

LEARNING NEW AVIONICS FAST

Making the move into the digital world can be stressful; training procedures can be overly complex. Here's how to learn new systems efficiently.

by Fred Simonds

Back in 2006 I transitioned from simple Grumman AA5-series airplanes into an Avidyne glass, dual Garmin GNS 430 Cirrus SR-20 with S-TEC 55X autopilot and other treats.

Color me intimidated.

My wife had to coerce me into staying with my formal transition course. It was the hardest thing I have ever done in aviation.

Looking back, the program was unnecessarily bloated because it did not differentiate what you *need* to know versus what's *nice* to know.

Then and there I understood that the first step in learning new avionics is

to focus on the things you will use 80 percent of the time.

Step one is to leaf through the manual and look for the simple, big-picture stuff first. Your avionics box may include a quick start guide.

That's a great beginning, but go beyond it and ask yourself, "What did I buy this thing to do?" Then set out to learn those things.

From here on I'll divide "avionics" into GPS and autopilots, because what you need to know is different for each device.

Top Ten GPS Skills

1. At system startup, know how to check that the GPS is working properly, including RAIM checks and current datalink, e.g. NEXRAD, subscriptions.

You don't want to trust your neck to a broken system or expired XM weather subscription, do you?

2. Be able to load, activate, edit (remove and insert) and verify flight plan waypoints, as well as how to activate the next leg. It is a perversion of life that the less you know about editing the more frequently ATC will change your routing.

Know how direct-to

bypasses flight plan waypoints, how to go directly to a waypoint in the flight plan and then resume it, and especially how to cancel direct-to navigation.

Verify the flight plan by using the map to prove that waypoints are properly ordered.

3. If your GPS supports them, know how to insert departure and arrival procedures.

4. Be able to find airport and navaid information without referring to paper.

5. Know how to use OBS mode to set up and fly a hold. OBS mode is dirt-simple and enormously useful.

6. With respect to approaches, be able to load, and activate an approach. This includes selecting a transition, flying a procedure turn, and setting MDA or DH. Be able to change the approach or IAF quickly.

7. Know how to initiate a missed approach. This is a very busy time and can be dangerous if you do not resume GPS sequencing, fly as directed and get that all-important climb going.

8. As best you can, learn what your GPS can and cannot do. For instance, G1000s know nothing of published en route holds and cannot be programmed to join an airway between waypoints. There is no way to know other than to read a lot, learn by experience (defined as "what you get when you were expecting something else") and perhaps connect with a knowledgeable pilot or instructor.

9. If you have them, bearing pointers are one of the most intuitive navigation displays. They simply point at a VOR or GPS waypoint.

10. If you have an integrated FMS which includes VOR receivers, know how to navigate just by VOR. I know it sounds archaic, but GPS receivers fail, and if you are in a non-WAAS airplane, you are required to have a navigation backup.

For most of us that's VOR, but it's worthless if you don't know how to use it. VORs are also an excellent cross-check for your GPS, something



The first time you look at an IFR GPS panel it can seem vast and intimidating. Knowing what is important to learn and understand will ease the transition process.

mighty comforting when the weather is sporty.

Accept occasional automation surprises as a fact of GPS life. Software bugs happen. This is IFR, where sometimes you just have to improvise.

Maintain proficiency by doing everything from using PC trainers to hooking up the airplane to external power and getting up close and personal with your avionics that way.

Mastering the ten top items will make learning the remaining 20% much easier. With more experience, you'll be able to figure out the rest of what you need on the fly (sorry).

Top Ten Autopilot Skills

Fortunately, AP functions are very intuitive. They are most easily learned by dividing their functions into lateral and vertical modes.

1. Typical lateral buttons include HDG, NAV, BC (back course) FD (flight director), and APR (approach) modes.

2. Vertical buttons typically include ALT, VS (vertical speed), Nose UP, Nose DOWN, and FLC (Flight Level Change). FD also has a vertical component, placing it in both camps. Some autopilots offer VNV or vertical navigation.

3. Know how to disconnect or power-off the AP if it misbehaves by using the yoke's AP disconnect button, blipping the electric trim or hitting the off button on the AP.

Some disconnect at first and then power off if pressed again. You should be able to find the AP circuit breaker by memory. Buy one of those circuit breaker rings in white or yellow that goes around the breaker to help you identify it in a pinch. You only have to experience a single trim runaway to become a believer.

4. If you have control wheel steering, know which AP modes will return the AP to what it was doing before and those in which the AP will keep doing whatever you are doing when you release the CWS button.

5. Know how to arm vertical modes such as altitude capture and lateral modes such as flying via HDG to join a localizer in NAV mode.

6. Know the operational envelope of your autopilot by heart. There's a maximum and minimum operating speed. There is likely a minimum altitude engagement of about 800 feet AGL on departure and a mandatory disconnect at around 200 feet AGL on approach. There may also be a fuel imbalance limit.

7. Some autopilots use the flight director to drive the AP. You can be misled into thinking the AP is engaged when only the FD is on. At that point no one (or thing) is flying the airplane.

8. Never let your fingers get ahead of your brain, known as "fat fingering".

Think first before you push buttons. Confirm every mode you select.

9. Use the autopilot on a missed approach only after a satisfactory rate of climb is established.

10. Some autopilots drop into ROL (roll) mode if the navigation source is changed. Is yours one of them?

Sticky Notes

Lastly, place sticky notes or simple diagrams (I use index cards) near your new avionics to help you learn your way around. As you advance, replace them with new things you can use. Save the removed notes in a notebook in the airplane for future reference. This method of incremental learning is guaranteed to help you get the most out of your new avionics investment.

Fred Simonds is a Gold Seal CFII and factory-certified G1000 instructor. See his web page at www.fredonflying.com.

THE TOP TEN THINGS YOU NEED TO KNOW

Top Ten Item	GPS	Autopilot
1	Preflight check your GPS	Know lateral mode functions (e.g., HDG, NAV)
2	Load, activate, edit, verify the flight plan "on the fly"	Know vertical mode functions (e.g., ALT, VS)
3	Insert SIDs and STARs	Know all ways to disconnect and power off the AP
4	Find airport and navaid information within your GPS	Understand how Control Wheel Steering can affect the AP's behavior in different modes
5	Know and apply OBS mode	Know how to arm lateral and vertical modes
6	Load, activate, modify an approach	Memorize the operational envelope of your AP
7	Activate, execute missed approach	Understand the difference between FD and AP
8	Know the weaknesses of your GPS	Think - act - confirm, every time you use the AP
9	Know how to use bearing pointers	Practice flying missed approaches with the AP
10	Know how to use VOR receivers	Know how the AP reacts to a NAV source change