seatback and addition of reinforcements if needed. The other AD, 91-23-2, applies only to 1988 models and calls for the replacement of the carburetor air box.

There haven’t been too many squawks on the airplane, but it would be a good idea to check the stainless steel control cables for wear and look for any vibration-related problems in the baffles and cowling that might be related to the relatively rigid engine mounting.

We’re not aware of a formal type club covering the Husky. There is [www.flyhusky.com](http://www.flyhusky.com), an information-sharing site and forum useful for finding Husky owner gatherings, maintenance topics, flying tips and the usual general discussions.

For its mission, it’s hard to find fault with the Husky. It does its thing remarkably well, and owners like it.

### EXPERT FEEDBACK

McCreery Aviation has been a factory-authorized Husky dealer since 2002 and during that time I’ve sold well over 100 new Huskies and many more used ones. Our shop knows the aircraft well and I personally have over 5000 hours in type.

The Husky has few vices. Except for the earliest A-1s, the airframes are free of ADs and the non-recurrent ADs on those early airplanes have long been taken care of. The fit and finish is excellent, the airplane has few bad habits in flight (it won’t spin unless torque rolled) and newer models have a tremendous useful load (over 900 pounds) and a very wide CG envelope. It has good endurance—typically five hours, plus another hour of reserve. Later models have two baggage areas, plus the back seat is wide with a comfortable recline angle.

Properly equipped it can be flown IFR, compared to a Super Cub that’s type certificated for VFR only. The Husky is an FAR 23 aircraft and surpasses other utility aircraft of CAR 3 design in terms of safety and systems. The Husky comes standard with an altimeter and an airspeed indicator, but can be upfitted all the way to a Garmin G500/GTN750 combo or six



*With plenty of power to get on the step and off the water, a Husky is a fine floatplane.*

avionics packages in between. There are lots of tire and prop options and many different paint schemes and colors were available through the years.

The airframe is chrome moly (think NASCAR roll cages). It has powerful toe brakes, the trim is reachable by the front and rear pilot and visibility is amazing out the front and the sides. If the pilot is properly seated, S-turns aren't required while taxiing.

For most of its life the Husky has been on a constant improvement program. The ailerons and flaps were changed in 2005 to what we refer to as the "new wing," where the ailerons went from a long shallow spaded design like in the earlier Pitts (that Aviat also builds) to a Friese-type aileron that is shorter in span but deeper in chord and 20 percent larger in area. The new wing rolls twice as fast as the old, with half the breakout force and less adverse yaw. The flaps were enlarged in span by 13 inches and it increased the full-flap rate of descent by 50 percent, so less slipping is required to get into a short field with obstacles (the airplane slips very nicely). Other improvements include four GTOW increases from the original 1988 A-1's 1800 pounds to the current A-1C's 2250 GTOW; increasing the size of the entry door by 12 inches; and integrating shock absorbers into the MLG, which controls bouncing and airframe shock much better and allowed fitting of bungees with a softer spring rate (that was 2012). The door was redesigned with an outside handle/lock.

There was an option for a 200-HP fuel-injected Lycoming IO-360 on 2005 and newer Huskies. Other improvements are retrofittable by an STC including the Power Flow tuned exhaust system, which dramatically increases heater output into the cabin. There are multiple prop choices that now include the Hartzell Trailblazer and MT Ultra, both of which have measurable and significant weight savings and performance increases.

With the thousands of demo flights over the years I've never put one on its nose and I have no idea how anyone with a reasonable level of training in the aircraft can possibly do that. Prop strikes and wing whacks happen for three reasons: lack of training, lack of respect and lack of proficiency. For someone with no tailwheel time, 15 hours for a tailwheel signoff and another 10 hours of pattern work in varied wind conditions will get you about 85 percent proficient.

If you break one, factory repairs are excellent as damaged items go into the same jigs that were used to build them originally and use the same processes to come out as finished products. Danny at the factory does great work and I have zero issues with factory-repaired damage history, other than it hurting the value just because people would rather it had none than some. Most buyers want a virgin airplane.

I have landed with up to 45 knots of wind gust and made the taxiway without a moving windbreak, plus I've landed in 25-knot direct crosswinds. The powerful ailerons and tons of rudder make it possible, but you've got to know how and when to use

*continued on page 32*

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## USED HUSKY

*(continued from page 31)*

them (and the brakes) and how the aircraft is going to react once the tail comes down and the rudder becomes partially blanked.

In summary, the Husky can do a lot of things really well. It can be a stress-reducer, it can live at your house and fly off your pasture and you can fly with the window up and the door down. It is a fun, safe airplane that cruises at a real 120 MPH. Plus, it gets better gas mileage at that speed than my Chevy Tahoe does at 70 MPH. It can be put on straight floats, amphibious floats, skis and tundra tires up to 35 inches (up to 31-inch tires don't require an STC).

The Husky is about as inexpensive to maintain as any certified airplane and is comfortable even for this 6-foot 4-inch, 250-pound guy.

Jim Taylor  
McCreery Aviation  
www.mccreeryaviation.com

*Our special thanks to Jim Taylor for helping with some of the photos for this review and for providing the following list of the top common issues his shop sees when used Huskies come in:*

\*Old, dark/hard/brittle fuel sight tubes or incorrectly installed replacements that are leaking. This is addressed with Aviat SB 10.

\*Old, stretched and inelastic landing gear bungees. To install new bungees, you'll need the bungees, bungee replacement tool and installation instructions for the order as they are not all the same strength.

\*Misrouted engine wiring and/or hoses, often exposing them to high temperatures.

\*Fuel leaks at the tanks, sight tubes, fuel lines, fuel valve, fuel transducer or hose connections.

\*Incorrect length screws attaching belly pans, scraping paint off long-erons setting up corrosion opportunities (covered in Aviat SB 31).

\*Uncut wing inspection holes that don't allow inspection or lubrication of the flap mechanism.

\*Flight-control systems never or seldom thoroughly lubricated. This includes the Zerk fitting at the base of each control stick.

\*The 500-hour mag overhaul/replacement not accomplished.

\*Aged, crushed and ineffective engine mounts resulting in pilot fatigue from low-frequency vibration, air-frame damage and sheet metal cracks at the cowling smile and/or firewall.

\*The alternator shroud still in place, resulting in high alternator temps and shortened life (this is SB 23).

\*Inspection of the 180-HP engine airbox for excess play not accomplished (this is SB 25).

\*Excess play in elevator bushings.

\*The weight and balance/equipment list not updated, particularly with tire changes from original.

\*Missing plastic washers under exterior hardware that prevent dissimilar metal corrosion.

\*Gear leg/brake puck interference resulting in irregular brake pad wear, excessive brake pad replacements, loss of braking effectiveness and efficiency and irregular brake disk wear.

\*Incorrectly tensioned or routed tailwheel hardware (especially the chains), broken springs inside the tailwheel mechanism and/or lack of

### FEEDBACK WANTED

## BELLANCA VIKING



It's time for a fresh look at the Bellanca Viking market in an upcoming Used Aircraft Guide in *Aviation Consumer*. We want to know what it's like to own these piston singles, how much they cost to operate, maintain and insure and what they're like to fly. If you'd like your Viking to appear in the magazine, send us any photographs (**full-size, high-resolution please**) you'd like to share to the email below. We welcome information on mods, operating expenses or any other comments that can be helpful for buyers considering a Viking. Send correspondence by May 1, 2018, to:

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Email at:  
**ConsumerEditor@  
hotmail.com**

lubrication resulting in a loss of maneuverability, control and wear.

\*Incorrect rigging of the wings, with a roll component attempted to be offset by an adjustment to the rudder trim tab. This results in the airplane flying in a skid, reduced cruise airspeed and increased pilot fatigue. Adjust roll with a wing washout adjustment, not with the rudder.

\*Oil screen signed off as removed and cleaned during oil changes but found with original factory sealant.

\*A missing compass correction card. Worth mentioning is it's the first thing an FAA inspector looks for during a ramp check.

\*Burned-out muffler baffles that expose the remaining muffler can to excessive heat that it was not designed for.