

How to use home flight simulators
with your favorite apps

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PILOT NEWS

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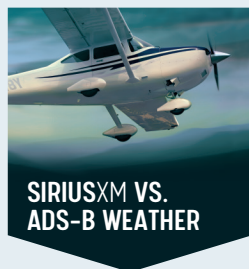
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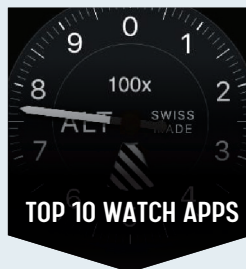
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ALAN NGUYEN

ATP, Flight Instructor

VIDEO PRODUCER

Sporty's Academy

Are you stuck at home and separated from your airplane, or just experiencing an unlucky stretch of bad weather? The good news is, you can still fly at home and stay current with your favorite aviation apps using the latest flight simulators.

Many flight simulators today integrate directly with EFB apps including ForeFlight, Garmin Pilot, FlyQ, and Stratus Insight. The apps will function nearly identically as if you were in the airplane, creating a realistic in-flight experience, displaying GPS position, moving maps, synthetic vision, and other flight parameters.

The simulators can even output real-time flight data, such as AHRS pitch and bank, allowing you to learn and experiment with the most advanced EFB features. Before getting started, we'll first need to ensure the EFB and flight simulator programs are set up properly. We'll then review various ways you can use these simulator programs to both maintain currency and learn new skills with a series of VFR and IFR scenarios.

Before using a flight simulator with your EFB, the tablet must be connected to WiFi on the same network as the flight simulator. We'll first start with ForeFlight and then look at Garmin Pilot, Stratus Insight, and FlyQ.

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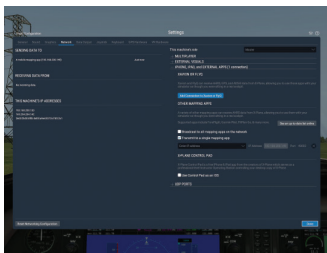
Get it all at iPadPilotNews.com

Questions? Email us: iPad@sportys.com

TIP #1 CONNECTING FOREFLIGHT TO YOUR FLIGHT SIMULATOR

X-Plane 11

This is the most widely used consumer flight simulator platform for PC and Mac, and the best option if you're just getting started with flight simulators. X-Plane 11 features integrated EFB app support, so setup is a breeze:



1. Open the settings (upper-right of the menu bar) in X-Plane and go to Network.
2. Open the "iPhone & iPad" Category, and choose broadcast to all mapping apps.
3. Return to ForeFlight, tap More > Devices > X-Plane and make sure the Enabled switch is on.

If you're having trouble connecting to ForeFlight using the steps above, select the option for "transmit to a single copy of ForeFlight" in X-Plane and then do the following:

1. Go to your iOS Settings app, tap on "Wi-Fi" and then tap the "i" icon next to your network to bring up the settings.
2. Under "IPv4 Address", copy the IP address or write it down, and enter it into the "Transmit to a single mapping app" box in X-Plane.
3. On ForeFlight, tap More > Devices > X-Plane and make sure the Enabled switch is on.

Prepar3D v4/Flight Simulator X

These also provide realistic simulator experiences and receive ForeFlight data over WiFi. Prepar3D already has integrated support for simulated position data.

Prepar3D v4:

1. Open the Applications Options box.
2. On the Options menu, click "General."
3. Click the "Application" tab on the left side. Tap and enable "Broadcast GPS Data to network."
4. On ForeFlight, tap More > Devices > Prepar3D v4 and make sure the Enabled switch is on.

Flight Simulator X and older versions of P3D:

Flight Simulator X and older versions of P3D require a third-party plug-in to receive ForeFlight Data. Additionally, some of these plugins require FUSIPC to work. FSUIPC is a third-party module that allows third-party programs to communicate with FSX/P3D (old versions) properly.

Here are a few plugin options to try: MindStar GpsVR, FSXFlight, FlightsimGPS, XMapsy v3.

TIPS FOR USING YOUR AVIATION APPS WITH HOME FLIGHT SIMULATORS

TIP #2 SETTING UP GARMIN PILOT, STRATUS OR INSIGHT AND FLYQ

To ensure a proper link between other EFB apps and a flight simulator, the EFB needs to know it should be communicating with a simulator.

Garmin Pilot

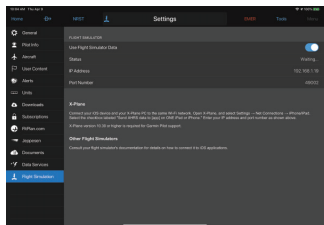
1. Tap "Home" in the top left corner.
2. Tap the "Settings" icon.
3. At the very bottom, tap "Flight Simulation."
4. Toggle the "Use Flight Simulator Data" switch to on.

Stratus Insight

1. Tap the "Settings" icon in the top-right corner.
2. Scroll to the bottom of the list and enable the setting "Listen for Flight Simulators."

FlyQ

FlyQ does not require any additional configurations to work with a home flight simulator from within the app.



TIP #3 INFINITE FLIGHT

Infinite Flight is the platform of choice for running a flight simulator directly on Android and iOS devices. Infinite Flight 15.04 or later can send simulated data such as position, attitude to traffic to ForeFlight.

1. Launch Infinite Flight on a separate phone or tablet, different from the one running ForeFlight.
2. On Infinite Flight, tap the "Gear" (settings) button in the upper left corner.
3. Scroll down to the bottom of the list and tap "Enable ForeFlight Link" switch to ON.

If you're an Infinite Flight Live user, you'll be able to see simulated traffic if you enable the traffic layer on the Maps view. Synthetic Vision on ForeFlight can also use simulated data from Infinite Flight.



TIP #4 FLYING IN THE SIMULATOR

In this next section, we're going to focus on tips for flying with ForeFlight with your home simulator, but the concepts and tips apply to all EFB apps. To begin, set up a basic flight in your simulator, and spend time personalizing your EFB to your specific preferences. Here is a list of features to get you started:

- Auto track logging
- Auto-centering modes
- Breadcrumbs
- Custom map layers
- Dark mode vs light mode
- Distance rings
- Glide advisor
- Instrument panel data boxes
- Radar, TFRs opacity
- Track vector

You'll be able to preview your changes in real-time on your simulator without concern for heads-down time in the cockpit or the expensive Hobbs meter ticking away.

Next, take some time to dive deeper into your favorite app features. You can use your simulator to practice different ways to perform a task and most likely find

Continued on page 4



something new along the way. There may be a more efficient way for you to do certain things, and now is the time to explore those different techniques. For example, experiment with different ways to quickly modify your route, simulating either an emergency diversion of IFR re-route issued by ATC. Or try out that new electronic audio checklist feature in ForeFlight.

If you are flying somewhere new, or you're looking for a new route to a familiar place, use your favorite EFB and simulator to get familiar with the routes. You can use this to see and what types of airspace you'll encounter, different terrain, landmarks, and geography. You can use the maps feature on your EFB to visualize the waypoints along your route, and what the alternate airports look like along the way.

For the VFR pilot, now is the time to practice using your EFB to assist with an emergency. Curious about how far your airplane will glide if the engine quit? Try

out the glide advisor in ForeFlight and simulate an engine out scenario from a normal cruising altitude using the glide advisor.

Going on a cross-country on a beautiful VFR day using pilotage? Try flying it in a flight simulator with your EFB and make note of some important geographical landmarks or terrain features along your route and build that familiarization.

If you're a student pilot, you can even use the simulator to obtain a general concept of your flight maneuvers. The simulators don't typically do a great job of replicating aerodynamics of the maneuvers such as slow flight, stalls, or steep turns. That doesn't mean it can't be a valuable resource. You can still chair fly the procedural aspect in the simulator, and even use the tracklog recording function so you can review and debrief the flight data later to see

if you were within ACS limits for a practical test.



Instrument pilots can greatly benefit from staying proficient, as procedures from the real world can easily be translated and practiced in the simulator world. There is a lot of data to be processed in the instrument flying realm including weather, NOTAMS, and approach plates. Use the time in the simulator to come up with a way to help you keep that data organized and easily accessible.

If you're not up for trying out different emergencies, flight simulators can be great for staying proficient or even working on some fundamentals like the instrument scan. Regardless of your mission, flight simulators are a great tool for pilots to stay productive, especially if you're grounded for an extended period of time. Once you understand the limitations of flight simulators, they are an inexpensive way to explore new EFB features, keep your skills sharp, and build upon good habits.

SIMULATOR HARDWARE



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SPORTY'S PILOT TRAINING APP GROWS TO INCLUDE

OVER
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COURSES

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Sporty's Academy



Sporty's Pilot Training app has helped tens of thousands of pilots earn their pilot certificate, add new ratings, learn how to use a wide variety of advanced avionics systems, and get checked out in new aircraft types. The platform is famous for its relentless pace of innovation, bringing new content, new training tools, and technological enhancements every year. The last twelve months have been no exception.

Pilot Training offers pilots the ultimate flexibility in training, providing access to aviation courses on dedicated iPhone and iPad apps, an Android app, online, and on the TV, using the included AppleTV app, RokuTV channel, and Chromecast support.

The iOS and Android apps have received a number of big updates over the past year, adding some exciting new features and a number of new courses. Here's a look.

Updated Learn to Fly and Instrument Rating Courses

The most popular parts of the Pilot Training app have always been Sporty's complete courses for earning a Private Pilot certificate and Instrument Rating. While the 15 hours of in-flight HD video and detailed animations make up the heart of Sporty's Learn to Fly Course, it's the powerful FAA test prep component of the course that pilots look to when

preparing for the knowledge test. This component has been completely overhauled in the 2020 courses, adding new study modes, performance tracking, and the new AirSync feature.

First, you'll notice four new ways to work through the database of over 1,000 questions in the app. In addition to studying specific categories of questions, you can also select to study a custom number of random questions, marked questions or questions you've always answered incorrectly. You can also create a smart study session, where the app learns from your progress and creates customized quizzes to drill on topics that need improvement.

After completing a session, you can review how you performed in each category, and start a new session at any time based on correct, incorrect or marked questions from that session. Sporty's new AirSync feature makes studying more convenient as well, by syncing all sessions and results to all your devices—computer, iOS apps, and Android app. This allows you to start a session on your laptop, and finish and review it later in any of the apps.

The app also added a new document library that provides access to applicable FAA

handbooks, like the Airplane Flying Handbook and Pilot's Handbook of Aeronautical Knowledge for Private training, and the Instrument Flying Handbook for pilots working on an instrument rating. Each book includes interactive outlines and search capabilities to quickly locate key topics, and the ability to add bookmarks to help organize your studying.

Sporty's Instrument Rating Course has seen a number of updates as well, including 15 new or updated video segments. These use the latest HD video and sophisticated animations to bring complicated topics to life, including weather briefings, approach lighting systems, electronic flight bag best practices, principles of turbocharging, and holding patterns.

Both courses are available for \$249 and include lifetime updates.

New Commercial Pilot Training Course

Training for the Commercial Pilot certificate is a bit different than the Private certificate, as the initial focus is on time-building towards the 250 flight hour requirement. The preparation then shifts towards mastering the commercial flight maneuvers (chandelles, lazy eights, eights on pylons),

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studying for the knowledge test and prepping for the checkride.



The Commercial Pilot Test Prep course was designed with these goals in mind with three main training tools.

The Flight Maneuvers Guide includes 36 video segments, with detailed animations describing exactly how to perform all the maneuvers you'll have to demonstrate on the checkride. From chandelles to lazy eights, each segment provides step-by-step instructions, Airman Certification Standards for successful completion, and common errors to avoid. It's over an hour and a half of animations, plus a helpful video section on flying complex and high-performance airplanes.

Sporty's powerful test prep section will help you ace the Commercial Pilot knowledge test with a database of over 800 test questions covering all the essential topics, from airplane systems to weather to FAA regulations. You can choose individual categories or study random questions. It also includes Smart Study Sessions that help you focus on topics that need the most work, so you spend less time studying questions you already know.

The course includes all the required study resources in one convenient location for quick reference. This includes the complete Commercial Pilot Airman Certification Standards, your guide to the checkride and an essential checkride study resource. There's also a complete flight training syllabus, the same one used in Sporty's flight school, to help you organize your training and record each lesson. All of these documents (and many more) are available in the Pilot Training app or online, and intuitive PDF tools make it easy to organize, search, and print each document.

The Commercial Pilot Test Prep Course

includes lifetime access and is available for \$149.99.

New aerobatics course with Patty Wagstaff

Sporty's has also been partnering with outside organizations to add new courses to the Pilot Training app. This fast-paced course is hosted by legendary airshow pilot Patty Wagstaff, and is aimed at anyone who is interested in airshows, aerobatic maneuvers, or high performance flying in general. The wide-ranging course includes video segments on the history of aerobatics, different types of aerobatic airplanes, physiological concerns, Aresti diagrams, and tips for creating a show routine.

Then Patty demonstrates all the maneuvers in her Extra 300, complete with supporting animations and the multiple camera angles. A basic section includes loops, rolls, spins, Cuban eights, Immelmans, Split Ss and more. Then the advanced maneuvers section dives into some extreme airshow



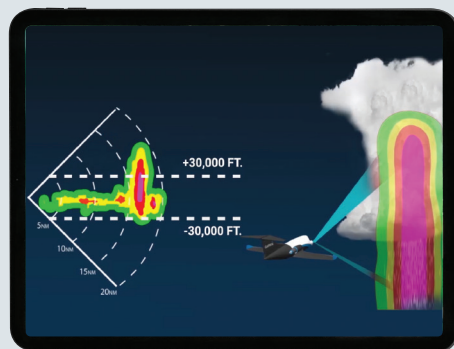
options like the avalanche, tail slide, and Lomcevak. One of the highlights is a 360-degree video section, which allows you to pan around the cockpit by tilting your iPhone or iPad. It feels like you're riding along for an aerobatic routine, and it's a great use of mobile technology.

Intro to Aerobatics with Patty Wagstaff is available for \$49.99 and includes lifetime updates.

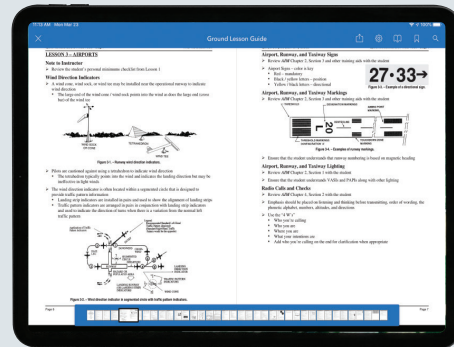
Five Garmin training courses

Continuing the theme of partnerships, avionics giant Garmin has collaborated with Sporty's to add five avionics training courses to the Pilot Training platform. The latest covers the popular GTN 650 and 750 navigators, including the latest Xi versions. The GTN Essentials 2.0 eLearning Course brings the pilot's guide to life with videos, animations, and valuable tips. It covers all the essential features, from flight plan

management to IFR procedures. Three scenarios show typical features in high altitude, mid-altitude, and helicopter flight.



Four other courses cover the Garmin TXi glass cockpit, aviation weather radar, and the Garmin G5000 flight deck (both with and without autothrottles). These courses use scenario-based video training to ensure you not only know how to operate all the features but how to best use them in all phases of VFR and IFR flying. They incorporate interactive exercises that allow you to take advantage of your mobile device's touchscreen display to interact with the flight displays through a series of real-world scenarios as if you were actually loading an instrument approach or scanning an active weather system using the radar.

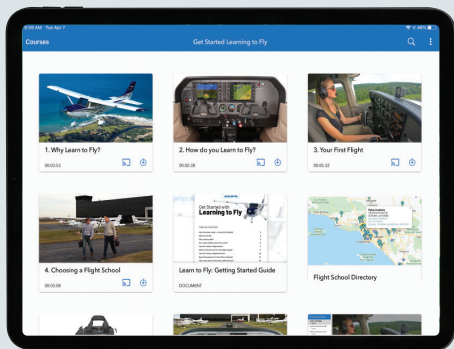


Sporty's Ultimate CFI Lesson Plan Guide

To help flight instructors stay organized and prepare for each ground and flight lesson, Sporty's also launched another new resource in the Pilot Training platform, the Ultimate CFI Lesson Plan Guide. This convenient resource was designed as an instructor's companion when working with students using Sporty's Learn to Fly, Instrument Rating and Commercial Pilot Courses. It includes the following:

- Training Course Outlines (Syllabi) for Private, Sport, Recreational, Instrument and Commercial Pilot
- Ground Lesson Guide
- Airman Certification Standards (ACS)
- Flight Maneuvers Guide

Each document is accessed using a powerful PDF viewer, complete with search, bookmarking and sharing features. The Lesson Plan Guide costs \$19.99.



Free Get Started course

Learning to fly is a process, but oftentimes the most confusing part is taking that first step. What should you ask a prospective flight instructor? What's the difference between a Sport Pilot and Private Pilot certificate? Sporty's has recently released a new course to help answer these questions, and it's completely free.

The course, called Get Started with Learning to Fly, features videos, articles, and other resources for the brand new pilot, including:

- Four video segments covering the basics of learning to fly, finding a flight school, and what a first lesson looks like
- A twelve part article series that addresses common questions, like Part 61 vs. 141 schools and FAA medical requirements
- A flight school directory, searchable by zip code, with contact information for schools
- A high resolution Cessna 172 cockpit poster, great for getting acquainted with a common training airplane
- Helpful links to other resources and essential pilot supplies

The course is 100% free, and can be found in the Pilot Training app.

Remote Pilot Test Prep

Operating a drone for non-hobby operations requires a Remote Pilot Certificate. You must successfully pass an FAA Knowledge Exam to earn a Remote Pilot Certificate with a Small Unmanned Aircraft Systems (sUAS) rating. This affordable course will help you do exactly that.

Bundled with a wealth of resources, including the Small UAS Study Guide and the Remote Pilot Knowledge Test Guide, Sporty's Drone Study Buddy will prepare you for the Remote Pilot FAA written test like no other study tool available. After reviewing the study material, you can then study the test questions with three modes of operation. Test material is expertly organized into categories based on subject matter and includes questions, answers, correct answers, and detailed explanations. Learning Mode allows you to create custom review sessions by selecting exactly which categories you want to study. Flashcard mode tests your knowledge by allowing you to see only the question - without the answer choices. Test mode randomly generates a 60-question session from the entire database of test questions, simulating the real Remote Pilot test.



HOW TO USE SMART TVs TO WATCH SPORTY'S COURSES



A smart TV is really just a high definition screen with some type of internet connectivity built in, often with the option to run specific apps on the TV (much like a mobile phone or tablet). It allows you to watch TV shows and movies without a cable or satellite subscription. There are plenty of options, but the two most popular smart TV platforms are Apple TV and Roku.

The Apple TV isn't really a TV; it's a small black box that plugs into an existing TV and offers the ability to run channel-specific apps. For example, you can download individual apps that allow you to stream shows from Netflix, watch live sports from ESPN, or rent new release movies from the iTunes store. All you need is a home WiFi network.

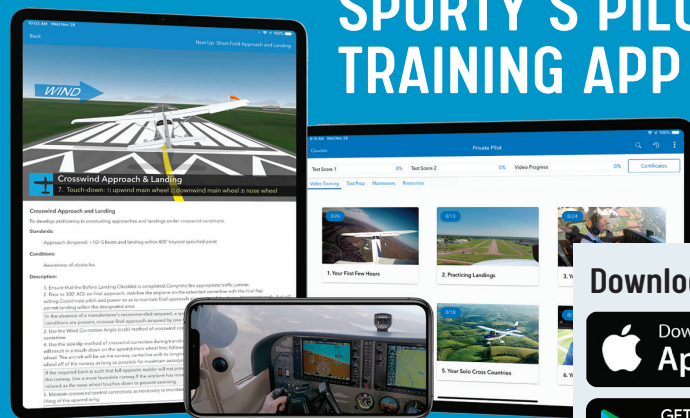
Roku comes in a number of different flavors, from small HDMI sticks that plug into the back of your TV to fully integrated systems built into the latest large-screen TV models. In fact, if you've purchased a TV in the last year or two, you very well might have a Roku built in already. The implementation is slightly different from Apple but the idea is the same: add apps (Roku calls them channels) to your home screen and watch videos.

As more and more pilots use smart TVs, Sporty's Pilot Training app has expanded to support both Apple TV and Roku. Download the free apps on your TV, sign into your Sporty's account and watch all your aviation training videos on the big screen. Automatic cross-platform sync means you can watch videos on your Apple TV, finish them on your iPad, then take practice tests online.

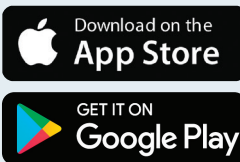
The latest update even adds Chromecast. This requires a TV that supports Chromecast, or a connected Chromecast streaming dongle. When in the iPhone, iPad or Android app, you'll then see the familiar "cast" button that can then be used to send the video segment from your mobile device to your TV.



SPORTY'S PILOT TRAINING APP



Download for FREE



HOW TO USE FOREFLIGHT'S NEW SPLIT-SCREEN FEATURE



BRET KOEBBE

ATP, Flight Instructor

EDITOR

iPadPilotNews.com

ForeFlight addressed two of the most sought after features from pilots in late May—iPad split-screen multitasking and full flight planning support from the Maps screen on iPhone.

That's just the start though, as ForeFlight's biggest update in a long time added much more, including the ability to edit the tab order on the bottom of the screen, internet-sourced traffic display, a reorganized Airports screen layout, and a few small improvements to the Maps screen. Let's look at some highlights.

Multitasking Support for iPad

In an effort to better position the iPad as a competitor to the traditional laptop computer, Apple began adding iPad-specific software features back in 2015 in iOS 9. This first iPad-specific change allowed you to run native iOS apps like the Safari web browser and the Mail app side by side in a split-screen view, allowing for increased productivity when working with multiple apps simultaneously. Many third-party apps were updated soon after to support this feature, with the big omission being ForeFlight in the aviation space.

The wait is finally over, as ForeFlight now

supports the dynamic resizing needed to display the 1/2 and 1/3 screen sizes when using iPad multitasking. Here's a look at each of the split-screen options using the Apple Timer app as an example:

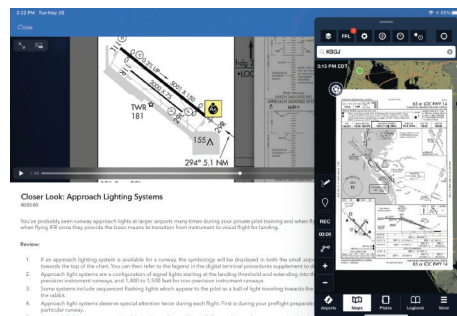


To try this out, first, drag the icon of the app you'd like to run alongside ForeFlight to the dock at the bottom of the screen.



Then launch ForeFlight, and swipe up slowly from the bottom of the screen to reveal the dock. Using the native Apple Timer app as an example, tap, hold and drag the icon of the Timer app to the right side of the screen and release your finger. You'll now see timer displayed side-by-side along ForeFlight. Tap and hold on the separator in the middle of the screen to adjust from 1/2, to 1/3 or 2/3 size ratios. To revert either app back to full screen, tap and drag the separator to the far left or right side of the screen.

In addition to split-screen multitasking, ForeFlight also supports the iPad slide-over view. Say for example you're studying in Sporty's Pilot Training app and wanted to review a particular approach chart for an airport, you can now overlay the ForeFlight app in a "slim" presentation on the right side of the screen and continue to use both apps at the same time. To load this alternate view, first launch the primary app, and then tap and hold the ForeFlight icon and drag it from the dock to the middle of the screen (instead of the far right or left edge of the screen for multitasking) and release your finger.

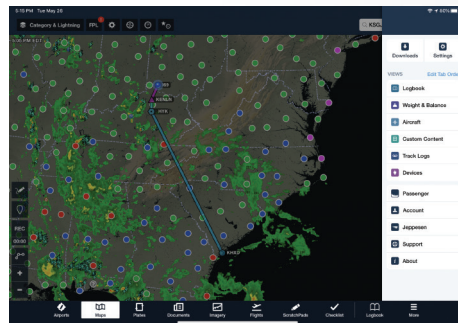


To remove the slide-over view, tap and hold the top of the ForeFlight window, as shown in the example above, and drag it off to the right side of the screen. It's worth pointing out that the "slim" presentation of ForeFlight in the 1/3 split-screen or slide-over view is the same layout as you'll see in the updated iPhone version (more on that later).

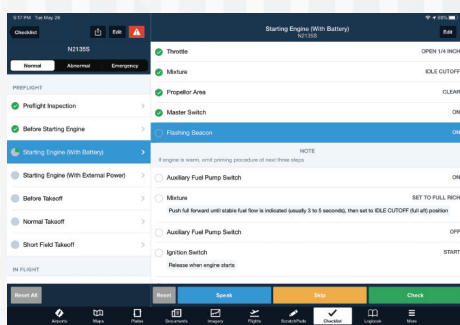
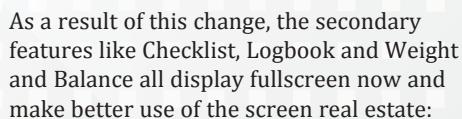
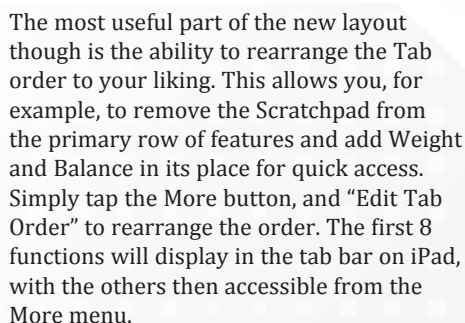
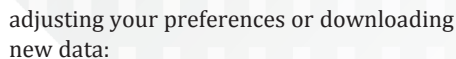
Redesigned "More" Menu

ForeFlight has outgrown its basic tab-bar navigation system over the last ten years as it added supplemental features like Checklist, Logbook, Weight and Balance, and Track Logs. These features spilled into the "More" section of the app, along with account management, settings and chart downloads.

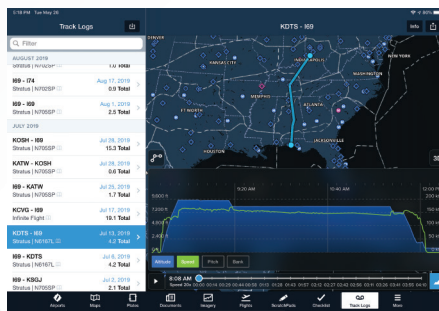
To help make these secondary features more accessible, ForeFlight changed the design of the More menu to a slide-over view appearing on the right side of the screen:



This new design offers several benefits. First, it allows you to access the More menu without leaving the screen you're currently viewing. Next, it displays the Downloads and Settings in inset windows, again allowing you to stay where you're at in the app while

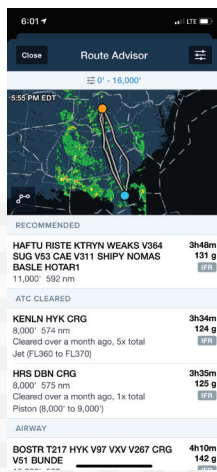



There's one final thing to point out here—look at the tab just to the left of the More button, which has a thin vertical line to the left of it. This is a dynamic button that provides quick access to the most recently used feature from the More Menu.

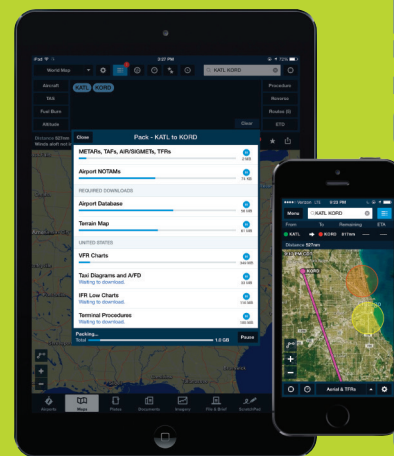


iPhone updates

If you're like many ForeFlight users, you typically use the iPhone version of the app for quick data checks, like weather and basic airport info, but switch over to the iPad's more capable interface when it comes time for IFR route and procedure planning. You may want to rethink this flow now, thanks to the addition of the Route Editor in the new iPhone version of the Maps screen. This now displays the familiar waypoint "Bubble Editor," allowing you to select aircraft profiles and fully interact with the altitude advisor, route advisor and procedure advisor planning tools on iPhone.



You will also find dedicated Plates and Scratchpad screens on iPhone too. The only view not accessible on iPhone is the Terrain/Airspace profile analysis on the Maps screen. 



ForeFlight

ForeFlight is the critically acclaimed flight planning, flight support, and electronic flight bag (EFB) app for pilots. Navigation charts, internet and in-flight weather, moving map, hazard and terrain awareness, wireless connectivity, data syncing and backup, and much more. Built with an attention to detail and backed by a dedicated, fanatical support team, ForeFlight is a best selling aviation app for iPad and iPhone.

ForeFlight Basic Plus

99031A \$99.99/year

ForeFlight Pro Plus

99030A \$199.99/year

ForeFlight Performance Plus

99032A \$299.99/year



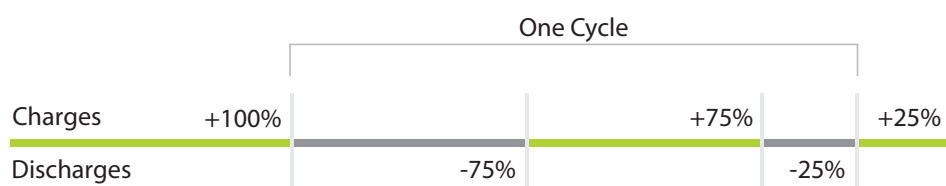
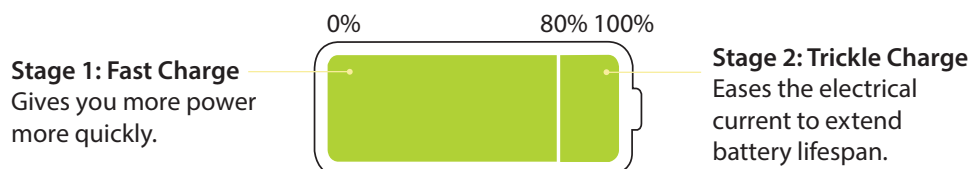
Flying with ForeFlight Course

ForeFlight Mobile has become the most popular app for pilots, with powerful features and an easy-to-use interface. But like any software, there's a lot to learn and some time spent learning the basics can really pay off. That's why Sporty's developed this comprehensive ForeFlight training video, packed with jargon-free tips and real world shortcuts. It's ideal for prospective users, new ForeFlight pilots and experienced pros alike. Approx. 106 minutes.

- Go in depth with the route editor to learn how to choose the right route
- Learn the preflight iPad checklist you should use every time
- Explore how to use the Logbook, Weight and Balance, and Track Logs
- Get tips for using wireless iPad accessories with ForeFlight
- Fly along on a real trip to see everything in action

Tips for better performance

HOW TO MAXIMIZE IPAD BATTERY LIFE



One charge cycle is complete after you've discharged 100% of your battery's capacity.



DOUG RANLY

Private Pilot
CATALOG MANAGER
Sporty's Pilot Shop

One of the most under-appreciated features of the iPad is its fantastic battery life. Even with a high-resolution screen and a powerful processor, Apple's tablet offers a battery life of 4 to 6 (or more) hours in the air—better than almost every other competing tablet. This is a huge advantage in the cockpit, as it'll last for the duration of all but the longest flights.

But there are a number of things you can

do to improve the performance of your iPad battery and keep it in top working condition. First, it's important to know what type of battery the iPad (and the

"The iPad battery will rapid charge to about 80% which is ideal for pilots."

iPhone, for that matter) uses, and how it works. Like most consumer electronics, the iPad uses a lithium-ion polymer battery, often called a LiPo battery. These are the standard in portable devices now because they have a high power density but are very lightweight. Another major advantage of LiPo batteries is the way they are charged. There is no "memory effect" like older Nickel Cadmium batteries, so you can charge your iPad anytime you want and even leave it on a charger overnight. The battery will also charge very rapidly, to about 80% in a few hours, while the last 20% is more of a trickle charge and takes longer. LiPo batteries also hold their charge for a long time, so a fully charged iPad that is stored for a month will still have most of its charge.


So far we've talked about the "battery life," meaning how long the iPad will run on a

single charge. But Apple also specifies a "battery lifespan," which is the number of times you can charge and discharge the battery before it starts to lose capacity. The iPad was designed so that, after 1000 charge/discharge cycles, it will still have 80% of its battery capacity. Note that it's not considered a "charge cycle" every time you plug in your iPad. If you used 20% of your iPad's battery life every day for 5 days, and recharged it each day to 100%, that would be one charge cycle. So 1000 charge cycles is actually quite a long time (probably years of use for most people).

"A cycle does not mean a single charge - it requires a full 100% charging period."

With that background in mind, here are some tips for getting the most out of your iPad's battery:

- Heat can permanently reduce battery life, especially if you use your iPad at temperatures higher than 95° F. The cockpit certainly can get that hot, so the best advice is to never leave your iPad in the airplane and never place it in the sun. Also, charging the device when it's over 95 is even worse, so try to do your charging at home if you often fly in hot conditions.
- Cold conditions (below 32°F) can also affect battery performance, but this is a temporary issue. Again, you shouldn't store your iPad in the airplane on a cold night, but once it warms up the battery should give you normal life.
- Use your iPad regularly. Lithium-ion batteries are meant to be used hard, so don't be afraid to use and recharge your iPad often. In fact, if you don't regularly use your iPad, you should perform a complete charge cycle at least once a month (where you fully discharge the battery, then charge it up to 100%).
- Adjust screen brightness and wireless radio settings for maximum battery life. If you don't need the screen at max brightness, turn it down—this can significantly reduce battery drain.
- Use the battery utility in the Settings app to monitor what apps are using battery life.

One downside to the iPad battery is that there is no way to replace it in the field. If your battery needs service or replacement, it must be sent back to Apple or taken to an Apple service provider. 

NEW DUAL USB CHARGER IS PERFECT FOR THE COCKPIT

For pilots using a tablet as their primary chart reference, keeping an iPad charged isn't just a convenience—it's a safety of flight issue. Fortunately, there are a whole host of solutions that can keep your battery topped off; unfortunately, many were developed for cars and not airplanes. As we've learned the hard way, not all of these "good deals" work in the demanding environment of an airplane cockpit.

We've recently been testing a new option that is made for aviation but is both inexpensive and portable. It has some nice upgrades over previous generations too.

The Flight Gear Dual USB Charger is a compact cigarette lighter plug, shaped like many other charging plugs. There are three key differences, though, that make this our new favorite charging accessory.

It's universal. Most airplanes have 12V cigarette lighter plugs (even those with 28V electrical systems), but some put out 24V or even 28.5V. This automatically disqualifies most car chargers. Conveniently, the Flight Gear model will accommodate a wide range of plug voltages. We've tested it on everything from 12V Cessna plugs to 28.5V Pilatus plugs and we've had good results on them all. Just plug it in and go.

Dual 3 amp plugs. Here's another handy feature that eliminates thinking. While iPhones are happy to charge off a 1 amp plug, iPads and ADS-B receivers all need 2.1 or 2.4 amps to charge properly. Again, inexpensive car chargers often have either no high amp plugs or only one, so you're constantly searching for the one labeled "2 amps." Both USB ports on the Flight Gear USB Charger are 3 amps, so you can easily charge an iPad and a Stratus at the same time. Even the latest iPad Pro models can charge off this plug at full speed.

Built-in screen. This is something we've seen on a few models, but with varying



JOHN ZIMMERMAN

ATP
VICE PRESIDENT
Sporty's Pilot Shop

success: a built-in screen right on the front of the charging plug that shows real time system status. This one delivers just what pilots need, and it also has a pivoting arm that allows the screen to be tilted 45 degrees, which is helpful in tight cockpits. When you plug in the charger and the airplane's electrical system is on, you'll see the current voltage being put out by your cigarette lighter. This is a good way to monitor the status of your battery, or at least your plug. You'll see the screen blink if it drops below 12V (for 12-14V airplanes) or is between 18 and 24 volts (for 24-28V).

Once you plug into the USB ports, the screen also cycles through the amps being drawn by your devices. This is a great way to confirm that your iPad is getting its 2+ amps, and you'll notice it automatically charges an iPhone at the lower rate of about 1.3-1.5 amps.

We've flown a number of flight with this charger, in a variety of aircraft, and so far it has

worked well with a slew of portable devices, including iPad Pros, an older iPad, Stratus ADS-B receivers, and GoPro video cameras. Notably, there has been no avionics interference, a common problem with cheap chargers. It even has some aviation reference information printed on top.



Flight Gear Dual USB Quick Charger

Two USB ports provide up to 6.0 amps (3.0 amps each), giving it plenty of power for even the newest tablets. An integrated LED screen displays the voltage of the cigarette lighter socket it is plugged into. When you plug a USB device into it, the screen changes to show the amount of amps your device is drawing. Works in 12 volt and 24 volt aircraft. **3033A \$18.95**



Flight Gear Backup iPad Battery The all new Flight Gear Backup Battery for iPad is the pilot's answer for charging mobile devices on the flight deck. This battery packs some serious power, 20,000mAh of capacity to be exact. Two 3 amp, one 2.4 amp and one 2 amp USB port deliver enough power to charge multiple iPads at the same time while those iPads are being used by the pilots. **6639A \$79.95**



Flight Gear Dual USB Smart Charger

Keeping your portable devices topped off is essential to stress-free flight. iPads, smartphones, tablets, GPS units, ADS-B receivers... all need to be charged before heading to the airport. This dual USB charger provides all the power you need to keep your devices fully charged. With 2 ports providing 2.4 amps each, it will keep even the most power-hungry iPads charged. **6638A \$16.50**

BUY ALL 3!

Flight Gear Charging Bundle

B1124A \$99.95

WHICH ADS-B RECEIVER SHOULD I BUY?



CHRIS MCGONEGLE

Commercial Pilot
NEW PRODUCT MANAGER
Sporty's Pilot Shop

ADS-B receivers continue to be the most popular iPad accessory on the market. These all-in-one devices stream GPS, subscription-free weather, traffic and optional backup attitude information to your iPad, changing it from a static chart viewer to an interactive in-flight tool. Some even include SiriusXM weather and entertainment features. How do you pick the right one? Here are some questions to consider.

Choose an app first

The first tip is easy: choose the app you prefer first, then choose an ADS-B receiver that works with that app. Some pilots get this backwards, chasing hardware around and switching between apps. That just leads to confusion and frustration.

As a pilot, you have to live with your aviation app on every flight (and in between them), whether you use an ADS-B receiver or not. Make sure your app is one you understand and feel comfortable using. Whether it's ForeFlight, Garmin Pilot, WingX, FlyQ or something else doesn't matter—the right app is the one that works for you and your flying. Try them all (they offer free trials so you can couch fly them) and become truly proficient with the one you select. After picking your app, then it's easier to choose the right ADS-B option. Because of the deep integration required between app and accessory, some ADS-B receivers are app-specific:

- *ForeFlight*: Stratus 3, Sentry, Sentry Mini, Garmin GDL 50/51/52
- *Garmin Pilot*: GDL 50/51/52
- *FltPlan Go*: Stratus 3, GDL 50/52, Dual XGPS 170D, Dual XGPS 190
- *WingX, FlyQ, Stratus Insight*: Stratus 3, Dual XGPS 170D, Dual XGPS 190

Don't misunderstand us: there are differences between the various ADS-B receivers. But these differences pale in comparison to the apps. You have to start here.

Using a Garmin portable GPS?

If you fly with a Garmin 760 or 660, there is an additional consideration. The GDL 50/51/52 can feed information to a portable GPS, in addition to your iPad. This is a nice way to get extra utility out of an older GPS or to have a full-featured backup navigator in the cockpit.

For the 796 and aera 760/660, this connection is wireless via Bluetooth. For other models like the 696, it requires an adapter cable. Also note the Garmin 760 and 660 allow you to display full pitch and roll information from the GDL's built-in Attitude Heading Reference System (AHRS). This makes these truly no-compromise display units.

If you don't have one of these devices, this feature won't matter. If you have a Garmin GPS but you use another app, is it worth switching to take advantage of this? Only you can answer that question, but

ask yourself which device would be primary: iPad or Garmin?



Comparing specs

Once you've settled on an app and considered the Garmin option, it's time to choose a specific ADS-B receiver. This is where it makes sense to compare specs, but it's worth noting that every receiver on the market offers the two key features: GPS and subscription-free weather. These are the things you'll use most often, and every unit includes them. That means there isn't really a bad option.

Beyond these basics, there are three other features to consider: battery, backup attitude sensor, and SiriusXM. Almost all receivers have a battery, but how long the internal battery lasts is an important



Sentry is a compact, affordable ADS-B receiver specifically made for ForeFlight

feature to think about. For a homebuilder wiring in an ADS-B receiver, or for a pilot who plans to keep his receiver plugged into the cigarette lighter, a built-in battery may not be necessary. For a renter or a pilot who prefers fewer wires, a built-in battery is an essential feature. We also think it has great value as a backup.

- *No battery*: Sentry Mini
- *With battery*: Stratus 3 (8 hours), Sentry (12 hours), GDL 50 (8 hours), GDL 51 (7 hours), GDL 52 (5 hours), Dual XGPS 170/190 (5 hours)

Another feature to consider is built-in

ADS-B

BUYER'S GUIDE

RECEIVER	 FORFLIGHT SENTRY MINI	 FOREFLIGHT SENTRY	 APPAREO STRATUS 3	 GARMIN GDL 50	 GARMIN GDL 51	 GARMIN GDL 52
ADS-B WEATHER	✓	✓	✓	✓		✓
SIRIUSXM WEATHER					✓	✓
WAAS GPS	✓	✓	✓	✓	✓	✓
TRAFFIC	Dual-band	Dual-band	Dual-band	Dual-band		Dual-band
AHRS (ATTITUDE)		✓	✓	✓	✓	✓
FLIGHT DATA RECORDER			✓			✓
CO DETECTOR		✓				
ANTENNA	Internal	Internal	Internal	Attached	Internal	Attached
BUILT-IN BATTERY		✓	✓	✓	✓	✓
BATTERY LIFE	N/A	12 hours	8 hours	8 hours	7 hours	5 hours
COMPATIBLE APPS	ForeFlight	ForeFlight	ForeFlight, WingX, Fltplan Go, FlyQ	Garmin Pilot, GPSs, ForeFlight, Fltplan Go	Garmin Pilot, GPSs, ForeFlight	Garmin Pilot, GPSs, ForeFlight, Fltplan Go
CONNECTION	WiFi	WiFi	WiFi	Bluetooth	Bluetooth	Bluetooth
PRODUCT #	7592A	6891A	6647A	7261A	7147A	6241A
PRICE	\$299.00	\$499.00	\$699.00	\$699.00	\$649.00 +\$200 REBATE	\$1,149.00 +\$200 REBATE



AHRS to deliver backup attitude information or synthetic vision to your iPad. This is not a primary instrument, but in a worst case scenario, we would not hesitate to use it. For a VFR pilot, it may be overkill and you can save money by choosing a non-AHRS model, but we still think there's value in it for situational awareness. For an IFR pilot, it's a great insurance policy.

- *No AHRS:* Sentry Mini, Dual XGPS 170D

- *With AHRS:* Stratus 3, Sentry, GDL 50/51/52, Dual XGPS 190

For pilots who fly in Canada, or for those flying high performance airplanes, SiriusXM weather is another nice option to consider. This weather is delivered via satellite, so unlike ADS-B there are no coverage limitations—it works from coast-to-coast, even on the ground. You'll also have access to more weather products, including base reflectivity radar, storm cells, and much more. There is a monthly subscription with SiriusXM (starting at about \$30), but you can also add music to your subscription.

- *ADS-B Only:* Sentry Mini, Sentry, Stratus 3, GDL 50, Dual XGPS 170D, Dual XGPS 190
- *SiriusXM Only:* GDL 51
- *SiriusXM and ADS-B:* GDL 52

“Whether it’s ForeFlight, Garmin Pilot, WingX, FlyQ or something else doesn’t matter—the right app is the one that works for you and your flying.”

Other considerations

There are also some additional features beyond the basic weather/GPS/traffic/attitude set. Some models, like the Stratus 3, include automatic flight data recorders so you can store your flights and replay them in apps like CloudAhoy or Google Earth. This is great for training or proficiency flights, and it's always recording.

Finally, while most pilots spend a lot of time debating ADS-B vs. SiriusXM or AHRS vs. no AHRS, we think too little time is spent on “softer” features. These include ease of use, reliability and customer support. Such features aren't easily compared in a chart,


but they impact your flying in a significant way. Consider how well-integrated the receiver is with the app you use, how easy to use the entire system is and what customers are saying about support. You can learn a lot reading customer reviews online.

One feature that doesn't matter much is reception. Every ADS-B receiver we've flown with has perfectly good reception.

Build it yourself

There is another option for pilots who enjoy a little bit of electronics work. Stratus is an open-source software project that turns commercially available parts into full-featured ADS-B receivers. For about \$150 in parts and a few hours of assembly, you can have a dual band receiver. There are even some kits available, although not all include a battery so read the parts list carefully.

Final thoughts

Don't make this decision harder than it needs to be. In its most basic form, we suggest a two step process. First choose your app, then choose whether you want “VFR features” or “IFR features.” The big difference between VFR and IFR would include a built-in AHRS and maybe SiriusXM. In most cases, you will have a decision after answering those questions. 

FOREFLIGHT ADDS SENTRY MINI TO FAMILY OF ADS-B RECEIVERS



JC MAYERLE

Recreational Pilot

DIGITAL MARKETING MANAGER

Sporty's Pilot Shop

Portable weather receivers, especially those that pick up the free ADS-B broadcasts, have exploded in popularity over the past five years and we think that's great news. In fact, we believe that every pilot who flies beyond the traffic pattern should have datalink weather in the cockpit. That's not just a matter of convenience or having the latest technology—a recent study shared by the Aircraft Owners and Pilots Association showed that pilots flying with ADS-B In had a 50% lower accident rate and a 90% lower fatal accident rate.

Now there's an affordable and easy-to-use option for flying with this safety-enhancing technology. Sentry Mini, introduced in 2019, is an incredibly small, lightweight ADS-B receiver that's specifically made for ForeFlight. It delivers subscription-free datalink weather, including radar, lightning, METARs, TAFs, and TFRs, plus dual band ADS-B traffic and WAAS GPS position. All these features are packed into a case that weighs less than two ounces and is smaller than a deck of cards. Trust us—it's tiny! Perhaps best of all, it's priced at just \$299—a good investment for almost any pilot.

Flight test

We've had the chance to go flying with Sentry Mini flying on numerous flights, and it has performed flawlessly. Just mount it on the side window (using the included RAM suction cup mount) and plug it in to a power source. There's no power button so as soon as it's plugged in it will start up.

Reception was solid, as we picked up an ADS-B tower just 200 feet off the ground at Sporty's airport and had continuous coverage throughout four cross countries.

Two green lights on the front confirm you are receiving both ADS-B and GPS. That GPS receiver is a nice addition here—ForeFlight introduced Scout a few years ago, but the lack of a GPS was a significant limitation for us. The Sentry Mini is a more complete product.

Another easily overlooked feature is weather replay. This means you can turn off your iPad screen to save battery life, then turn it back on and get an update from the Sentry Mini with all the weather information you missed. This can extend your iPad's battery life by hours.

Power and mount options

Sentry Mini does not have a battery (one reason it's so small), so you'll need either a cigarette lighter plug, a panel-installed USB plug, or a portable battery pack. We've used all three options and they work just fine—a sturdy, braided USB-C charging cable is included with Sentry Mini and it's long enough to reach across the cockpit.

The Flight Gear Backup Battery Pack in particular is a great combination. It ran Sentry Mini for four long flights without recharging. The original 20,000 mAh size should power Sentry Mini for over 75 hours; the new 10,000 mAh size is a more convenient size but should still provide enough juice for multiple flights.

The included suction cup mount is the same as the one included with the full size Sentry, and it works well. Just twist the Sentry Mini onto the RAM suction cup and mount it on a side window. Because there is no AHRS in Sentry Mini, it's less particular about where in the airplane it's mounted.

A family of Sentry receivers

Of course if you're looking for top-of-the-line features, the Sentry Mini's big brother is a great option and it's not going away. It adds a 12-hour battery for completely wireless operation, plus an AHRS to drive a backup attitude display and synthetic vision. There's even a built-in carbon monoxide monitor to alert you of dangerous cockpit conditions from an exhaust leak. This makes Sentry a complete in-cockpit safety tool, but it's still quite small and totally portable. It would be at home in almost any type of aircraft, from taildraggers to helicopters to jets. Either one is a good value and an important safety tool for any pilot. ➡



Affordable and powerful ADS-B receivers

The Sentry family of portable ADS-B receivers is an easy and affordable way to add datalink weather and ADS-B traffic to your iPad. Specifically made for ForeFlight, both Sentry and Sentry Mini pack a long list of features into a small size.

Features:

- Subscription-free weather in flight
- Dual band ADS-B traffic
- Built-in GPS
- Weather replay
- Connect to ForeFlight
- Backup attitude information (Sentry)
- Pressure altitude sensor (Sentry)
- 12-hour battery (Sentry)

Sentry Mini The easiest and most affordable way to fly with subscription-free weather, Sentry Mini weighs less than 2 ounces but still delivers all the essential features for cross country flying. You'll see complete FIS-B weather data in ForeFlight, from radar and lightning to METARs and TFRs. Dual band traffic helps you track nearby aircraft, and the built-in GPS drives moving map navigation with terrain alerts.

Available at an incredible price, Sentry Mini can be plugged into a cigarette lighter charger or a portable battery pack. **7592A \$299.00**



Sentry A no-compromise safety tool, Sentry includes all the features of Sentry Mini plus a 12-hour battery for completely wireless operation and an attitude heading reference system (AHRS) to drive synthetic vision with real-time pitch and bank. There's even a built-in carbon monoxide detector to alert you to potentially fatal exhaust leaks. Even with all these thoughtful features, Sentry measures just over 1" thick and weighs less than 5 ounces, so it's easy to take along on every flight.

6891A \$499.00



APPAREO INTRODUCES NEW STRATUS INSIGHT APP TO COMPLEMENT POPULAR ADS-B RECEIVERS



CHRIS CLARKE

Commercial Pilot
VIDEO PRODUCER
Sporty's Academy

After buying Aerovie last June, many pilots wondered what the next step would be for Appareo, maker of the popular Stratus line of ADS-B receivers. Earlier this year, Appareo showed what they've been working on, introducing Stratus Insight. This is a significantly upgraded app with a new name and a new look.

Essential features

At heart, Stratus Insight is a full EFB app, competing with dominant companies like ForeFlight and Garmin. That means it's a complete pre-flight and in-flight resource, with all the features pilots have come to expect. This includes:

- VFR and IFR charts
- Geo-referenced approach plates
- Pre-flight weather briefings
- Airport and FBO information
- Flight plan routing
- Synthetic vision
- Terrain warnings
- Checklists
- Pilot logbook

While this is a familiar list of tools, it's still impressive. We've been testing the app for a few weeks and overall found it powerful and easy to use. There are some differences in design, as there are with all apps, but key features are intuitive and we didn't experience any bugs.

New ideas

It's clear that Appareo wants to make Stratus Insight more than just a "me-too" aviation app. The company's vision is to go "beyond

glass," meaning the next step in portable avionics that does more than just duplicate a glass cockpit. In particular, the goal is not merely to provide information but help pilots make smarter decisions by anticipating their needs. That leads to some unique features.


Most notable is the option for radio transcription and playback. The idea is to listen to everything that comes over the radio and display it as text, sort of like visual voicemail on a smartphone. This seems simple, but it actually requires a lot of behind-the-scenes work.

Stratus Insight uses Appareo's proprietary artificial intelligence tools (natural language processing) and thousands of hours of training to offer useful translations instead of just raw text output. For example, the app knows that "one zero, ten thousand" should display as 10,000, or that "November two two eight four quebec" should display as N2284Q. These little fixes make a big difference in usability, and pilots can tap on a transmission to listen to the recording.

This is an innovative feature, with the potential to save pilots time and confusion, but it's worth mentioning some important caveats. First, these audio features require a cable to connect your iPad to the aircraft's intercom. It seems like you should be able to do this via Bluetooth, but Apple severely limits this feature. That means the only option is to plug into the headphone jack. This can be done with Appareo's \$50 cable, but remember that not all iPads have a headset jack so an adapter may be required.

We've flown with this feature for months and it has steadily improved. We've found the transcriptions to be helpful, but they are certainly not flawless. Radio quality, controller accent, and other variations can negatively impact performance. The good

news is that, as the app listens to more and more transmissions, it learns and improves.

Stratus Insight is free to download from the App Store, and works with iOS 11.4 and later. A subscription is required to unlock most features, which costs \$99.99/year. 



STRATUS 3



"Insanely good piece of equipment."

- Simon W., Stratus owner

Stratus 3, the latest generation of aviation's top weather receiver, is your everyday cockpit companion. Just turn it on and go flying—in minutes you'll see subscription-free weather, ADS-B traffic, backup attitude, and GPS position right on your tablet. All this information at your fingertips will dramatically improve your situational awareness and help you make better in-flight decisions. Proven by millions of flight hours in everything from Piper Cubs to military fighters, Stratus is the portable avionics solution you can trust.

Features:

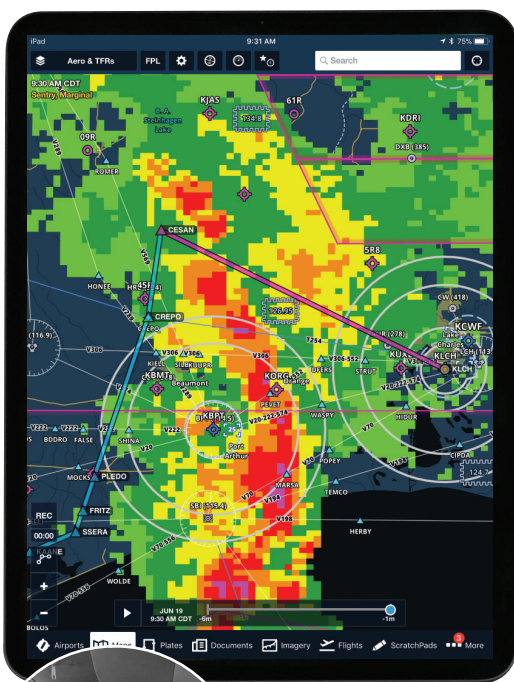
- Subscription-free in-flight weather
- Dual band ADS-B traffic
- Internal WAAS GPS
- AHRS for backup attitude
- Automatic flight data recorder
- Pressure altitude sensor
- Long-lasting 8-hour battery
- External antenna ports
- Overheat protection built-in
- Totally wireless operation

Stratus 3 ADS-B Receiver 6647A \$699.00

Stratus Audio Cable Simply plug this cable into the headphone jack and use the Stratus Insight app to record the audio transmissions from your intercom. The cable connects the iPhone/iPad to your headset and radio. **3362A \$49.99**



ADS-B VS. SIRIUSXM DATALINK WEATHER



MICHAEL WOLF

Commercial Pilot
PRESIDENT
Sporty's Pilot Shop

WHAT'S THE DIFFERENCE?

If you're considering a datalink weather receiver for your iPad (like a Sentry, Stratus, or GDL), one of the first decisions you'll face is the source of your weather data: ADS-B or SiriusXM? Both are reliable systems that deliver the same key information, so neither one is a bad choice. But there are important differences to consider. Let's review each option.

The basics

There are enough acronyms to confuse even the most experienced pilot, so let's begin with the essential information. If you're shopping for a weather receiver, you probably know the quick features of ADS-B and SiriusXM.

ADS-B:

- Information is broadcast up from ground stations
- No monthly subscription is required
- Includes the essential weather information (radar, METARs, TFRs)

SiriusXM:

- Information is broadcast down from geostationary satellites
- A subscription is required (\$30-100/month)
- Includes higher end weather products (satellite, storm cell information, etc.)

All of those bullets are correct, and they summarize the main differences. A deeper dive into the details, though, may help you make a smarter decision.

Coverage

The first thing to consider is coverage area, and here's the first major difference between the two systems.

ADS-B uses a network of over 700 ground stations to broadcast weather on the 978 MHz frequency. Like a VOR, if you have a radio tuned to the right frequency (and with an ADS-B receiver,

you do) then you'll get weather. Also like a VOR, reception is based on line of sight, so higher altitude improves reception and mountains prevent reception. East of the Mississippi, ADS-B coverage is quite good but you likely won't receive weather on the ground (at Sporty's airport we typically get reception at 200-300 feet and the closest tower is about 25 miles away). Almost the entire country has coverage at 3-5,000 feet AGL, but if you're flying over the Rockies at low altitude, coverage can be spotty.

Here's a map from the FAA, estimating ADS-B coverage at 5,000 feet AGL:



It's worth noting that ADS-B uses different types of ground stations that transmit different weather products. In everyday flying, this doesn't matter—one ADS-B ground station is enough to get weather, but you'll typically receive somewhere between 3 and 12 towers. The only time this difference between towers comes into play is if you're only receiving one tower and it's a surface station. In that case, you might not see national (CONUS) radar.

SiriusXM, since it uses satellites, has no altitude limitations—you'll receive all weather products even on the ground. This makes it ideal for pilots flying at low altitude in remote areas. It also offers some coverage in southern Canada and the Caribbean, but it's important to note that satellite reception does not guarantee there is weather data for your location. That is, you may get good SiriusXM reception in the southern Bahamas, but there is no radar data to display.



Here's the coverage map for SiriusXM:

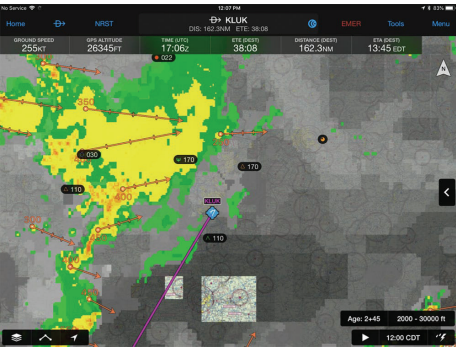
Weather products

After reception, the next difference is in the weather products that ADS-B and SiriusXM broadcast. Both transmit the most important ones, including: NEXRAD radar, METARs, TAFs, PIREPs, AIRMETs, SIGMETs, lightning, and TFRs. Those are the tools most pilots need to avoid thunderstorms, IFR conditions, and restricted airspace, but there are some details to consider.

SiriusXM offers four main subscription packages, and depending on the subscription level you can access additional weather products. This includes freezing level graphics, surface wind forecasts, and both cloud-to-cloud and cloud-to-ground lightning (ADS-B only shows the latter). Note that you can suspend SiriusXM service for up to six months per year, so with a Garmin GDL 52 a seasonal flyer could use SiriusXM during the peak flying months and ADS-B during slower months.

Perhaps the most useful additional product on SiriusXM is Storm Cell Attributes. This adds echo tops, direction of movement, and speed of movement to the typical radar image. These extra data points can help you determine whether that yellow cell is convective or just rain. In the example below, that line of weather has tops between 25,000 feet and 45,000 feet, and

is moving east at a fairly good pace. That suggests real convection and a nasty ride:



While SiriusXM has the higher end weather products, ADS-B has closed the gap recently by adding lightning, cloud tops, Center Weather Advisories, and icing forecasts. The biggest thing missing from that list is satellite, although we would put that in the nice-to-have category, not the must-have category.

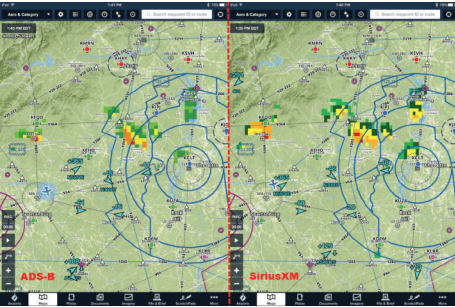
Also note that while SiriusXM transmits all weather data simultaneously, ADS-B will often only show METARs and TAFs within about 500 miles of your airplane.

Radar

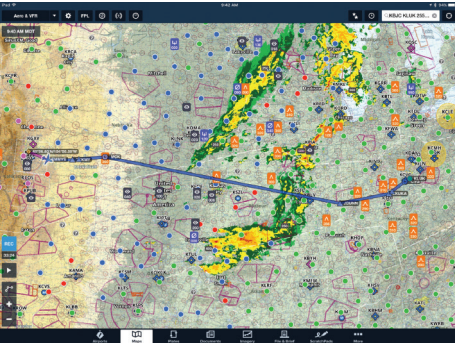
One final topic that gets a lot of attention when it comes to weather products is radar. You'll often hear something like, "ADS-B radar is blocky; SiriusXM is high resolution." That's sort of true, but it doesn't tell the whole story; it depends on two questions. First, what receiver are you using and where are you displaying the radar (ForeFlight on your iPad, G1000 screen in the panel, etc.)? Some apps and avionics do a lot of radar smoothing to make it look higher resolution than it really is. That's not a bad thing necessarily, but it doesn't have

much to do with the raw radar data.

Secondly, while SiriusXM has a single resolution nationwide, ADS-B uses a higher resolution regional NEXRAD and a lower resolution national NEXRAD image. Here's a side-by-side comparison of ADS-B regional radar and SiriusXM, as displayed in ForeFlight. As you can see, the resolution is basically the same:

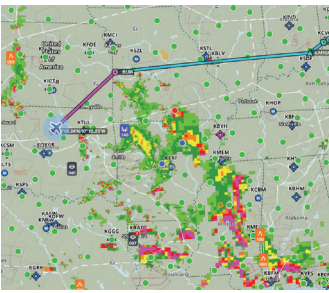


The difference is that SiriusXM radar is full resolution nationwide. In the example below, we can see full resolution radar in northern Wisconsin, even though our airplane is 800 miles away:



With ADS-B radar, you can see higher resolution radar close to the airplane (near Tulsa, Oklahoma), but further away the radar gets blockier (into Mississippi). That

blockier image is the national radar picture, and as you get closer to it, the image will change to the regional radar image:




In our experience, the two resolutions of ADS-B radar are not a major limitation unless you're flying a high performance aircraft.

Final analysis

As you can see, a detailed discussion of ADS-B vs. SiriusXM quickly gets confusing. But strip away all the talk of dBZ and ground stations, and the message is clear: fly with some type of datalink weather. The similarities are much more important than the differences, and when used properly we believe either service can improve your safety.

If you fly a piston airplane 50 or 75 hours per year, we think ADS-B is a perfectly good solution. You won't miss the higher end weather products and the lower resolution national radar is not a practical limitation.

If you fly a high performance airplane, fly at low altitude or fly in Canada, SiriusXM is probably worth the extra money. You won't have to worry about different radar resolutions and some of the additional weather layers can be very helpful. Just remember you'll be paying at least \$180/year extra for SiriusXM over ADS-B—only you can decide whether that's a good investment. 

Garmin Weather Receivers

Garmin's GDL series of portable weather receivers can take your tablet or portable GPS to the next level, with datalink weather, GPS position, and backup attitude information. The compact receiver sits on your glare shield and streams all this information wirelessly via Bluetooth to your tablet running the Garmin Pilot app or a Garmin GPS. It's everything you need to make smarter in-flight decisions. There's a model for every type of pilot—choose whether you want ADS-B weather, SiriusXM weather, or both. Plus, get a backup synthetic vision with the GDL's built-in attitude heading reference system (AHRS).



WHAT'S THE DIFFERENCE?	GARMIN		
	GARMIN GDL 50	GARMIN GDL 51	GARMIN GDL 52
ADS-B	✓		✓
SIRIUSXM WEATHER		✓	✓
SIRIUSXM RADIO		✓	✓
WAAS GPS	✓	✓	✓
AHRS	✓	✓	✓
BATTERY LIFE	8 hours	7 hours	5 hours
CONNECTION	Bluetooth	Bluetooth	Bluetooth
PRICE	\$699.00	\$649.00	\$1149.00
PRODUCT NUMBER	7261A	7147A	6241A
		+\$200 REBATE	+\$200 REBATE

HOW TO MONITOR YOUR ADS-B OUT SYSTEM'S PERFORMANCE WITH AN iPad



CHUCK GALLAGHER

Private Pilot, Repairman Certificate
PRESIDENT
Cincinnati Avionics

The FAA deadline to equip with ADS-B Out has now passed, probably to the relief of many pilots. Overall equipage levels rose quickly at the end of 2019, with both avionics shops and A&Ps staying busy installing tailBeacons, GDL 82s, and Stratus ESGs. The FAA reports over 100,000 aircraft now have ADS-B Out installed.

While ADS-B Out avionics are pretty simple to operate (they're basically just upgraded transponders), it is important to ensure your system is working properly.

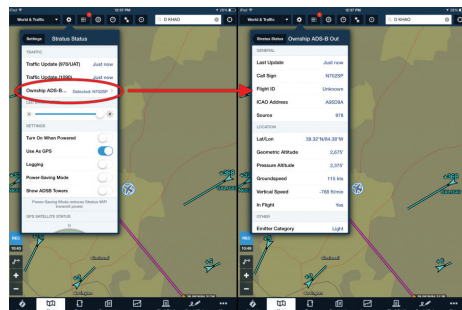
Simply choosing the wrong setting during installation can lead to significant errors, and we've heard a number of stories where this has happened. Fortunately, it's free and easy to check.

ForeFlight and Sentry/Stratus

For pilots flying with ForeFlight and a portable ADS-B receiver, the easiest way to verify the performance of your ADS-B system is by using the Status menu. As you fly along, Sentry or Stratus is listening for all kinds of ADS-B transmissions, including your own. So when your ADS-B Out transponder sends out a message, your portable receiver is one of the first to hear it. ForeFlight packages this information together and displays it right in the app.

Go to the Maps page in ForeFlight, then tap the gear symbol at the top left. At the bottom of that pop-up menu, you can select your receiver, then scroll down and tap on Ownship ADS-B Out. This screen will show you all kinds of information, from your tail number and pressure altitude to lat/lon and emitter category. In general, green means good here. If in doubt about something you see, take a screenshot and email it to your

avionics technician. We know a few avionics shops who use this exact setup on post-installation flights to make sure everything is set up properly.



Garmin Pilot app

You can use the Garmin Pilot app and one of Garmin's ADS-B receivers, like the portable GDL52, to detect your airplane's ADS-B Out signal and provide full diagnostic data in the app. Like Sentry or Stratus, Garmin ADS-B receivers are constantly listening and will detect the transmissions from your ADS-B out transponder.

To view the data, go to the Connex section in Garmin Pilot and select the ADS-B receiver paired to your iPad under the Devices section on the left side of the screen. Next, select the ADS-B Compliance option,

ADS-B OUT SOLUTIONS

1090MHz These are basically upgraded transponders, and replace your existing Mode C transponder in the panel. 1090MHz is the standard worldwide and is approved for use at all altitudes, so there are fewer restrictions compared to 978MHz. These all-in-one solutions are a great option if you're looking to replace an older transponder.



STRATUS ESG

- Integrated WAAS GPS for an all-in-one solution
- Connects to Stratus portables

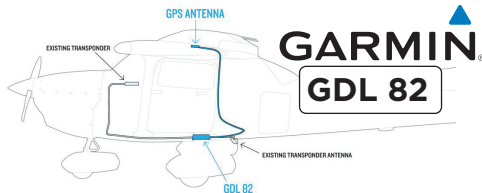
Certified 16800A \$2995.00
Experimental 22311A \$2795.00



GARMIN GTX 335

- Built-in WAAS GPS means nothing extra to buy
 - Includes altitude encoder and USB charger
- 5960A \$3195.00**

978MHz These are allowed in the United States only, and below 18,000 feet. 978MHz systems also require aircraft owners to maintain their existing Mode C transponder, so they are a good option if you have a modern digital transponder like a GTX 327. If you have an older, analog transponder like a KT76A or a Narco, we suggest a 1090MHz solution.



This 978 MHz UAT can be installed between your existing transponder and transponder antenna, so there's no need for extensive panel work. Also includes a WAAS GPS for total compliance.

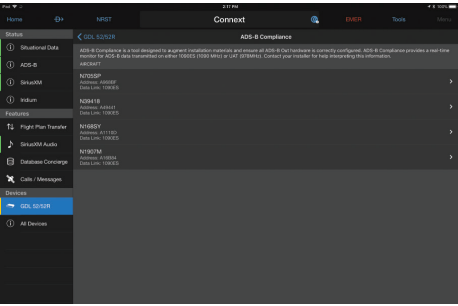
5838A \$1795.00



The most popular option overall, the tailBeacon includes 978 ADS-B Out and a WAAS GPS, but also includes an LED nav

light to replace your existing rear position light. Quick and easy installation and like the skyBeacon it automatically syncs with your Mode C transponder. A great choice for quick install, even by an A&P. **2836A \$1999.00**

and you'll see a list of nearby ADS-B out aircraft, including your own N#.



Select your aircraft from the list to view the detailed report. Again if you suspect something doesn't look quite right, take a screenshot and send it to your avionics technician.

Public ADS-B Performance Report

A more formal way to verify your ADS-B Out avionics are working properly is to request a checkup from the FAA, officially called a Public ADS-B Performance Report. The ADS-B network is constantly listening to ADS-B Out transmissions and monitoring

performance. While this is typically used by Air Traffic Control, you can get a copy of this data for your aircraft, and it's completely free.

This report used to require sending an email to an obscure address, but it's much easier now to use the FAA's web page to get the report. After a flight (in ADS-B coverage), go online and fill in a few fields specifying what kind of equipment you have on board. Within about 10 minutes, you'll receive an email report with all kinds of details about your ADS-B transmitter, GPS source and configuration. Some of this will be incomprehensible to anyone other than an avionics technician, but potential trouble spots are highlighted in red. For a complete glossary of terms, read the FAA's PAPER User Guide.

Reporting ADS-B errors

Both of these methods are great for checking the status of your ADS-B system. But what if you suspect a problem with the

FAA's network of ADS-B ground stations? We experienced this on a flight in an ADS-B Out equipped airplane a few years ago. We saw a ghost target (that is, an airplane 100 feet below us, traveling at our same speed and altitude) for over 100 miles. While ghosting can occasionally happen if you aren't ADS-B Out equipped, it should not happen if you are—and it should not happen for more than 100 miles.

In this case, we suspected something was wrong so we contacted the FAA. They replied within a day, explaining that they found a bug that caused a ground station to send incorrect and/or duplicate traffic information. The problem was quickly fixed. To make your own report, email adsb@faa.gov. The more detail you have, the easier it is for them to diagnose a potential problem.

Missing Elements

Element	Value	Unit	Value	Unit	Value	Unit	Value	Unit	Value	Unit
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft

Integrity & Accuracy

Element	Value	Unit	Value	Unit	Value	Unit	Value	Unit	Value	Unit
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft

Kinematics

Element	Value	Unit	Value	Unit	Value	Unit	Value	Unit	Value	Unit
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft

Other Checks

Element	Value	Unit	Value	Unit	Value	Unit	Value	Unit	Value	Unit
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft
Alt	10000	ft	10000	ft	10000	ft	10000	ft	10000	ft

Notes: MCF - Minimum Corrective Factors

HOW TO CHOOSE THE BEST GPS FOR YOUR IPAD

External iPad GPSs were one of the first accessories to appear for the iPad. After the iPad was released in 2010, pilots quickly realized that the tablet was far more useful with an accurate position source—moving maps, terrain warnings and so much more come into play. Let's survey the market.

Do you need a GPS?

If you own a WiFi-only model iPad, it's simple—you have no built-in GPS so you definitely need one. However, LTE model iPads (ones with the cellular radio in it) have a built-in GPS receiver. But while the on-board GPS does work with all popular aviation apps, it was really designed for ground use and it's not always as reliable in the air. For this reason, many iPad pilots—even those with an LTE iPad—opt for an external GPS. It's pretty cheap insurance.

More recently, with the exploding popularity of portable ADS-B receivers like the Stratus and GDL 50, external iPad GPSs have faded in popularity just a bit. If you have a full-featured ADS-B receiver, you do not need a separate GPS, since most of them include one already. However, if you're just getting

started with the iPad and don't want to spend \$500-\$1000 for an ADS-B receiver, a GPS represents a great way to get started.

Note that GPSs are app-agnostic—that is, they work with almost any app because Apple builds "location services" into its core iOS functionality. Many of these GPSs are also compatible with Android devices.

Basic or deluxe

The next question is whether you want a basic, lower cost model or a deluxe model. The three main features of the higher

end models are: longer battery life, data logging functions and the ability to connect to multiple iPads simultaneously—a nice feature for two pilot crews or for connecting to a phone for backup. None of these are necessarily must-have features, but if you'll be flying regularly with a GPS, the longer battery life is worth it.

Two models are available in this deluxe class. Bad Elf offers their Pro+ GPS with all of these advanced features, plus an altimeter, for \$249.99. Dual offers their XGPS160 model for \$149.95.

iPAD GPS	DUAL XGPS150A	DUAL XGPS160	GARMIN GLO 2	BAD ELF PRO	BAD ELF PRO+	BAD ELF PLUG-IN
CONNECTION LIMIT	1 device	5 devices	4 devices	5 devices	5 devices	1 device
BATTERY LIFE	8 hours	10 hours	12 hours	16 hours	35 hours	N/A
DATA LOGGER		✓		✓	✓	
SCREEN				✓	✓	
CONNECTION	Bluetooth	Bluetooth	Bluetooth	Bluetooth	Bluetooth	Lightning plug
PRODUCT #	9044A	7100A	7700A	4753A	8634A	5786A
PRICE	\$99.95	\$149.95	\$129.95	\$149.95	\$249.95	\$99.99



CHARLIE MASTERS

Flight Instructor
FLIGHT SCHOOL MANAGER
Sporty's Academy

Securing your iPad while you fly is important for safety (to prevent your tablet from flying around the cockpit), but also for convenience (to keep it close by and easy to use). There are plenty of different mounts to choose from, but they aren't all universal. Which one is right for you? It depends a lot on the type of airplane you fly. Let's look at some examples.

Cessna high-wing (C152, C172, C182, etc.) Almost any mount will work in these popular airplanes, but our two favorites are the RAM suction cup and yoke mount.

The suction cup is easy to put up and remove, making it a good choice for renters. It keeps the iPad off the yoke, so it doesn't block any instruments, but it's still easily viewed. We like the side window, angled toward the pilot, especially for larger iPads (where the yoke may not work).

The yoke mount is also very popular, since it holds the iPad very securely right in your line of sight. This works best for the iPad Mini, but the full size iPad Air and Pro models are small enough to work too. Most yoke mounts now use an improved claw design, which is easier to install and does a better job keeping the iPad in place on the yoke shaft. One other tip: you can mount the iPad on the co-pilot yoke to keep the primary instruments unobstructed.

If you want to mount your iPad with one of these options, but don't want to remove your case each time, consider the Robust series mounts instead of the form-fitting RAM cradle. This provides the flexibility to secure your iPad with the case on while still using a yoke or suction mount.

HOW DO I MOUNT THE IPAD IN MY AIRPLANE?

Cirrus or Cessna Corvalis With the side stick, one popular option is out the window for these airplanes (the yoke mount), but there are still some good choices. Again, the suction cup mount works well here, but be careful about where you mount it in the side window – the iPad can interfere with the side stick in some configurations.

For this reason, some pilots choose an iPad kneeboard instead, and with plenty of room in your lap this is a good setup.

Piper and Mooney Like high-wing Cessnas, the suction cup mount and the yoke mount are two good options here. One thing to keep in mind for these airplanes is that kneeboards may not work very well. Oftentimes the yoke is very close to the pilot's legs in these cockpits, so the yoke might hit a kneeboard on takeoff or landing.

Beech Most of these airplanes have a much larger control column than Cessnas and Pipers, so pilots of these airplanes need to use a different yoke mount. These attach to the large control column that parallels the panel. Both RAM and MyGoFlight offer good solutions for these airplanes.

Small/Mid-Size Jets There aren't many great options for these airplanes, since the yoke design varies dramatically between models. The kneeboard option is our preferred choice, since it stays out of the

way of floor-mounted yokes. The other mount we've had success with is the double suction cup mount from RAM. This holds firmly to the side window, and most jets have enough cockpit space to accommodate this mount without interfering.

Other Mounting Options The mounts above include options from RAM, Robust, and MyGoFlight. Another option is the PIVOT case and mounting system. This hard-sided case was developed by a Southwest Airlines pilot and offers serious protection. The complete system includes a quick-release suction cup mount that is ideal for the side window. Alternately, pilots can use the universal 1" ball adapter to use the PIVOT with RAM Mounts.

In addition to the Beech mounts, MyGoFlight also offers a complete line of iPad mounts, including a suction cup and a yoke mount. These have multi-piece arms with multiple joints, so they are almost infinitely adjustable. The mounts cost a lot more than a typical RAM or Robust system, but they are well made and offer a lot of flexibility.

As you can see, the options are vast and sometimes confusing, but there is a setup that works in virtually any airplane. ➤

MyGoFlight offers a line of mounts that are almost infinitely adjustable.



The double suction cup mount is a good option for jets and turboprops.

RAM MOUNTS

RAM® Perfect Fit Mounts



These mounts, our most popular, feature custom designed cradles to fit your iPad securely, so there's no movement in flight. Due to their tight fit, they will not work with cases.



Claw Yoke Mounts

iPad Mini 1-3	2476A	\$66.95
iPad Mini 4-5	1602A	\$67.95
iPad Air 1-2 and Pro 9.7"	5938A	\$69.95
iPad Pro 10.5" and Air 3	4585A	\$69.95
iPad Pro 11"	5166A	\$72.95
iPad Pro 12.9" (3rd gen)	7024A	\$75.95
iPhone 11 Pro Max, XS Max, 8+, 7+, 6+	7374A	\$55.95
iPhone 11 Pro, X, XS	6156A	\$55.95

Suction Cup Mounts

iPad Mini 1-3	6618A	\$51.95
iPad Mini 4-5	1494A	\$52.95
iPad Air 1-2 and Pro 9.7"	4866A	\$54.95
iPad Pro 10.5" and Air 3	9635A	\$54.95
iPad Pro 11"	5199A	\$54.95
iPad Pro 12.9" (3rd gen)	7239A	\$59.95
iPhone 11 Pro Max, XS Max, 8+, 7+, 6+	6146A	\$39.95
iPhone 11 pro, X, XS	7195A	\$39.95

MyGoFlight

Features three independent joints, all adjustable and lockable from a single control knob. Extends up to 10.5" in length to get the iPad right where you need it. Custom systems for the iPad Mini and iPad Air include a cradle that snaps around your tablet.

Yoke Mounts

iPad Mini 4-5	B1991A	\$248.00
iPad Pro 10.5" and Air 3	B3250A	\$258.00
iPad Air 1-2 and Pro 9.7"	B2050A	\$258.00
Universal Phone	B2292A	\$198.00
Universal Tablet	B1261A	\$278.00

Suction Cup Mounts

iPad Mini 4-5	B1982A	\$248.00
iPad Pro 10.5" and Air 3	B3002A	\$258.00
iPad Air 1-2 and Pro 9.7"	B2013A	\$258.00
Universal Phone	B1369A	\$198.00
Universal Tablet	B1900A	\$278.00



PIVOT

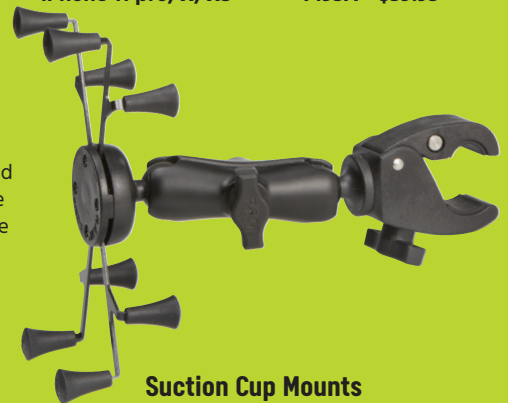
PIVOT combines a simple, robust case with a sleek mounting solution. This system has quickly become a favorite of many airline pilots—over 8000 pilots at Southwest Airlines are using the case in daily flight operations. It's tough enough to work in any cockpit, but the case is also perfect for everyday use as your main iPad cover.

iPad Mini 4-5	1824A	\$149.95
iPad Air 2, Pro 9.7"	B1049A	\$174.95
iPad Pro 10.5"	B1063A	\$174.95
iPad Pro 11"	21452A	\$175.95
Universal 1" Ball Adapter	4913A	\$12.95
Leg Strap	7889A	\$39.95

RAM® X-Grips



These spring-loaded cradles can adjust to fit different size tablets, including iPad, Android and Windows. Simply squeeze the mount to open it up, place your tablet in the middle and let go. Rubber pegs will hold tight without scratching your expensive electronics.



Claw Yoke Mounts

7" Tablet	3201A	\$79.95
10" Tablet	2219A	\$119.95
Phone	4282A	\$64.95
"Phablet" (Large Phones)	7228A	\$64.95

Suction Cup Mounts

7" Tablet	5565A	\$64.95
10" Tablet	3160A	\$103.95
Phone	5457A	\$59.95
"Phablet" (Large Phones)	6066A	\$59.95

ROBUST SERIES MOUNTS

You shouldn't have to buy a new mount every time you upgrade your phone. The Robust Universal Phone Mount will fit all smartphones up to 3.6" wide including all iPhone models. The Robust Universal iPad Suction Cup Mount will fit all iPads and tablets.

Robust Universal iPad Suction Cup Mount

B4410A \$39.95

Robust Universal iPad Yoke Mount

B2315A \$49.95

Robust Universal Phone Suction Cup Mount

B4400A \$29.95

Robust Universal Phone Yoke Mount

B2301A \$39.95



Tablet Suction Mount



iPad/Tablet Yoke Mount



iPhone Suction Mount

HOW TO KEEP YOUR IPAD FROM OVERHEATING IN FLIGHT



MARK WIESENBAHN

Recreational Pilot
VICE PRESIDENT
Sporty's Pilot Shop

Based on an iPad Pilot News reader survey we conducted, over 70% of respondents reported that they have had the iPad shut down on them at least once in flight due to overheating. This is by far the most common problem reported by pilots when flying with an iPad, but it can be prevented with a little bit of planning and preparation.

Apple lists the normal temperature operating range for the iPad as 32° – 95°F. While there are reports of the iPad shutting down when operating in environments well below freezing, the most likely result will be lagging as you interact with the touchscreen (tip – when operating in cold environments, plug it into a charger and use a case to help generate and retain heat).

The more likely scenario when operating at the extreme ends of the temperature operating range is overheating, which will lead to the iPad entering a thermal protection mode where it will become completely unusable until the internal temperature of the device is reduced. The primary reason for this is to protect the enclosed lithium-polymer battery (bad things can happen if they get too hot).

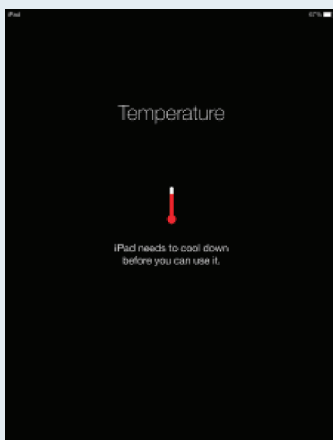
There are a couple of ways on a typical flight that this can happen and both will catch you off guard if you're not paying attention. The first scenario can happen when you're flying in a low-wing airplane en route at altitude with the iPad secured in a kneeboard on your lap. You're in VFR conditions in sunny weather, but the iPad is out of direct sunlight. Then you make a turn over a waypoint, and the sun begins

to shine directly on your iPad's dark screen without you noticing. Even though the ambient temperature may be well below the 95°F limit, the iPad's internal temperature will quickly elevate and soon display the overheat warning.

There are several factors that may increase the potential for an overheat situation like this in flight. First, if you're using the iPad with a fully-enclosed case or kneeboard, you will be restricting airflow around the rear of the iPad, limiting its ability to dissipate heat. Also, charging the iPad from a USB port in the airplane or a backup battery will also increase the internal temperature of the device, increasing the risk for an overheat situation in a hot airplane or near direct sunlight.

The other likely scenario in which your iPad can unexpectedly overheat is after shutting the engine down on the ramp on a hot summer day. Prior to the iPad, many pilots would set their paper charts or kneeboard on the glareshield to get them out of the way. New iPad users might inadvertently do the same thing out of habit. As we all know, the temperature inside the cabin will quickly rise after you shut the door, again putting the iPad in a vulnerable state for potential overheating. Make it a habit to take your iPad with you after shutdown, or store it in a protected part of the airplane to ensure a timely departure when you return.

Your iPad becomes completely unusable when it overheats and will display a temperature warning on the screen. At this point, your only option is to get it to a cooler environment and lower the internal temperature. Remove it from direct sunlight and aim a few air vents over if possible. If you had it in a kneeboard or case,



X-Naut Cooling Mounts

iPad Cooling Case This ingenious mounting system solves iPads overheating with built-in fans to circulate cool air, specifically targeted at the iPad's main hot spots. Runs off eight AA batteries (four for the Mini) so there are no wires.

iPad Mini (1-5)	2071A	\$179.99
iPad Air 1-2 and Pro 9.7"	7960A	\$199.99
iPad Pro 10.5" and Air 3	7901A	\$199.99
iPad Pro 11"	2482A	\$199.99
Kneeboard Kit	7741A	\$39.99

remove these to aid the cooling process, and remove it from any charging sources. Once the iPad's temperature lowers it will automatically switch back on—there's nothing else for you to do at that point, except to keep it out of the sun.

If you fly an airplane that has large windows and lets in a good deal of sunlight to the cabin, your best bet is to consider a yoke or suction cup RAM or Robust mount. These provide plenty of flexibility to pivot the iPad screen away from direct sunlight, and expose more of the front and rear surfaces of the iPad to ambient air for continuous cooling.

If a kneeboard is your only option and overheating is a concern, try raising the iPad slightly above the bottom of the kneeboard to create an open layer of air between it and the backside of the iPad. Many pilots report that adding a few pencils to accomplish this works well. It might be the most polished solution, but it works!

Another consideration is to use the X-Naut Cooling Case (above) along with your iPad. This mounting system features built-in fans to circulate cool air, specifically targeted at the iPad's main hot spots to prevent it from overheating. The mount can be powered off of typical alkaline batteries or USB with a power bank or backup battery. In addition to working with the RAM mount system, you can also turn it into a kneeboard. We've had good success with this product, and heard many positive reviews from customers. It really works.

HOW DO DIFFERENT SIZES OF IPAD FIT IN AN AIRPLANE?



ERIC RADTKE

ATP, Flight Instructor
PRESIDENT
Sporty's Academy

We get a lot of questions from pilots looking to get the best size iPad for their cockpit. It's a difficult thing to visualize without actually getting the device inside the plane; on top of that, you want to compare one size device to the next. There are over a dozen different sizes of iPads and iPhones that you could be using for your EFB app. In this article, we're taking a look at the most commonly asked-about sizes. With that in mind, we didn't examine some of the older generation iPads that might still be hanging on. If that's your iPad, well it might be time to upgrade to a newer, faster, more capable unit, and this article should help you decide.

Let's consider seven different size devices in the same Cessna 172 cockpit to see what fits best. We mounted the iPads and iPhone in two ways: with a suction cup and with a yoke mount. We were able to mount nearly every device to the yoke with the exception of the 12.9" iPad Pro. Not only would it be too big, but there isn't yet a cradle capable of holding it.

For the suction cup mount, we tried to use our favorite mounting spot—the bottom of the windscreen that wraps around to the left-hand side. This spot sort of extends the glare shield if you line it up right and helps you keep the iPad in your natural instrument scan. A few of these iPads proved to be too big for this location, so we opted to move the suction cup mount to the right-hand side of the plane by the copilot. With the iPad angled toward your view and out of the way of the yoke, it was definitely a good option for those flying with big iPads.

We wanted to give you a reference for the size and potential placement of these


devices in the cockpit. Some of these pictures are to prove that it's not feasible to mount the pictured device as we have. Remember that the final decision to mount your iPad or iPhone is up to the pilot in command, who must consider the safety risks associated with adding gear to the flight deck. Always be sure that you mount your devices with flying in mind first – the last thing you want is to flare on final and find your mount is in the way.

Here are the devices we mounted in our C172.

- iPhone XS Max (same as 11 Pro Max)
- iPad Mini 4/5
- iPad Air (same size as the Air 2, Pro 9.7" and 2017 iPad)
- iPad Pro 10.5"/Air 3
- iPad Pro 11"
- iPad Pro 12.9" (1st generation)
- iPad Pro 12.9" (3rd generation)

Which iPad do I have?

If you're not sure which iPad you have, it's okay, you're not alone. Please note that we loathe the naming convention Apple has chosen for the iPads as much as you do. It's difficult to be sure which iPad you have but if you need to look that information up here's how you do so.

First, identify your iPad's Model Number. Go to Settings > General > About. You'll see it listed here on the Model line. If you see a different format of the model number (something like MTFL2LL/A), tap on it once to view it in the format below. Then reference the chart to the right. 



Name	Year	Model Number
iPad (3rd gen)	2012	A1416 (WiFi) or A1430/A1403 (cellular)
iPad (4th gen)	2012	A1458 (WiFi) or A1459/A1460 (cellular)
iPad (5th gen)	2017	A1822 (WiFi) or A1823 (cellular)
iPad (6th gen)	2018	A1893 (WiFi) or A1954 (cellular)
iPad (7th gen)	2019	A2197 (WiFi) or A2198/A2200 (cellular)
iPad Air	2013	A1474 (WiFi) or A1475/A1476 (cellular)
iPad Air 2	2014	A1566 (WiFi) or A1567 (cellular)
iPad Air 3	2019	A2152 (WiFi) or A2123, A2153, A2154 (cellular)
iPad Mini (original)	2012	A1432 (WiFi) or A1454/A1455 (cellular)
iPad Mini 2	2013	A1489 (WiFi) or A1490/A1491 (cellular)
iPad Mini 3	2014	A1599 (WiFi) or A1600 (cellular)
iPad Mini 4	2015	A1538 (WiFi) or A1550 (cellular)
iPad Mini 5	2019	A2133 (WiFi) or A2124, A2126, A2125 (cellular)
iPad Pro 9.7"	2016	A1673 (WiFi) or A1675 (cellular)
iPad Pro 10.5"	2017	A1701 (WiFi) or A1709/A1852 (cellular)
iPad Pro 11"	2018	A1980 (WiFi) or A2013/A1934/A1979 (cellular)
iPad Pro 12.9" (original)	2016	A1584 (WiFi) or A1652 (cellular)
iPad Pro 12.9" (2nd gen)	2017	A1670 (WiFi) or A1671/A1821 (cellular)
iPad Pro 12.9" (3rd gen)	2018	A1876 (WiFi) or A2014/A1895/A1983

TOP 10

WEATHER APPS FOR PILOTS

Checking the weather before flight has always been one of the most popular uses for the iPad. After all, it's easier to get an update by looking at your tablet or your phone than to sit down at a computer or call Flight Service. But which app to use? There are thousands of weather

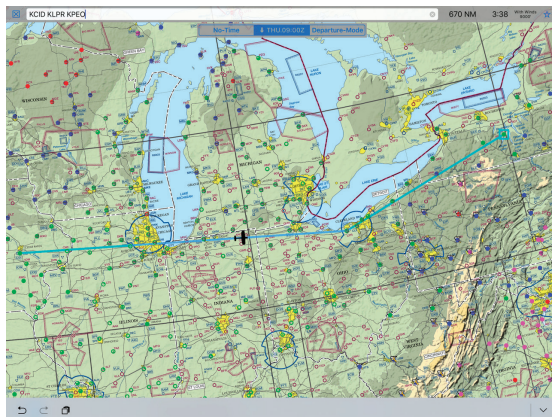
apps for the general public, from free to quite expensive. These are great for deciding whether you need a jacket tomorrow, but when it comes to aviation weather—looking at thunderstorms, ice, turbulence, visibility and so much more—these apps just aren't enough. So we'll focus on apps that offer more for pilots, both free and paid.

#10 Weekend Flyer

Heading out on a weekend trip and want to get a feel for what the weather will be like a few days out for the return flight?

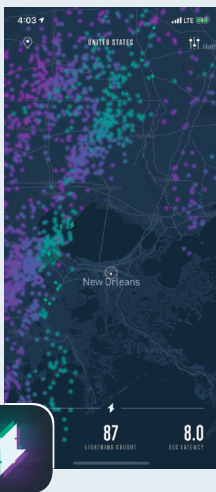


Weekend Flyer is designed just for that purpose, providing a graphical forecast with a time slider from 1 hour to 3 days out in the future. As you move the slider and adjust the forecast window, the forecast colors change on each airport based on the weather forecast for the selected time (green for VFR, red for IFR, etc.). This is great for viewing large-scale trends in the weather and to see where there is a potential for thunderstorm development.



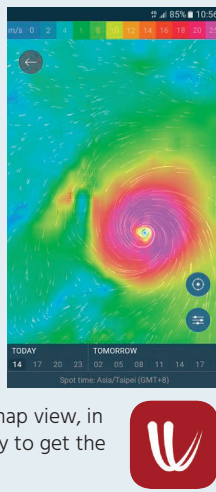
#9 Thunderly

While this app probably isn't going to help you with the final go/no-go decision, it can help you analyze the energy and convective nature of thunderstorms by displaying real-time lightning strike depictions. In addition to displaying an accurate day and night cycle, the globe view contains real-time clouds, precipitation and lightning history layer for last hour.



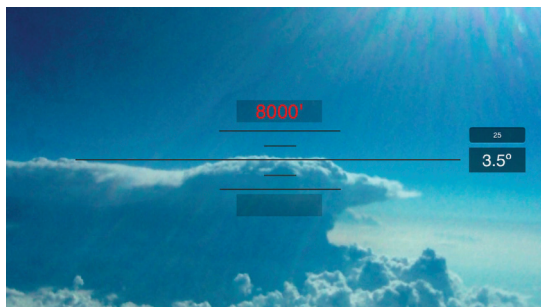
#8 WINDY

While thunderstorms and ice get all the attention, wind is actually the most common reason to cancel a flight. That's why we like this app: it shows current and forecast wind conditions for thousands of locations, and offers the ability to search by airport identifier. What sets the app apart is its elegant design and beautiful animations. The map view, in particular, is a fantastic way to get the big picture overview.



#7 CloudTopper

This may not technically be a weather app, but it's useful in flight when dealing with weather. CloudTopper, just \$0.99, is the answer to the ever-present question, "Are we going to top those clouds?" Using the iPad or iPhone's built-in gyro and camera, it allows you to point your phone at the clouds ahead, get it exactly level and see whether or not those clouds are above you. You can even enter your estimated distance to the clouds and the app will estimate how many feet you would need to climb to get on top. Great for VFR and IFR pilots alike.

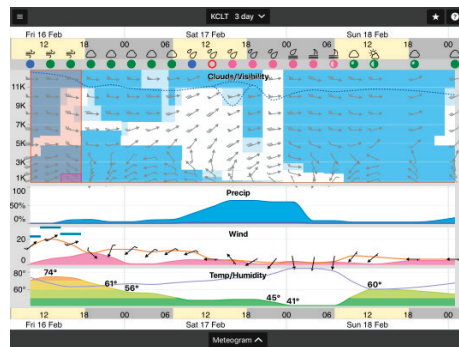


#6 METARs Aviation Weather

While plenty of apps show you text weather reports, this \$6.99 app is a fast and easy way to check the latest conditions without a lot of clutter. Set your favorite airports, then track VFR/MVFR/IFR/LIFR with color-coded icons. Plain English translations make it easy to understand all the details on that long METAR, too. But our favorite feature is the customizable notifications, which allows the app to alert you (even without having the app open) to changing weather conditions automatically. So if you want to know when your departure airport changes from VFR to marginal VFR, just tap a few settings and you'll be ready.



#5 WeatherSpork



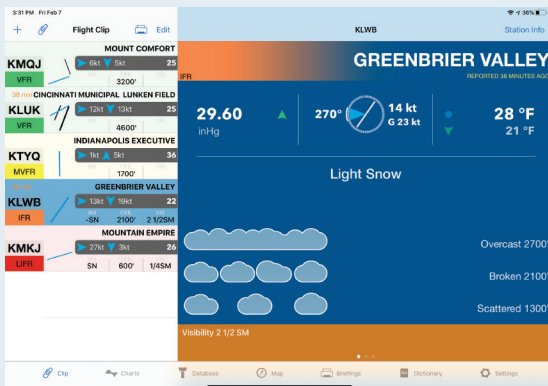
Co-founded by Scott Dennstaedt, a well-known former meteorologist and active flight instructor who worked at ForeFlight. Dennstaedt's goal is to improve pilots' understanding of weather, and in particular to help them choose the best day and time for departure. The app incorporates a unique set of views to help you visualize the atmosphere and go beyond the standard reports. We particularly like the Grid View that graphically displays weather forecasts for the various points along your entered route, for a quick analysis of VFR/MVFR/IFR/LIFR conditions. It also includes a wealth of weather imagery products, eliminating the need to hunt down the more advanced forecast graphics on aviationweather.gov.



For more apps see,
iPadPilotNews.com

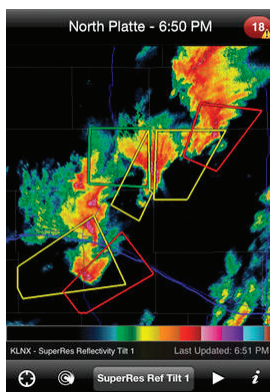
#4 Station Weather

Sometimes you just need a quick glance at the latest radar imagery or the updated METAR to see how things are trending. Station Weather provides this data using a visual-centric interface with helpful graphics depicting current and forecast conditions. It's also one of the few weather apps to offer an Apple Watch app that is easy to use and read on the small screen (including custom complications for watch faces), and an iPad today widget for quick reference to METARs on the home screen. StationWeather is offered in two versions—Lite and Pro. The Lite version allows you to store up to 3 airports in the favorites view, but includes most of the other features of the Pro version. You'll need to purchase the Pro version for \$3.99 to get the Apple Watch app, but it's well worth it for those who regularly use apps on their watch.



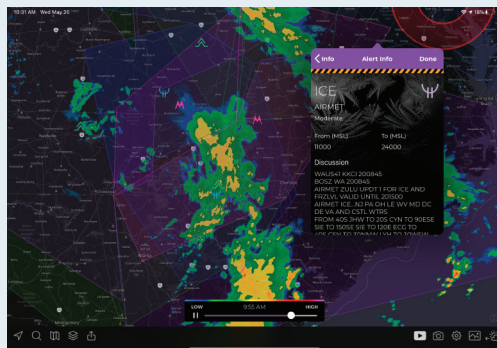
#3 RadarScope

If MyRadar is the lightweight, easy-to-use radar app, RadarScope is the weather geek's radar app. It focuses less on pretty pictures and more on options—you can display any of the 155 different radar sites in the US, and choose between base and composite reflectivity. This is a complicated subject, but many pilots think composite reflectivity is most useful for flight planning (but is not what most TV stations show). Having the ability to compare different radar scans can offer some good insights with a little training. There are all kinds of other radar products, from velocity to differential reflectivity. The app, which costs \$9.99, also allows you to zoom in and look for tell-tale severe weather radar signatures.



#2 MyRadar

There are literally hundreds of radar apps in the App Store, and with good reason. Checking the radar is an essential task for pilots and non-pilots alike. Almost all of these apps use the same data (from the National Weather Service), so it's mostly how this data is presented that distinguishes apps from each other. One of our favorites is MyRadar. It's free, fast and easy to use, with high quality looping radar. But there are some nice aviation features in there too, like an AIRMETs and TFR overlay.



#1 ForeFlight/Garmin Pilot/FltPlan Go/WingX/Stratus Insight/FlyQ

Whichever of the big aviation apps you use, they are hard to beat for weather briefings. Because you can overlay your flight plan route on different weather maps, they offer great situational awareness and endless possibilities for diversion planning (you can even factor in fuel prices). These apps also include a wealth of information, from graphical METARs to icing forecasts, that you can't find most other places. Finally, they allow you to get a formal weather briefing right in the app. This is not to mention the in-flight options for datalink weather, whether it's SiriusXM or ADS-B.



ForeFlight



Garmin Pilot



FltPlan Go



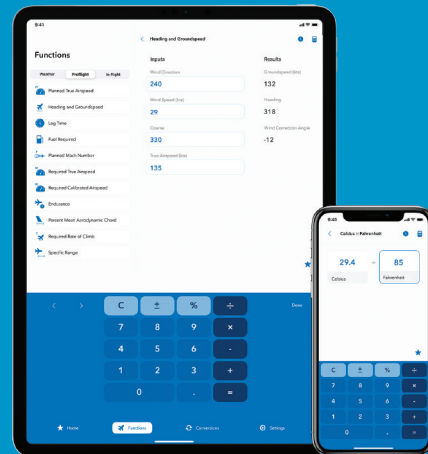
Wing X



Stratus Insight

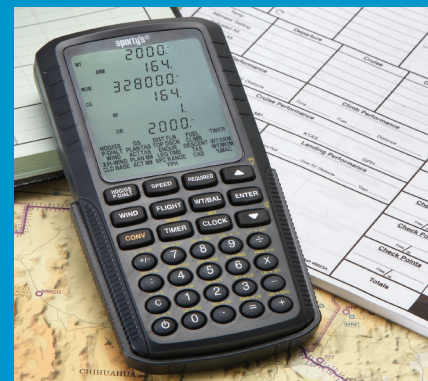


Fly Q



SPORTY'S E6B APP GETS A MAKEOVER

Sporty's E6B app was one of the first aviation-specific apps to appear when the App Store launched, and since then it has proven to be a popular addition to cockpits and preflight planning tables around the world. It's a quick way to calculate common navigation, fuel, speed, or weight and balance problems. With over 24 aviation functions and 20 common conversions, it offers fast answers to common questions. While the calculations haven't changed much in the last decade, mobile devices certainly have, so Sporty's has completely redesigned their E6B app. The new version has a simplified menu structure that works well on a wide variety of iPhones and iPads, from the Mini to the Pro 12.9" model. It's easy to mark functions as favorites for fast access and save calculations across functions. There's also a new dark mode that is particularly helpful at night in the cockpit. While it's a valuable everyday tool remember that it (like all smartphone apps) cannot be used for an FAA knowledge test.



Sporty's Electronic E6B Flight Computer Over 250,000 pilots have trusted Sporty's Electronic E6Bs over the years for fast flight planning and accurate FAA test calculations. It's approved for use on FAA knowledge tests, so it's a great companion for any student pilot.

7095A \$69.95

PROTECT YOUR IPAD



Captain's Bag

This bag has plenty of room for all your pilot supplies and a change of clothes. Perfect for the pilot who has more to carry. Measures 18"l x 10"w x 13"h overall. **9903A \$89.95**



Crosswind

Perfect for student pilots and weekend warriors, this bag was designed around the beginning pilot. Enough space for a headset and books, yet small enough to not throw off your weight and balance. Measures 16"l x 8.5"w x 10"h. **5515A \$49.95**



Tailwind Backpack

With dedicated pockets for a computer and iPad, you'll quickly find yourself using this bag every day for business as well as flying. Measures 18"h x 15"w x 10"d overall. **9950A \$99.95**



iPad Bag

The iPad Flight Gear Bag was specifically designed for the iPad pilot with lots of pockets for organization and custom pockets for protecting important electronics. The small footprint of the iPad bag makes it easy to fit on the floor between the front seats in a Cessna. Measures 12"w x 7.5"d x 13"h overall. **10034A \$69.95**



Internal front pocket organizes your gear



PLC Pro Bag

This combination backpack and briefcase is great for pilots on the go who need to protect expensive electronics like an iPad or laptop. Measures 16"l x 14"w x 9"d. **10176A \$299.00**



PLC Sport Bag

The PLC Sport is smaller version of the PLC Pro. Just enough room to carry one headset, an iPad/EFB, a hand-held radio, and other gear. Measures 14"l x 13"w x 6"d. **2298A \$179.00**



PLC Lite Bag

The PLC Lite bag is a great choice for any student pilot flying with an iPad. This bag easily accommodates the essentials without being too bulky. Measures 14"l x 11"w x 6"d. **4683A \$114.00**



MGF

IPAD SCREEN PROTECTORS: WHICH ONE IS BEST?



**PILOT YOUR OWN
ADVENTURE**



ERIC CARNAHAN

Flight Instructor
CUSTOMER SERVICE
Sporty's Pilot Shop

Screen glare is a persistent problem for pilots flying with the iPad. The latest iPad Pro models incorporate an anti-reflective coating that is an improvement over the earlier models, but it still can be difficult to view in sunlight or when covered with fingerprint smudges. While smart mounting strategies can reduce it (we've been able to make the iPad screen usable in even bubble canopy airplanes), there's no way to completely eliminate glare. After all, the iPad is a giant sheet of glass. Is there anything pilots can do?

For years, different companies have offered anti-glare screen protectors to help with this problem. We've tested dozens of them and most are, frankly, worthless. A good screen protector should pass four tests with us:

- It is easy to install, without air bubbles.
- It protects the screen from scratches.
- It does not affect the touch-screen interface.
- It cuts glare without dimming the screen.

After countless flight trials over the years, our favorite by a long shot is MyGoFlight's ArmorGlas.

To help illustrate its effectiveness, we installed the protector on an iPad 9.7"



(a model without the newer antireflective coating), with the screen brightness on maximum, and took it into the cockpit of a Cessna 172 on a sunny fall day—a really difficult lighting situation.

What you see below is a comparison of the iPad with no screen protector compared to the ArmorGlas. It's hard to show in the picture exactly what it looks like in the cockpit, but you get a good idea of each one's performance.

Here's how it stacked up on our four criteria:

- ArmorGlas is actually a thin sheet of tempered glass, so it's rigid. That means it's fast and easy to install—no bubbles.
- The ArmorGlas is thicker than less expensive films, so it provides better protection. We even took a box cutter to it and couldn't scratch the iPad screen.
- Somewhat counterintuitively, the ArmorGlas left the iPad screen more responsive than thinner films.
- While not a miracle cure, we felt the ArmorGlas did reduce screen glare noticeably. Under our extreme test conditions, the screen still needed to be tilted just a bit to be able to read it clearly, but this was better than no protector.

ArmorGlas

Anti-Glare Screen Protectors When it comes to screen protection, nothing is better than the feel and clarity of pure glass. ArmorGlas is like having no screen protector on at all; you won't even realize it's there. ArmorGlas is made of premium, ultra-thin tempered glass material. It is designed to preserve the feel and clarity of the standard screen on your device while adding a substantial level of protection.

iPad Air 1-2 and Pro 9.7"	1651A	\$49.99
iPad Pro 10.5" and Air 3	7764A	\$49.99
iPad Pro 11"	7942A	\$49.99
iPad Pro 12.9" 3rd/4th Gen	5013A	\$59.99
iPad 2,3,4	8104A	\$49.99
iPad Mini 1-3	1741A	\$49.99
iPad Mini 4-5	5736A	\$49.99



LIFT

This sturdy bag has room for all the essentials, but won't get in your way. Includes a large headset pocket, iPad pocket and multiple organizer sections with room for all your accessories. **8456A \$99.95**



LIFT XL

The Lift XL is a larger version of the top-rated Lift Bag, adding more room for storage (including two headsets) and more organization options, all while retaining the signature design features that make Flight Outfitters bags so useful in the cockpit. **10756A \$165.00**



WAYPOINT

A good backpack keeps your most important gear organized, hauls everything you need for an adventure, and leaves your hands free to react to life as it comes at you. The Waypoint Backpack from Flight Outfitters does all that and more, whether you're at the airport, the campsite, or the office—and you won't look like you're headed to math class. **10292A \$129.95**

IPAD KNEEBOARD BUYER'S GUIDE

Every pilot should secure their iPad in the cockpit, for both convenience and safety. The most popular ways to do this involve either a mount or a kneeboard, and it usually ends up being a bit of a “Coke or Pepsi” debate. Some pilots just love iPad mounts, while others hate them and prefer kneeboards. There’s not really a right answer for everyone; it depends on the pilot and the airplane.



iPad Rotating Kneeboard

This kneeboard wins hands down for simplicity and value. The basic version offers nothing more than a way to secure the iPad to the pilot’s leg. It’s not fancy, but it works well, and allows you to switch between portrait and landscape orientations quickly. The elastic leg strap is comfortable and adjustable. This will work with iPad Air 1, Air 1-3, 9.7” Pro and 10.5” Pro. At just \$19, it’s an unbeatable value—probably worth owning for backup if nothing else.

iPad Air, Pro 9.7” 4908A \$18.95



Flight Gear HP Bi-Fold Kneeboard

This bi-fold design opens up to reveal an iPad mount on the left side and storage pockets on the right. In typical use, the right flap will hang down on the side of your leg, with two pockets accessible. These are a great place to store your cell

phone, screen cleaners or charging cables. There’s also an elastic strap for a stylus or pen, plus a zippered pocket.

Features:

- Four elastic bands lock the iPad kneeboard into place
- Removable board permits both vertical and horizontal mounting options
- Contoured back and elastic strap securely hold the kneeboard on your leg
- External chart pocket and ID holder
- Two internal, low-profile side pockets
- Zippered pocket with protective flap to protect iPad screen
- Pen/stylus holder
- Accepts Gear Mods

iPad Mini 1-5 5829A \$34.95



MyGoFlight

For a premium option, MyGoFlight offers two styles of kneeboards for iPad pilots. First, the Folio C includes both a custom iPad mount and a metal writing surface. The writing desk attaches with magnets, so it’s easy to attach it to the front or it can be attached to the left panel of the bi-fold kneeboard when open. The Folio C includes a leg strap and closes up neatly for a professional look outside the cockpit.

The MyGoFlight Folio C Kneeboard range in price from \$154 to \$174. MyGoFlight has options for all kinds of devices including the iPad Air, 9.7” Pro, 10.5” Pro, iPad Pro 12.9” and iPad Mini 1-5. These kneeboards aren’t cheap, but they are well made, good-looking and highly-functional.

The second option from MyGoFlight, called the iPad Sport kneeboard, is more of a minimalist design. Constructed of black, smooth polycarbonate, the Sport adds protection and great feel to the iPad. Ideal for aircraft where space is tight or where there is a cyclic or control stick being used between the legs. This kneeboard is also designed to work with the Sport Adapter found on MyGoFlight’s yoke and suction cup mounts, making it great for pilots wanting both a kneeboard and mounting solution.

Mini 1-5	6621A	\$154.00
iPad 5-7, Air, Pro 11”	7250A	\$154.00
iPad Pro 12.9”	5850A	\$174.00



MyClip

This simple but elegant kneeboard has been around for a while, and we still like it. It's the smallest kneeboard we've seen, so if you're flying in a tight cockpit, it's an excellent choice. It's also very adaptable, fitting all iPad sizes, from iPad Mini to iPad Pro 12.9", with or without a case. If you like to leave your protective case on, this is easily the best option. Just pull the rubber gripping surfaces apart, position the iPad and release—the elastic straps hold the kneeboard in place and prevent your iPad from moving around. It's well-made and durable, and it takes up virtually zero space in your flight bag. The only downside is that it offers no storage or protection for your iPad.

MyClip 7757A \$34.95

These kneeboards are covered with soft, leather-like material and feature a wide leg strap to hold the kneeboard in place during flight. A holding clip on the front provides a place to secure a notepad or other paper documents you might need to reference. Inside, the kneeboard is covered with a soft microfiber to protect your iPad. The built-in adjustable easel provides tilted viewing angle. The power port is accessible with the cover closed and a back cover window exposes the camera lens for easy picture taking. ASA's iPad kneeboard is a good value.



ASA

iPad 9.7"	7249A	\$49.95
iPad Air 3 and Pro 10.5"	7723A	\$49.95
iPad Mini 1-5	8136A	\$49.95

The Flight Outfitters iPad Kneeboards take cockpit organization to a whole new level. Loaded with innovative, pilot-friendly features, these kneeboards provide a sturdy mounting bracket for an iPad. The updated design uses expandable loops to securely hold the corners of the iPad to the bracket. This allows you to keep your iPad in your case instead of removing it for every flight. The bracket rotates for both portrait and landscape orientation. The unique design is completely reversible for use on either leg. Heavy-duty elastic leg strap securely holds the kneeboard in place. Two mesh pockets on the side of the kneeboard provide storage for cleaning cloths and other accessories. Includes a drawstring bag for storage.



iPad Mini 1-5	7641A	\$49.95
iPad Air, Pro	6195A	\$49.95

Flight Outfitters Slimline

KNEEBOARD BUYER'S GUIDE



KNEEBOARD	FLIGHT GEAR Rotating	FLIGHT GEAR Bi-Fold	FLIGHT OUTFITTERS Slimline		MYGOFLIGHT Folio C			MYCLIP	ASA		
iPAD COMPATIBILITY	Air 1-3, Pro 9.7" and 10.5"	Mini 1-5	Mini 1-5	Air 1-3, Pro 9.7", 10.5", 11"	Mini 1-5	Air 1-3, Pro 9.7", 10.5", 11"	Pro 12.9"	Any tablet from 3" to 12" wide	iPad 9.7"	Air 3, Pro 10.5"	Mini 1-5
FITS iPADS WITH CASES	Thin cases	Thin cases	Thin cases	Thin cases	No	No	No	Yes, up to 0.85" thick	Thin cases	Thin cases	Thin cases
CLIPBOARD					✓	✓	✓				
POCKETS		✓	✓	✓							
ROTATING iPad HOLDER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TILTING iPad HOLDER		✓							✓	✓	✓
PRODUCT #	4908A	5829A	7641A	6195A	6621A	7250A	5850A	7757A	7249A	7723A	8136A
PRICE	\$18.95	\$34.95	\$49.95	\$49.95	\$154.00	\$154.00	\$174.00	\$34.95	\$49.95	\$49.95	\$49.95

WHAT'S THE BEST IPAD FOR PILOTS?

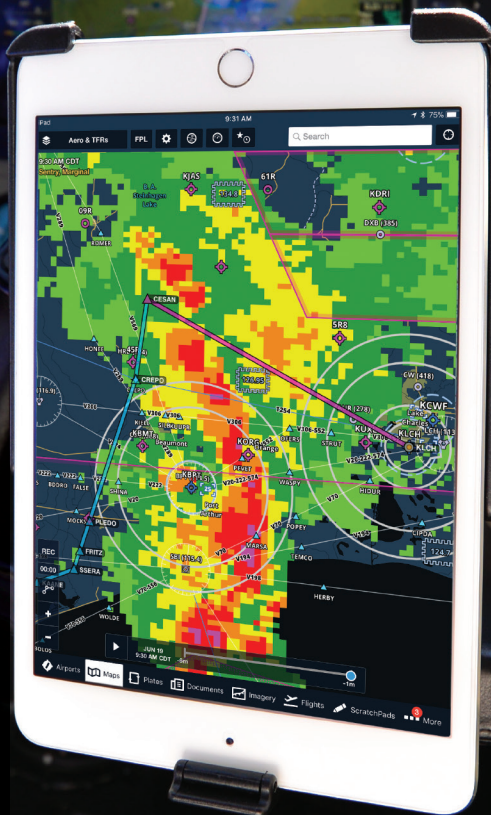


JOHN ZIMMERMAN

ATP
VICE PRESIDENT
Sporty's Pilot Shop

The original Apple iPad was released over ten years ago and. Since then Apple has continuously improved the tablet, making upgrades to its storage capacity, screen resolution, processor, connectivity options and form factor. The iPad Pro 11" and 12.9" are the top-end models currently available for sale today, and represent an enormous leap in performance over the original iPad.

While these high-performance pro models would suit (and honestly exceed) most pilots' needs in the cockpit, there are some other options and features worth considering when purchasing an iPad for use in aviation. Here we'll break down the differences in each, and give some insight for those looking to buy a used or refurbished iPad, which is a great way to save some money.



iPAD PRO, iPAD OR iPAD MINI?



Apple currently offers 5 models of iPad: the iPad Mini 5, the iPad 10.2", the iPad Air 10.5", the iPad Pro 11" and the iPad Pro 12.9". The iPad 10.2" (good), iPad Air 10.5" (better) and the iPad Pro 11" (best) feature nearly the same external dimensions and pilots will find that all three work very well with nearly every aviation app available.

The 10.2", 10.5" and 11" specs on the mid-size models refer to the screen's diagonal dimension, meaning these models feature more screen real estate than the original iPad, while maintaining a similar form factor.

The iPad Pro 11" improves on the original



The iPad Mini fits nicely on a yoke mount.

iPad Pro 10.5" design by including a large edge-to-edge display, high-performance processor, and FaceID to quickly unlock the device. It also includes a bright, high-resolution liquid retina display with an anti-reflective coating. The latest iPad Pro 12.9" model represents a major

improvement over the original iPad Pro 12.9"—it is 25% smaller

while retaining the same display size, thanks to the edge-to-edge screen. The footprint is about the same as a sheet of paper, so it's a good fit now in most GA cockpits. It comes

at a premium price, but we can recommend this model now for those who want the most screen real estate possible.

It's worth noting that Apple released updated versions of the iPad Pro 11 and 12.9" models in March 2020. While the form factor and screen details remain identical, the 2020 models added a speedier A12Z processor, rear LIDAR camera, and "studio-quality" microphones.

The iPad Air 10.5" is essentially a more powerful version of the original iPad Pro 10.5", incorporating Apple's powerful A12 processor. This provides performance that is about on par with the new iPad Pro, but for several hundred dollars less.

The budget-friendly model referred to now as just "iPad" is no slouch and was recently updated with a larger 10.2" screen and Apple Pencil support. This is a great buy for less than half the price of the Pro model, but there's no doubt the iPad Mini, Air and Pro models will offer significantly better performance when flying with graphics-intensive aviation apps.

If you're looking for an iPad with a smaller footprint, consider the iPad mini. This version measures 7.87" by 5.3" and will be a better fit in cockpits with tighter constraints. It runs at the exact same resolution as the full-size iPad model, so all the iPad apps currently available are compatible with it. It was updated in 2019 with the latest high-performance A12 processor, which puts its performance nearly on par with the iPad Pro. It also includes the anti-reflective screen coating which pilots will find useful in the cockpit. For a sense of the size, here's a picture of an iPad Mini 5 in a Cessna 172 cockpit:



If you're using an iPad 3, 4, Air 1, Air 2, or Mini 4, it may be time to consider an upgrade. While most apps will still run on these models, the processor is noticeably slower. You may find map redraws and other higher-end features to be frustrating. Plus, the latest version of Apple's iOS platform won't run on the original iPad 1 - 3, so you'll be stuck on an older version.

WiFi-only or WiFi + Cellular model?

After choosing a size, it's on to the connectivity question. This is pretty simple, but there are some confusing terms thrown around, so let's start basic.

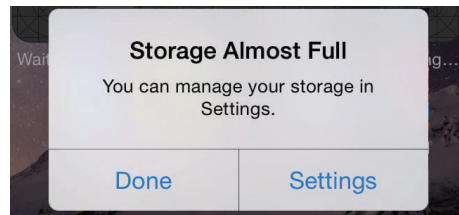
Every iPad model ever built offers WiFi connectivity to the internet, so you can connect to your home network, your office network, a local coffee shop, etc. But you can also buy an upgraded cellular model—called LTE—that receives wireless data from AT&T or Verizon (for a monthly fee). The benefit to pilots with the cellular model is that it also contains an internal GPS receiver, which is useful for showing your aircraft's position on aviation map applications (although it has some minor limitations). The cellular model also allows you to download weather and file flight plans on the go, but don't count on this cellular data connection to work in the air. In our experience, it just isn't reliable. It's also technically illegal.

The internal GPS on an iPad with cellular data is completely independent of the cellular antenna and does not require that you activate a data plan from AT&T or Verizon to work properly. You could buy a cellular model iPad and use the GPS without ever activating your service.

So which is the right choice for pilots? Either one, really. The GPS that comes with the LTE model is nice, but for the price of this upgrade, you could buy an external iPad GPS that is more reliable in some ways. If you frequently use your iPad on the ground in locations without WiFi, the upgrade to the LTE model definitely makes sense.

Storage capacity

Apple offers multiple versions of internal memory options for iPads: the entry-level iPad is available in two sizes, either 32GB or 128GB, while the newer Mini and Air models feature are available in 64GB and 256GB sizes. The Pro models go even bigger, with the option to upgrade to 512GB and 1 TB storage options. Downloading all the VFR & IFR charts for the entire United States across multiple data cycles can take nearly 20GB, so even the smallest option available can work. And then you have to consider that you might also want to store high-resolution terrain data, synthetic vision, charts for the



Not what you want to see.

Canada, Mexico and Caribbean, and PDF documents.


Another thing to keep in mind is that many apps like ForeFlight allow you to download the next cycle's charts approximately 4 days in advance. If you plan to keep charts for the entire U.S. on your iPad, you'll need additional free space during this transition period each month.

Finally, consider that you may use the iPad for more than just aviation (e.g., pictures, videos, other apps), so you'll want to leave open some free space for those items. The iPad's memory is not upgradeable, so you have to commit to a size up front. If in doubt, go with the 256GB option; 64GB may sound like a lot now, but it doesn't leave much room for future growth as new aviation databases and features are introduced and your photo and music libraries continue to expand.

Conclusion

The good news is that any iPad model will work for pilots, so there's not a bad choice here. But some are definitely better than others. So which model do we recommend? Based on our experiences flying with each model of iPad, we think the 11" iPad Pro, WiFi-only, 256GB is the ideal choice if you're looking to buy a new iPad or upgrade from an older model. For those on a budget, the iPad 10.2" WiFi-only, 128GB is a great alternative, available for nearly half the price of the Pro model. And for those that prefer the smaller footprint of the iPad Mini, the iPad Mini 5 was updated in 2019 with a high-performance processor and is highly recommended.

For the ultimate big-screen experience on the flight deck, we can now recommend the new 12.9" iPad Pro thanks to its 25% smaller size. It's expensive, but powerful.

We've found the reliability and performance of external GPS receivers to be far superior to the internal option, and they're available for under \$100—less than the upgrade to the cellular model. For the ultimate setup, we recommend adding a wireless ADS-B receiver, like Stratus ADS-B receiver, which provides subscription-free in-flight weather and WAAS GPS position data. 

Wi-Fi + LTE Built-in GPS



**iPad models with
LTE built in also
have a GPS.**

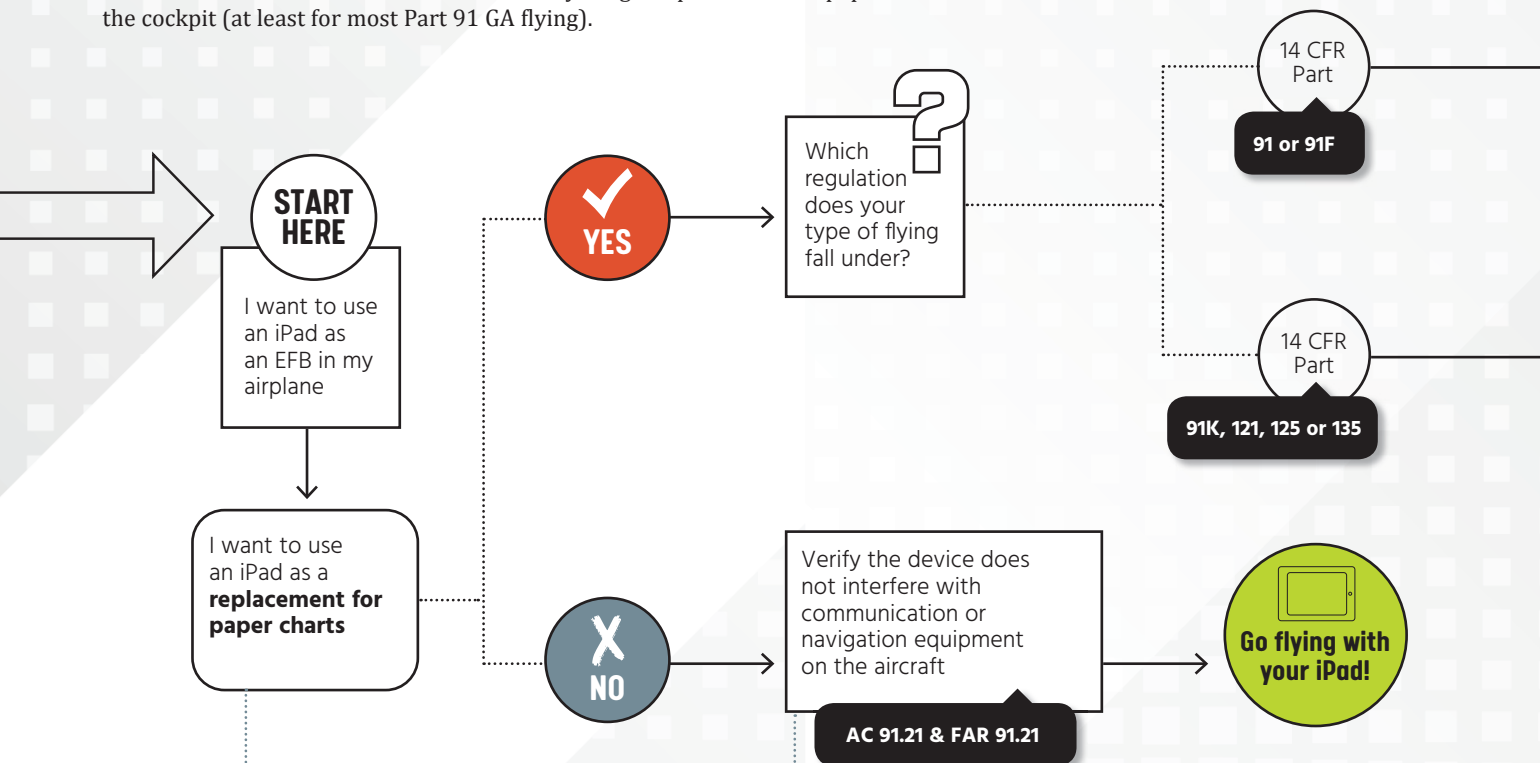
IPAD LEGAL BRIEFING

What Pilots Need to Know

Each year we publish a plain-language review of the FARs and Advisory Circulars pertaining to the use of iPads and electronic flight bags in the cockpit. This is great information for pilots looking to make the transition from paper charts to an iPad, but should also be reviewed by experienced iPad pilots as well. We like to think of it as another step in maintaining pilot currency by staying up with the legalities of using digital devices in flight.

The number one question we get on using an iPad for charts is whether it is “legal” for aviation use. The definition of “legal” depends on what type of flying you do and what you’re using your iPad for, so there’s no one-size-fits-all answer. Here we’ll cover the applicable Federal Aviation Regulations (FARs) and Advisory Circulars (ACs). But first one suggestion: don’t get caught up in all the minutiae.

The short answer is that the iPad is absolutely a legal replacement for paper charts in the cockpit (at least for most Part 91 GA flying).



NOTES

You can use an iPad purely for supplemental purposes.

FAR 91.21 does not apply only to iPads. It covers any electronic device.



iPAD EASY APPROVAL

Ideal for
Part 135
or 121
operations



Verify the device does not interfere with communication or navigation equipment on the aircraft

AC 91.21 & FAR 91.21

Review and comply with **AC 91.78:**

1. Requires a source of data that is the functional equivalent of paper reference material (aviation app)
2. The charts and data in the aviation app must be current
3. A backup source of data is suggested, but not required
4. A transition period is suggested where you still have paper charts available as you learn to use the iPad/EFB during flight


Go flying with your iPad!

Review and comply with **AC 120-76** and gain FAA approval:

1. Establish and document useful battery life
2. EFB must be secured or stowed during critical phases of flight
3. Requires interference testing and compliance (results must be documented)
4. Requires documented maintenance procedures for lithium-ion batteries and UL/IEC safety/testing standards
5. Requires proof that the EFB device will still function after the rapid decompression of the cabin
6. The flight crew must complete a training program on the use of EFBs in the cockpit


Go flying with your iPad!

If you fly Part 91, AC120-76 does NOT apply. However, it's worth reading for some best practices.

The iPad with ForeFlight is quickly becoming a popular choice for paper chart replacement. If you're flying a large airplane (more than 12,500 lbs) or turbine-powered airplane governed by Part 91, Subpart F, or if you're flying as a fractional or an on-demand, Part 135 operation, you'll want to consider a formal approval process. Gaining approval for your iPad as an Electronic Flight Bag (EFB) can be a time-consuming and complicated process – enlisting an expert can save you precious time and resources.

Sporty's Easy Approval includes:

- Detailed description of approval process & plan for execution
- Customized cover letter specific to your flight operation
- Templates & Checklists for initial evaluation and assistance on completion
- Operational Procedures (General Operations Manual (GOM) content)
- Comprehensive Training Program, Testing & Documentation
- Supplemental Flight Deck Checklists
- Portable Electronic Device Non-interference Testing Guidance
- Rapid Decompression Testing Data
- Plan & Templates for flight line evaluation

5201A \$895.00

For more information see,
Sportys.com

How to use the GARMIN D2 DELTA WATCH WITH THE GARMIN PILOT APP



ALAN NGUYEN

ATP, Flight Instructor
VIDEO PRODUCER
Sporty's Academy



use the D2 Delta as a GPS position source for the Garmin Pilot app. Outside the cockpit, the D2 Delta is packed with everyday features, including Garmin Pay contactless payments, music storage, and multi-sport training mode.

Here we're going to show how you can use the D2 Delta with the Garmin Connect app to get the most out of it as an everyday smartwatch.

Pairing the D2 with the Garmin Connect app

Because it was built specifically for the needs of pilots, the D2 Delta doesn't need to be tethered to a phone or iPad in the airplane to provide full navigation and flight performance data, making it an excellent backup navigation tool. For everyday use on the ground though, you'll want to pair it up to your iPhone or Android device to deliver internet connectivity to the watch, along with the full array of smartwatch features (just like with the Apple Watch).

To get started, download the Garmin Connect app to your iPhone. There are a couple key things to remember—the Garmin Connect app is a completely separate app from the Garmin Pilot app, and is only built for phones and not iPads/tablets (again just like the Apple Watch concept).

Next, follow these steps to pair the D2 Delta to your phone:

- **Enter Pairing Mode on the D2**—hold the UP button on the D2 for a few seconds, go to Settings-> Phone -> Pair Phone.
- **Turn on Bluetooth on your phone**—go

to your phone's Settings app and turn on Bluetooth. The important takeaway here is that you cannot pair the watch like you normally would in the Bluetooth settings page. Rather it's done directly in the Garmin Connect app.

- **Pair with Garmin Connect app**—open the Garmin Connect app on your phone, go to More tab and scroll down to Garmin Devices. Tap the blue "Add Device" button at the bottom of the screen and follow the pairing instructions. You'll next enter your personal information and preferences (used primarily for fitness tracking features), and follow the prompts to finalize the pairing.

You'll only need to complete this pairing process once, as the watch will automatically connect again when your phone is nearby.

Using the D2 Delta connected features

The D2 Delta relies on a system of "Widgets" to display small bits of useful information from both its internal sensors and your phone. By default, you'll see widgets displaying sensor data and flight instruments from the compass, altimeter and activity tracker. But when connected to your phone you'll see internet-driven data, like the current METAR for the nearest airport (or any airport you select) and general weather forecasts.

iPhone users will also see all the standard iOS notifications in a dedicated widget, which are loaded from all the apps on your phone and not just those from Garmin. Best of all you can add third-party Widgets to the D2 from Garmin's Connect IQ Store.

When on any screen, you'll also see pop-up notifications and feel a vibration when you receive an incoming call, text message, email, etc. It also constantly monitors your activity and displays all your stats in the Garmin Connect app. This feature makes it a great fitness tracker too, useful for running, biking, skiing or any other workout activity. The Connect app does a nice job of collecting and organizing this data for easy review on your iPhone's larger screen.

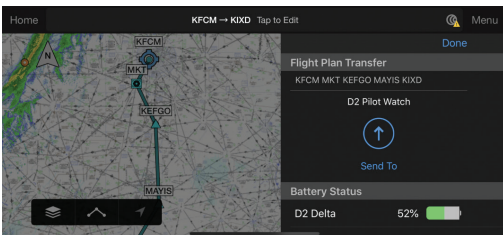
Flying with the D2 Delta PX

Like the previous-generation Garmin aviation watches, the D2 Delta has a dedicated Direct-To button at the top right



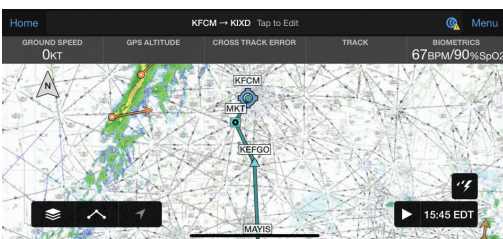
for quick waypoint input – press and hold it to enter this mode. You can also tap this button once to quickly enter the “Fly” mode, which allows you to view navigation details, flight instruments, color moving map and more.

When connected to a device running the Garmin Pilot app, you can quickly send the active flight plan to the watch by pressing the blue Connex symbol at the top of the screen, and then the Send-To button.



The D2 Delta PX device has a wrist-based pulse oximeter to gauge the saturation of oxygen in your blood (SpO2). Knowing your oxygen saturation can help you determine how your body is adjusting to high altitudes. As your altitude increases, the level of oxygen in your blood can decrease. When you view the pulse oximeter widget while you are not moving, your device analyzes your oxygen saturation and your elevation. During a flight, the device automatically takes pulse oximeter readings more frequently, so you can monitor your SpO2 percentage.

You can view this information on one of the D2's default widgets on the watch, or set one of the navigation fields in the Garmin Pilot app to continuously display heart rate and %SpO2.



Garmin Pilot will display an alert if your oxygen level drops below a preset % value, which you can customize from the Connex section of the app.

The D2 Delta can also help you track altitudes, fuel tanks, and more. Configurable pressure altitude notifications provide a series of vibrations when arriving at a selected altitude. A fuel tank timer vibrates at configurable intervals to help remind pilots to switch fuel tanks while in-flight. Finally, a cross track error notification triggers a vibrating alert when pilots deviate from an active flight plan.

GARMIN Connected devices



D2 Delta Watch

The fourth generation of Garmin's popular D2 includes a sleeker model for women and a premium model with built-in pulse oximeter. All three include a built-in GPS receiver that drives an HSI display, full airport database, compass, altimeter, and nearest airport function. You can even connect the watch to your Garmin avionics to share routes and flight data. Outside the cockpit, the D2 Delta is packed with everyday features, including Garmin Pay contactless payments, music storage, and multi-sport training mode. It's the no-compromise smart watch for pilots.

Garmin D2 Delta S Watch (rose gold)	4684A	\$899.00
Garmin D2 Delta PX Watch (titanium bracelet)	7747A	\$1249.00
Garmin D2 Delta Watch (leather band)	5768A	\$949.00



Garmin MARQ Aviator Smartwatch

MARQ Aviator is the luxury modern tool watch that champions the spirit of flight. With each takeoff, it shows where you're headed. Along the way, it also shows you've arrived.

- Be prepared for any situation with Direct-to emergency navigation.
- Show your wings proudly with the aviation-inspired titanium bracelet.
- Stay on schedule with local time, GMT, and two additional airport time zones.
- See aviation weather reports plus NEXRAD weather radar for your route.
- Enjoy smartwatch functionality for extra convenience on your travels.
- Spread your wings, with up to 12 days on a single charge.

5448A \$1950.00



Garmin Pilot App

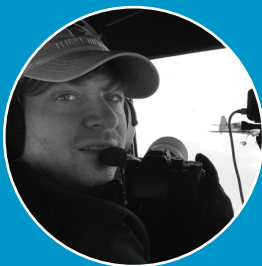
Garmin Pilot is a comprehensive suite of tools for the iPhone, iPad and Android, designed specifically for general aviation and corporate pilots. Flight planning, filing, charts, interactive maps, weather briefing resources and navigation capabilities; it's all included. The app's intuitive interface mirrors those on the newest Garmin touchscreen avionics so you can go seamlessly from preflight to inflight. Plan, file, fly with Garmin Pilot.

Standard \$74.99/year
IFR Premium \$149.99/year



TOP 10

AVIATION APPS FOR APPLE WATCH



CHRIS CLARKE

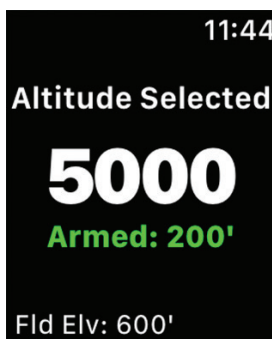
Commercial Pilot
VIDEO PRODUCER
Sporty's Academy

The Apple Watch has come a long way since the first version was released over four years ago. Today's 5th-generation model features a much faster processor for speedier operation, always-on screen, an internal GPS, and optional LTE cellular data so you can use all the features without the need to take your iPhone everywhere you go.

We've been flying with the Apple Watch since it first launched, and while it has some unique uses, it's mostly a novelty in the cockpit. Fortunately, many aviation developers offer Apple Watch apps along with their primary iPad/iPhone app, allowing you to access bite-size pieces of aviation data from your wrist.



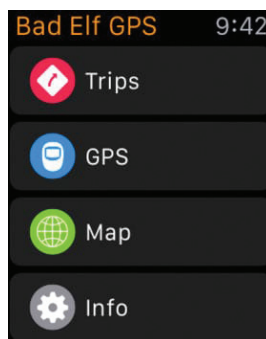
Altimeter+ Display an altimeter flight instrument on your watch. You can choose to use the barometer, GPS or ASTER calculations as the source.



AltitudeAlert Receive haptic alerts directly on your watch when deviating from pre-selected altitudes when using the AltitudeAlert app.



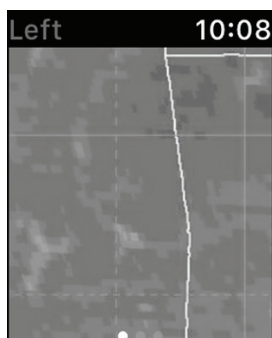
Aviation Altimeter for Watch This altimeter watch app goes beyond the basics and includes altitude alerting features, along with an oxygen alarm.



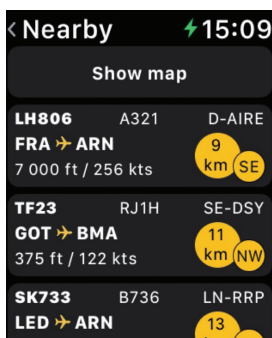
Bad Elf GPS Utility Monitor and control your Bad Elf GPS accessory right from your Apple Watch. The app provides a moving map view and basic navigation.



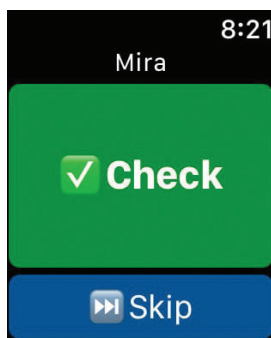
Civil Twilight for Watch This simple app automatically calculates the times for civil twilight and sunset/sunrise based on your locations, so you know how to log time.



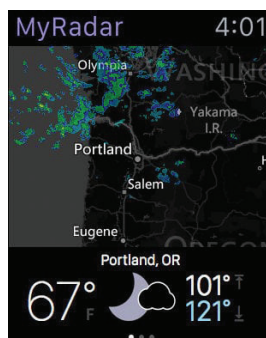
Cloud Map Quickly check any of the 120 NOAA weather station satellite images for visible cloud cover.



FlightRadar24 Turn your Apple Watch into an air traffic radar and see a listing of nearby airplanes.



MiraCheck CoPilot The companion Watch app provides an alternate means to advance the checklist from your wrist.



MyRadar View detailed weather radar imagery, current weather conditions, and a 5-day forecast.



NRST Continuously displays the direction and distance to nearby airports, along with a navigation instrument.

ANNUAL MAINTENANCE CHECKLIST FOR YOUR iPad

Similar to the routine of having your airplane undergo an annual inspection, we recommend that you take the time to review the following items once a year to keep your iPad, apps and accessories performing at their best.

CHRIS MCGONEGLE

Commercial Pilot
NEW PRODUCT MANAGER
Sporty's Pilot Shop

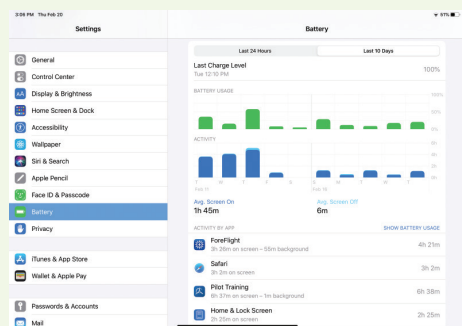


Restart the device

It's possible that you may go months or years without having to restart your device, which is a testament to the iPad's stability. Make it a habit from time to time to completely power down your iPad, and then turn it back on to reset internal memory and give the operating system a fresh start.

Check the battery usage report

Open the main Settings app, and choose Battery from the list of options on the left side of the screen. Here you can see which apps are demanding the most power from the battery over either a 24-hour or 10-day period. If there's an app you see here consuming a lot of power that you don't use very often, consider tweaking that app's location services settings, or its background app refresh permissions, which can be adjusted in Settings > General.



Delete unused apps and media

It's not hard to accumulate a lot of extraneous apps and media on your iPad over the course of a year. Go to the main Settings app, General, and select iPad Storage. You'll see a list of all apps installed, sorted by those that are taking up the most space. After reviewing this information, you might find it helpful to open one of the bloated apps and remove old downloaded content, like podcasts, movies, and books. And like with the Battery screen, you'll find suggestions to help you isolate large chunks of data for quick removal.

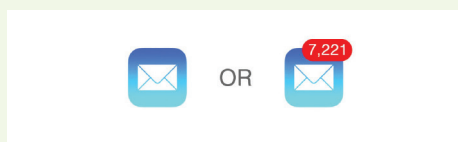
Check that your iOS is up to date

Make it a point to keep your iPad up to date as new iOS updates become available, which typically include security and reliability improvements. Just make sure to check our iOS Update Green Light page online after each update is released to verify it is compatible with your aviation EFB app and accessory.

One word of caution on iOS updates. You might be tempted to enable the "Automatic Updates" option on the Software Update screen, but we recommend you leave this setting disabled. You want to manually initiate each update after compatibility has been confirmed.

Check that apps are up to date

There's a running joke on the internet that there are two types of people:



The same goes for apps, where a large volume of app updates can pile up over time. Not only will app updates get you the latest feature enhancements, but you'll also be getting the most stable version of the application as developers continue to address bugs and other inconsistencies in older versions of the app.

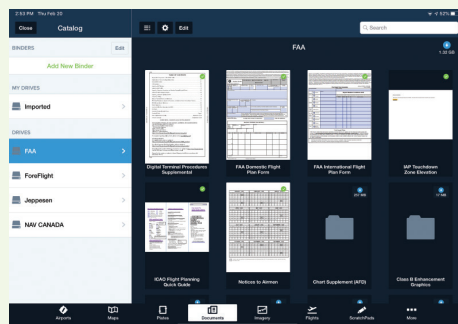
Verify your accessory firmware is up to date

Your wireless accessories also have software installed on them, called firmware, that can be updated from time to time with stability and feature improvements. Make it a point to periodically check that you have the latest firmware installed on your portable ADS-B and GPS accessories.

Review and update documents

Most of the major aviation EFB apps feature

a document viewer with a catalog of FAA and supplemental reference documents. These are updated throughout the year and should be reviewed periodically to make sure you have the latest versions saved for offline viewing in the airplane.



Check your aircraft performance and equipment data

In-app performance calculations are based on the aircraft profiles. Take a look at these from time to time to make sure they're representative of how you're actually flying the airplane so that you continue to get accurate performance planning numbers before takeoff. Also, check out the equipment assigned to the aircraft profile, like ADS-B transponder type, GPS navigator performance, and survival equipment.

Verify Find my iPad and Backups

The worst time to question whether you have the iPad tracking feature enabled is after you misplace it, so take the time once a year to verify that the "Find my iPad" option is enabled. Tap on your name at the top left of the Settings screen, select your device name at the bottom right, and you'll see the Find my iPad setting. While you're viewing your device settings, also verify that iCloud Backups are enabled.

Updated Aithre app offers remote monitoring of **CARBON MONOXIDE, PULSE OXIMETRY, AND OXYGEN TANKS**

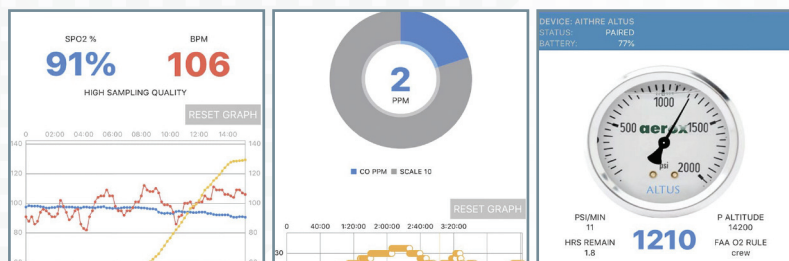


CHARLIE MASTERS

Flight Instructor
FLIGHT SCHOOL MANAGER
Sporty's Academy

Not all apps are focused on charts and in-flight weather; in fact, the maturation of the aviation app marketplace has brought a number of interesting ideas into the cockpit that solve specific problems. One example we've flown with is the Aithre Connect app and its companion line of pilot monitoring devices. This free app connects to the company's carbon monoxide detector, pulse oximeter, and oxygen tank monitor, then provides real time status information and audio alerts—without having to read multiple screens on remote devices.

Version 7.6 of Aithre Connect refines the design of the app, with more information visible on the home screen as a sort of dashboard layout. Across the top you can swipe through indicators for carbon monoxide, pulse oximetry, oxygen tank pressure, turbulence (using your phone's built-in accelerometer), history, settings, and even a checklist editor. This is a good way to quickly scan critical information in flight, and you can tap on each button for a detailed page with current data and recent trends (see below).



Tapping on the checklist editor presents the option to create up to four custom checklists (runup, takeoff, landing, and a custom-named one). This is fairly basic—enter the checklist item in each blank line—but once a checklist is created, you can tap on each item to skip/check it or have Siri read the item to you. If you've paired your Bluetooth-capable headset to your iPad (like a Bose A20 or Lightspeed Zulu 3), you'll hear each item in your headset so you can keep your eyes outside.

The speech tools go the other way too. Specific voice commands will cause the app to lookup airport information and frequencies. You can display this information on the app's home screen or have Siri read the information to you. For example, tap the green Assistant START button and say, "Get KOSH." The app will show Oshkosh frequencies, services, runways, and more. You can set a departure, arrival, and alternate airport so the information is preloaded for quick access. There's also a nearest feature that shows your closest airports, which can filter facilities by runway length and services.

Aithre Connect is hardly a full-featured electronic flight bag app (there are no charts or weather maps, for example), but it's a fairly intuitive addition to a helpful app.

The Aithre Connect is free to download and use for device monitoring. It's available for iPhone, iPad, and Apple Watch (a very handy option in this case). To turn on the assistant feature, with voice commands and airport information, you'll need to make a \$9.99 in-app purchase for a one year subscription.

Aithre Shield Carbon Monoxide Detector

This new model passed our tests for accuracy and ease of use, and stood out because of its innovative iPhone app. This easy-to-use app allows for precise monitoring without having to stare at a sensor.

6184A \$130.00



Aithre Illyrian Smart Oximeter The Illyrian smart oximeter uses a thin sensor pad worn under a headset ear seal to measure oxygen saturation. It then broadcasts wirelessly using Bluetooth Low Energy to your Apple phone, tablet, or watch using the free Aithre Connect app. Pop-up alerts let you know when to check the app. Uses a long-lasting portable power bank (included) for power.

7150A \$130.00



Aithre Altus Meso Oxygen Tank Monitor

Now you can keep track of the oxygen level in your portable tank—even when it's out of sight. The Altus Meso is a second generation smart tank monitor that wirelessly pairs to your iOS device to display pressure, flow rate, and time remaining. Just connect it to your oxygen tank with the included high-pressure T-fitting and plug Altus into the included USB battery pack.

8289A \$195.00



FLYING WITH THE INREACH SATELLITE MESSENGER

For pilots who don't need all the features (and expense) of full WiFi, Garmin's inReach offers a portable and affordable way to stay connected in flight. We tested the inReach Explorer+ on 10 different flights recently, and found a lot to like. It certainly doesn't enable email or web browsing, but it is useful for short text messages, flight tracking and even emergency messages. It also integrates nicely with the Garmin Pilot app.

Getting connected

The inReach communicators are battery-powered, standalone devices that connect to the Iridium satellite network. That means they get reception everywhere in the world, from pole to pole, even at altitude. You can send position reports, type text messages, or check weather reports using the screen and buttons on the device. This actually worked better than we expected—it is time-consuming to type a long message with arrow keys instead of a full QWERTY keyboard, but it wasn't bad.

There's also an SOS mode that sends an emergency message to a global monitoring

center, which can be activated by pressing a protected button on the side. This makes it useful as a standalone product.

The best option, though, is to connect the inReach to your iPad or iPhone via Bluetooth and use an app to manage communications. By doing this, you can mount the inReach in an optimal position for satellite reception and use an existing mobile device as the keyboard.

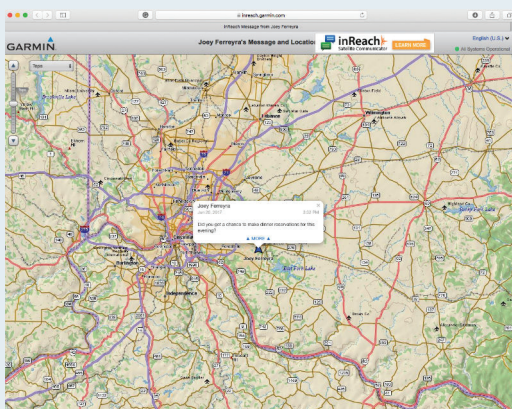
Garmin Pilot integration

One of the best features of the inReach is the way it can integrate into Garmin Connex, the company's vision for a connected cockpit. Once it's paired with your device, open the Garmin Pilot app and go to the Connex page. Here you'll see a green bar next to inReach, and you

can tap on this page for basic information about your device. You'll also notice a new menu option: Calls / Msgs. Tapping on this new menu option brings up the messaging page, which is the place to send and receive text messages. The app can also access your stored contacts, saving you time

when creating a new message thread.

This worked quite well for us, but there are two



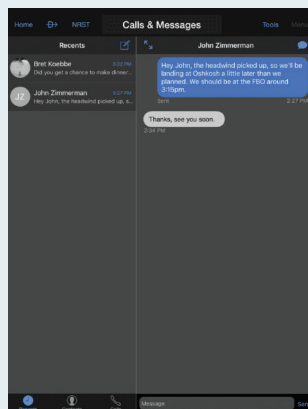
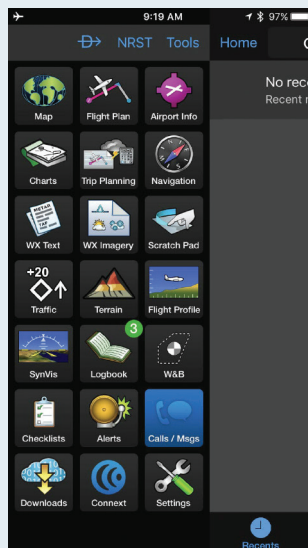
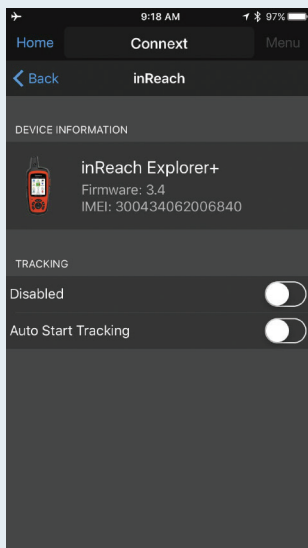
Mini

Explorer+

limitations to be aware of. First, the inReach is particular about placement. You simply can't place the device on the floor and expect to get reception—it needs a fairly unobstructed view of the sky.

Secondly, the messages are not sent instantaneously. Sending a message took anywhere from 10 seconds to 60 seconds, depending on satellite location and reception. This isn't a major issue on a long flight, but it's something to be aware of if you're used to lightning fast messages on your smartphone.

The inReach does require a subscription. Plans range from \$11.95/month to \$99.95/month, with flexible options for both seasonal and year-round plans.



Garmin Pilot integration

Garmin InReach

The inReach Mini features a black and white screen with fewer buttons; measures 3.9" x 2" and weighs 3.5 oz. The inReach Explorer+ provides full-fledged GPS on-map guidance with preloaded TOPO mapping; measures 6.5" x 2.7" and weighs 7.5 oz.

Garmin inReach Mini 6646A \$349.99
Garmin inReach Explorer+ 7969A \$449.99

ALL THE GESTURES PILOTS NEED TO KNOW

iPad Pro operation without a home button



MICHAEL WOLF

Commercial Pilot, Multi-engine
PRESIDENT AND CEO
Sporty's Pilot Shop

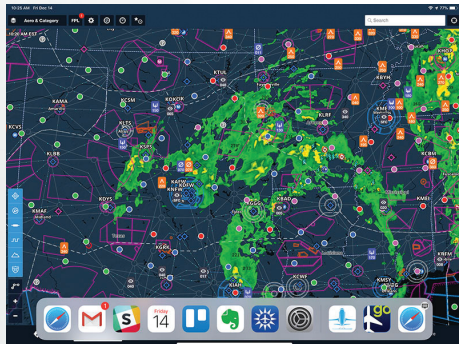
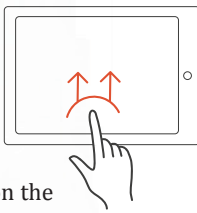


You can do almost everything on your iPad without touching a button – in fact, the new iPhone and iPad Pro models don't even have a home button. Whether it's closing an app, switching apps, opening the control center, or searching for something, iOS has multiple gestures that can save time or unlock additional features. Once you get proficient with them, they can really save time in the cockpit.

If you've been flying with an older iPad (like an iPad Air or Pro 9.7"), the new iPad Pro models may be confusing at first. They do require some new gestures, but once you get used to them, it's quite intuitive. Let's review all the options.

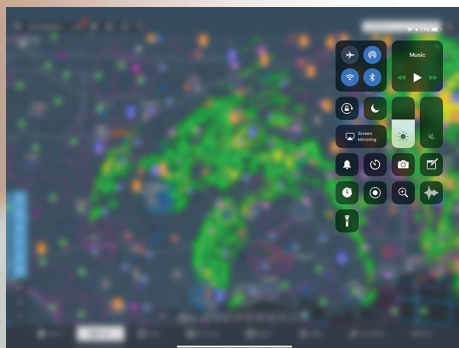
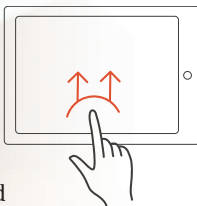
Swipe up (a little) for the app tray –

From any app, just swipe up from the bottom of the screen about an inch to display the tray of favorite apps. The ones on the left are set by you; the ones on the right are auto-filled by the iPad based on popular or recently used apps. This is a fast way to change apps, and it's also how you set up a split screen (see below).



Swipe up (a lot) to close the current app –

This is the home button replacement. Swipe up to about the middle of the screen and you'll close the current app and display the home screen. If you're on one of the secondary home screens, doing this will return you to the first page of apps.



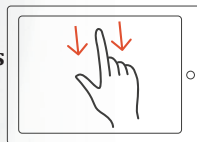
Swipe down from the top right corner for Control Center –

The Control Center provides quick access to some of the most commonly-used settings, including Airplane Mode, WiFi, Bluetooth, and screen brightness. It's also where you turn on the flashlight feature, so this is a frequently-used menu. Make sure you're swiping down from the top right corner.



Swipe down from top middle for notifications and today –

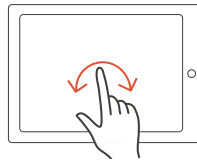
Did you get an alert and want



to review it? Swipe down from the top of the screen (in the middle) to see a list of all your notifications, whether it's a new email or an expected route from ForeFlight. After swiping down, you can also swipe from left to right to display the Today view. This is helpful because this view includes widgets, the little apps that run in self-contained boxes here.

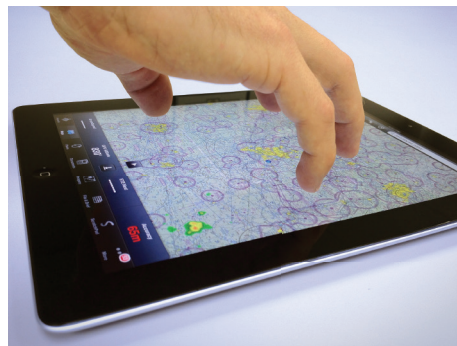
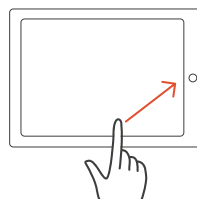
Swipe down from middle for search –

Most people learn this one by accident, but it can be useful if your iPad has a lot of apps. Swipe down from the middle of the screen and you'll see a gray screen with a search box at the top. You can use this to find an app that's hidden in another folder, a contact, or even search the internet. Tap cancel at the top to return to your home screen.



Drag an app from the tray to get split screen –

This is only available on newer iPad models running iOS 11 or later, but it's a powerful feature. While an app is open, swipe from the bottom of the screen to display the tray with favorite and recent apps. Then, tap and drag an app icon to overlay it on the app that's already open. This is a great way to use a checklist app or an E6B app without closing your favorite EFB app. Some apps go a step further and allow a full split-screen view, with two apps side by side. To view this, first drag an app icon out of the tray to display a second app, then drag it to the right side of the screen. You should see your original app resize and both apps will be active at the same time. You can even go from an 80/20 split to a 50/50 split by then dragging the new window from the left edge.

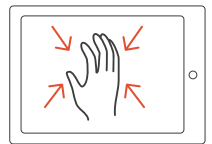


Besides these shortcuts, there are a number of gestures that require four or five fingers – Apple calls them Multitasking Gestures. To activate this functionality, go to Settings -> General -> Multitasking & Dock. The first

setting will enable the multiple app option mentioned above. The third one (Gestures) enables the following shortcuts:

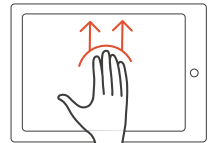
Pinch to the home screen –

Use this instead of pressing the home button to access the home screen from within any app. Place four or five fingers spread out on the screen, and pinch together.



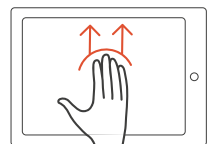
Swipe up and hold to see open apps –

Use this instead of pressing the home button twice (or the single finger swipe from the bottom) to access the multitasking view. Place four or five fingers spread out on the screen, and move your hand upward and pause for a second.



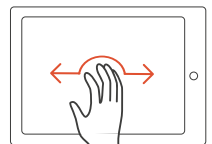
Swipe up from App Switcher to close multiple apps –

Once you've opened the App Switcher (what Apple calls this screen you get after doing the above gesture), you can close apps that are running in the background by swiping up. This doesn't delete the app, it simply closes it down completely. However, you can close multiple apps at the same time by swiping up with multiple fingers. This is handy if you want to close a lot of open apps, which is useful if you're trying to troubleshoot.



Swipe left or right between apps –

This allows quick movement between applications that are currently running. With an app running, place four or five fingers spread out on the screen. Now, move your hand to the left to switch to the last opened app. With the same motion, move your hand back to the right to switch back to the previous app.



CREATING A BACKUP PLAN

The iPad is quite reliable, but no electronic device is perfect. We suggest carrying some type of backup navigation, in addition to a backup power source.

Garmin aera 760

Large-screen GPS with WiFi, AHRS, and full instrument approaches

This is the GPS pilots have been waiting for. The rugged aera 760 is made just for the cockpit, with a vivid touchscreen, digital charts, panel avionics connectivity, and even WiFi for pre-flight weather briefings. It's like having an iPad and a GTN 750 in one.

5224A \$1499.00



Flight Outfitters Bush Pilot Flashlight

Rechargeable flashlight can also charge your phone



Illuminate the night with this powerful, rechargeable flashlight. Smart Select Dial provides five unique light modes that can be accessed without scrolling through each one. Blast up to 1,000 lumens of white light for safe preflight inspections, or provide up to 120 hours of low-level green light so you don't disturb sleeping passengers. An adjustable beam provides spot and flood light modes, and there's even a strobe setting for emergency signalling. **3090A \$89.95**

Power bank for your USB powered devices

Green stealth light



PJ2 COM RADIO

Ideal backup radio with built-in headset jacks

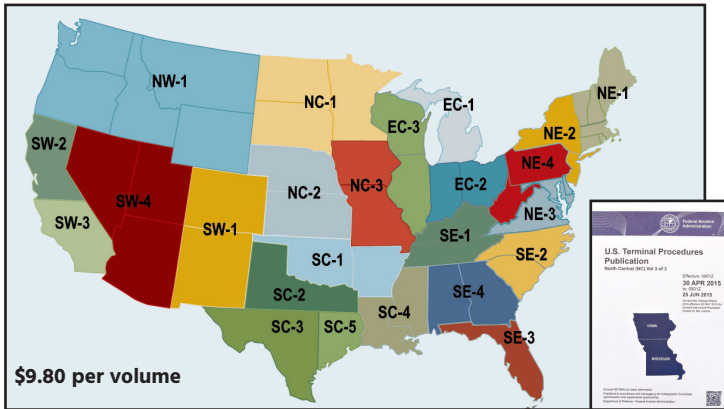
An emergency is no time to be searching for an adapter for your handheld radio. The PJ2 is the only handheld aviation radio that can be connected to standard aviation headset plugs (twin PJ plugs) without using a special adapter. The simplicity of this radio makes it a pilot favorite: just turn it on, type in a frequency, and plug in your headset. No menus, no wires, and no adapters. Dedicated volume and squelch knobs are easy to adjust, even in turbulence, and the extra-large screen and keypad make a big difference during an emergency.

1812A \$199.00



CHARTS

Terminal Procedures Publications



\$9.80 per volume

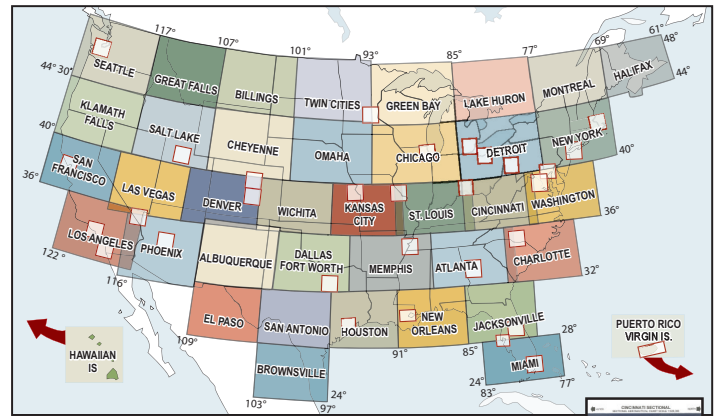
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Essential information for all instrument pilots. Each book includes instrument approaches, arrival/departure procedures, airport diagrams, takeoff minimums and more. Revised every 56 days. When ordering, please specify chart code, and loose-leaf or bound charts. For a complete set of Terminal Procedures Publications including Change Notices please order **B2004A \$237.20**

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NE2	NY, NJ	EC2	IN, OH	SC5	TX southeast
NE3	DE, MD, VA, DC	EC3	WI, IL	NW1	WA, OR, ID, MT, WY
NE4	PA, WV	NC1	ND, SD, MN	SW1	CO, NM
SE1	KY, TN	NC2	NE, KS	SW2	CA northern
SE2	NC, SC	NC3	IA, MO	SW3	CA southern
SE3	FL, PR, VI	SC1	OK, AR	SW4	NV, AZ, UT
SE4	AL, GA	SC2	TX northern	CHGE	CHANGE
		SC3	TX southwest		NOTICES \$2.00

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Sectional Charts (Scale 1:500,000) \$9.00 ea.

The most popular charts for VFR navigation. Each depicts land data like cities, rivers and topography, plus airports, nav aids and special use airspace. Please specify the names of the charts you want. Revised semi-annually.

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\$6.20 ea. A smaller scale version of sectionals, each one depicts a particular area's Class B airspace, including visual checkpoints. Some include a VFR Flyway Planning Chart on the back. Revised semi-annually.

*A VFR Flyway Planning Chart is printed on back of TAC. For a complete set of 30 TACs, order **B2010A \$189.80**

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*Atlanta	*Dallas-Ft. Worth	*Memphis	Salt Lake City
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Boston	*Detroit	Minneapolis	San Francisco
Charlotte	*Houston	New Orleans	San Juan (\$10.00)
Chicago	Kansas City	Philadelphia	Seattle
Cincinnati	Las Vegas	*Phoenix	St. Louis



How to safely contain a

TABLET FIRE

Lithium ion batteries are modern miracles: they provide enough power for an iPad to run for 6+ hours, they charge quickly, and are lightweight. But while the safety record of lithium ion batteries is remarkably good considering how many of them are in circulation, fires and explosions do happen. The FAA has published reports for over 40 such incidents in the last year alone.

Unfortunately, lithium ion battery fires are different from most other types because they do not need oxygen to burn. If it's caused by a short, the battery can enter thermal runaway and may even explode.

As a result of this threat, many airlines and corporate flight departments require pilots to carry fire containment systems on all flights. After all, in a pressurized airplane at 37,000 feet, you can't exactly throw the

tablet out the window. While these systems work very well, they have been far too heavy and expensive for general aviation pilots to consider—costing well over \$3,000 in some cases.

Fortunately, there's a new option that is both portable and far less expensive. Two sizes of fire containment bag are available, one for tablets/phones and one for laptops. Each has a multi-layer construction: the carbon layer prevents fire, and will withstand 3000 degree Fahrenheit temperatures, while a separate Kevlar layer prevents projectiles from injuring pilots and passengers in case of an explosion. A pair of fire resistant gloves is included for handling the device, making this a complete system. In the event of a tablet fire, just place the device in the bag and close the flap.



Tablet Fire Containment Bag
3360A \$495.00



Laptop Fire Containment Bag
3162A \$595.00

Why **POLARIZED** **SUNGLASSES**

don't work with the iPad

Many pilots have learned the hard way that polarized sunglasses, an increasingly popular option, don't always play nice with a tablet. Older iPad screens in particular will appear completely black when viewed in portrait mode if you're wearing polarized sunglasses. This is also true of some panel-mount flight instruments, which may have an anti-reflective coating on the front.

There's nothing wrong with the iPad; it's simply a matter of two anti-glare technologies (the polarized lenses on the sunglasses and the polarizing filter on the

iPad screen) combining to defeat each other. On most iPhones, the "extinction" is set to 45 degrees, which does not cause problems.

Some newer tablets do not have this problem, and you can always view the iPad in landscape orientation without problems. But for maximum versatility we recommend non-polarized sunglasses in the cockpit. There are plenty of great options below that cut glare and are 100% compatible with all cockpit avionics.



"Older iPad screens will appear completely black when viewed in portrait mode if you're wearing polarized sunglasses."



iPAD-FRIENDLY SUNGLASSES

RAY-BAN

AVIATOR

Small-55mm, gold

5609A ~~\$149.00~~ **\$119.95**

Medium-58mm, gold or black

5400A ~~\$149.00~~ **\$119.95**

Large-62mm, gold or black

5285A ~~\$149.00~~ **\$119.95**



COCKPIT

8106A ~~\$155.00~~ **\$119.95**



WAYFARER

1618A ~~\$155.00~~ **\$119.95**



DUAL EYEWEAR

DUAL AV1

1616A **\$99.95**



DUAL AV2

Bronze lens 2805A **\$99.95**

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DUAL SL2

7857A **\$64.95**



Built-in readers
on each pair!

CLOUDBASE

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6173A **\$79.95**



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6344A **\$79.95**





DOUG RANLY

Private Pilot
CATALOG MANAGER
Sporty's Pilot Shop

FARO AUDIO ADAPTER DELIVERS EFB ALERTS TO ANY HEADSET

One concern we hear from pilots related to all the bells and whistles in aviation apps for iPad is the tendency to spend too much time heads-down, poking around at the screen. It takes time and practice to get to really know your app and learn how to quickly retrieve key data and accomplish routine tasks, without losing focus on the primary task of flying the airplane or scanning for traffic out the window. This is a fine balance though, as the iPad has turned into a hazard avoidance tool too, displaying potential threats like nearby traffic, restricted airspace, terrain and weather, so there are times when it's critical you keep the iPad in your scan.

To assist with this task, ForeFlight can display a number of pop-up alerts to provide you with time-sensitive, location-based information—and there's an option for audio alerts in addition to visual warnings. Garmin Pilot doesn't have quite as many audio notifications, but there is an option for helpful traffic alerts when connected to one of their ADS-B Receivers. WingX provides helpful runway advisories via audio, as well.

All of these alerts are a real benefit for pilots—no matter what you're doing or what screen the app is on, you get important notifications when you need them. What can be problematic, though, is that the sounds coming from the iPad's small speaker are typically drowned out by your airplane's engine noise.

If you're flying with a newer headset, you can easily connect your iPad to your headset using Bluetooth to hear the alerts (see next page). But what about your older headset that functions perfectly well, but doesn't have Bluetooth or an audio input? That's where the Faro Stealth Audio Link comes in and can breathe new life into your headset.

The simple design connects between your headset and the intercom jacks and incorporates a Bluetooth receiver and audio input to connect to your iPad or another mobile device.

The Stealth Audio Link features independently-controlled volume levels for both the left and right ear with simple thumbwheel adjustments. The control box also has a stereo/mono switch, so it is adaptable to most aircraft intercom systems. It works with any standard twin PJ plug aviation headset and can be powered by either two AA batteries or via the USB type C port on the side of the unit.

The Stealth Audio Link allows pilots to prioritize input audio with an easy three-position switch. The top selection gives the aircraft priority, so anytime the intercom is active the music or input audio will be muted. The middle selection gives the music or input audio priority, so both the intercom and music will be heard at the same time—perfect for EFB audio alerts. The bottom selection mutes the music or input audio so pilots can focus on ATC transmissions.



Faro Stealth Audio Link
8643A \$139.95

Upgrade your aviation headset with the FARO Audio Link. Get alerts from your favorite aviation app, listen to music on long cross countries, or even make a phone call to get clearance while on the ground. The Audio Link uses Bluetooth to connect to enabled devices, and also has a 3.5mm aux-in jack for hard wiring. Works with any standard twin PJ plug aviation headset. Uses 2 AA batteries (not included), and can also be powered via the USB type C port on the side of the unit.



Bluetooth Connectivity



Audio Priority



USB Type C Power Input

USE IPAD AUDIO TO MAKE YOUR FLYING SAFER

The iPad is an engaging visual tool, but many pilots forget about its many audio uses. Especially for those pilots who worry about spending too much time looking at the iPad, it's worth understanding how apps use audio to make flying more efficient and safe. Let's look at some of the options, and how to set up an audio connection.

ForeFlight is able to display a number of pop-up alerts to provide you with time-sensitive, location-based information. These alerts include runway proximity, traffic, cabin altitude, destination weather, terrain, TFRs, final approach runway, and low altitude. There's even an alert for weight and balance when your center of gravity is out of limits. What many pilots may not realize, though, is that ForeFlight also provides audio alerts with these.

A more recent addition to ForeFlight is the ability to hear a verbal checklist. Go to the More tab, then Checklist and notice the Speak button at the bottom. Tap this and the app will read your checklist to you, complete with any modifications to the text you've made. There are options to go faster/slower or to pause the audio.

Garmin Pilot doesn't have quite as many audio notifications, but there is an option for helpful traffic alerts when connected to one of their ADS-B receivers. **WingX** provides helpful runway advisories via audio, as well.

The new **Stratus Insight** app offers a variety of electronic flight bag features, including charts, in-flight weather, and moving map navigation. Then it goes a step farther: when connected to your iPad using the Stratus audio cable, it can also record all your cockpit and ATC audio, and even transcribe it so you can read what the controller said in addition to hearing it.

Besides the big EFB apps, there are some other audio apps worth trying, like **MiraCheck**, which brings a high-tech audio checklist to the iPad. By integrating voice controls and voice recognition, it provides a heads-up and hands-free way to run normal and emergency checklists in flight.

Headset manufacturer Lightspeed updated their free **FlightLink** app last year, which is compatible with all Lightspeed headsets manufactured since 2012. This allows you to record all activity over the intercom (with a cord), including ATC and cockpit conversation, and play back the last two minutes of transmissions. There's also a scratchpad tool to copy clearances.

Likewise, Bose offers a free app called **Connect**, which works with the company's ProFlight series of lightweight headsets. The most interesting feature here is called Music Share, which allows you to pair two ProFlight headsets to one device, so a pilot and passenger could both listen to the same audio.

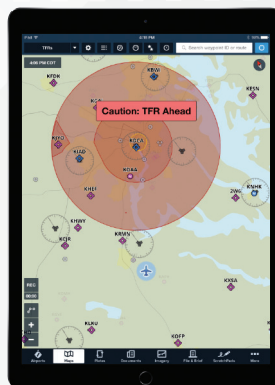
Fortunately, most modern aviation headsets have audio inputs allowing you to route audio alerts directly into them to help get your attention. If you have a headset

that offers Bluetooth audio compatibility, like the latest version of the Bose A20, all Lightspeed headsets, the David Clark One-X, or the Faro Stealth 2 line, you can wirelessly connect it to your iPad. There are good options here between \$250 and \$1100.

To do this, first activate the Bluetooth pairing function on the control module (usually using the button with the Bluetooth "B" symbol on it), and you'll see a status light flash on the headset control module. Next, go to the Settings app on your iPad, select Bluetooth from the list at the top left, and set the switch to on. You'll soon see the name of your headset in the devices list—tap it, and your headset will "pair" with your iPad and establish the wireless connection. The term pair here is important because you can only connect one headset to your iPad at a time.

You still have options if your headset is lacking a Bluetooth music interface. Many still feature an auxiliary audio input that allows you to connect an audio cable to the headphone jack on your iPad. Alternatively, you can add a small Bluetooth adapter to the audio input of your headset (see article on previous page).

One last note here: not all Bluetooth is created equal. You will see some headsets (like older Bose A20 and X models) advertise a Bluetooth cell phone interface, but unfortunately, this is only designed for voice phone calls and will not pass through music or other audio effects from the iPad.



The ForeFlight TFR advisor feature provides audio alerts when approaching a TFR.



Lightspeed's FlightLink app offers a number of helpful audio features.

BLUETOOTH HEADSETS

perfect for the iPad

BOSE

A20

At just 12 oz., the A20 is one of the lightest headsets on the market; combine that with its soft sheepskin ear cushions and minimal clamping force and you can wear this headset all day. Bose's proprietary active noise reduction cancels an impressive amount of engine and propeller noise, but maintains outstanding battery life.

A20 with Bluetooth

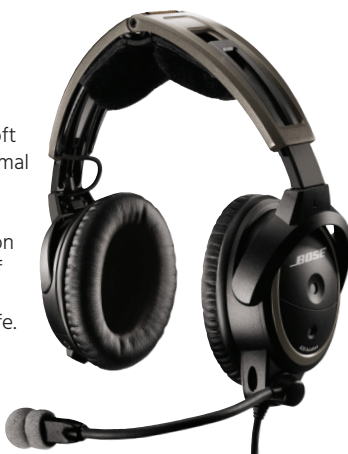
(specify PJ, LEMO, Helicopter)

3490A \$1095.95

A20 without Bluetooth

(specify PJ, LEMO, Helicopter)

9630A \$995.95



ProFlight Series 2

Now professional pilots can wear a Bose headset designed specifically for airline and corporate flight decks, including all the noise reduction, comfort, and advanced audio features that have made Bose the top-selling headset brand in aviation. The ProFlight Aviation Headset weighs just 4.5 ounces and uses comfortable silicone eartips to virtually eliminate side pressure, so it can be worn for hours without discomfort.

ProFlight (specify PJ, LEMO, or XLR plugs)

9784A \$1045.95



LIGHTSPEED

Zulu 3

The Lightspeed Zulu headset has been a pilot favorite for years, offering an unbeatable mix of performance and value. Whether you're flying a two-seat trainer or a large turboprop, Zulu delivers outstanding ANR performance and industry-leading Bluetooth options—all at a price under \$900.

3898A \$850.00



Sierra

The perfect choice for budget-conscious pilots, students, and passengers, Sierra offers high-end performance and features—including outstanding noise cancellation, full Bluetooth integration and compatibility with FlightLink, Lightspeed's in-cockpit recording app.

2472A \$650.00



DAVID CLARK

ONE-X

The DC ONE-X headsets provide advanced comfort and technology features in a sleek, low profile design. You'll have the sound performance and durability you need, with the comfort you demand. Features Bluetooth® technology for inflight calls and music. The full size leatherette ear seals provide maximum comfort for long flights.

DC ONE-X (twin plugs)

8408A \$895.00

DC ONE-XP (LEMO)

7182A \$895.00



PRO-X2

David Clark has a well-earned reputation for building some of the highest quality, longest-lasting headsets in aviation. The DC PRO-X2 is a completely new design with ultra-lightweight construction and superior electronic noise reduction. Includes: Hybrid ENC Technology, Bluetooth wireless input and soft, leatherette ear seals.

DC PRO-X2 (twin plug)

2485A \$745.00

DC PRO-X2P (LEMO)

4261A \$785.00



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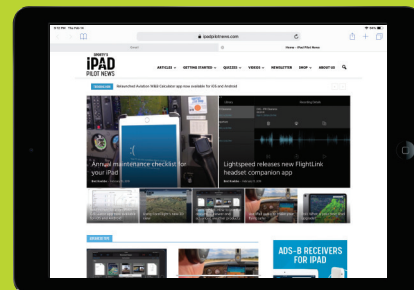
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SPORTY'S

PILOT TRAINING APP

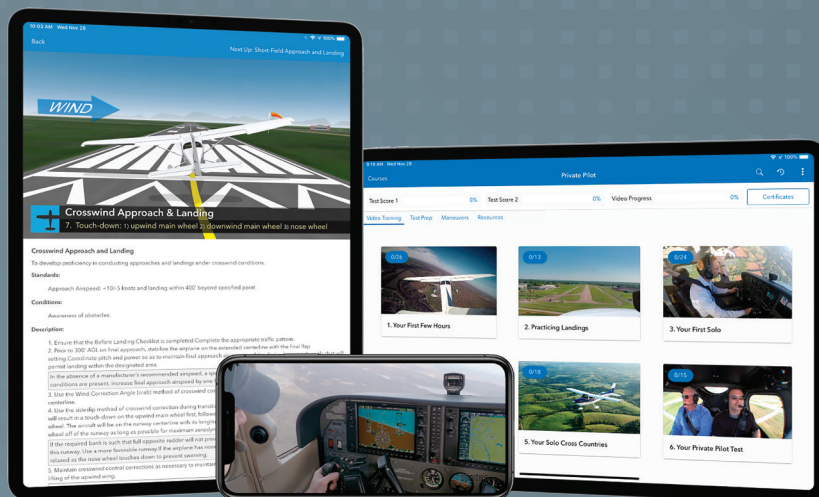


For iPad, iPhone, Android, Apple TV, and Roku

Sporty's innovative Pilot Training app brings a variety of aviation training courses to one location, allowing you to access all your aviation content from your phone, tablet or TV. Best of all, your training progress syncs across devices, so you can start learning on your phone, continue on your tablet, and finish on your TV.

Over 25 courses available:

- Learn To Fly Course
- Instrument Rating Course
- Flying with ForeFlight
- Flight Review
- Instrument Proficiency Check
- VFR Communications
- IFR Communications
- Garmin G1000 Checkout Course
- Flying the Aspen Evolution
- So You Want to Fly Helicopters
- So You Want to Fly Twins
- So You Want to Fly Seaplanes
- So You Want to Fly Gliders
- Aviation Weather - A Pilot's Guide
- Takeoffs and Landings
- Pilot's Guide to Airspace
- Garmin GTN Essentials 2.0 eLearning Course
- Garmin TXi eLearning Course
- Garmin Aviation Weather Radar 2.0 eLearning Course
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