

BEFRIENDING YOUR AUTOPILOT

When used properly, an autopilot can enhance the comfort and safety of your IFR flight—as long as you remember who (not what) is flying the airplane.

by Fred Simonds

In the 2008 robotic movie WALL-E, Captain McCrea of the spaceship Axiom battles with the ship's runaway autopilot, Otto, to regain control of his ship. After a mighty struggle, the captain succeeds in disconnecting Otto, who has been running things for 700 years.

Seven hundred years on autopilot seems like a bit much. For those of us who fly light aircraft, not giant spaceships, this raises an important question: When should we engage the autopilot and when is the airplane best hand-flown?

Presumably, Captain McCrea's spaceship skills have atrophied with time if they ever existed at all. His dilemma raises two more questions of proficiency vital to safely flying an autopilot-equipped airplane: Do you know your autopilot forward and backward for the specific airplane you are flying? Can you hand-fly the airplane in every phase of flight, especially in IMC on an approach?

Engage It

Autopilots have advanced swiftly in recent years. For example, the Bendix/King KAP140, Garmin GFC700 and S-Tec 55X are each capable of flying a heading, navigating a flight path, managing altitude and flying an approach. Alas, they still don't make coffee.

Technically advanced aircraft with avionics suites such as Avidyne/Garmin and Garmin G1000 units are designed to be flown on autopilot. Once basic

stick-and-rudder skills are mastered during transition training, the balance of the instruction focuses on avionics and the more-or-less automatic engagement of the autopilot from after take-off until moments before landing.

Can you hand-fly the airplane in every phase of flight, especially in IMC on an approach?

This makes sense, to some degree, because these are machines designed to go places. Those of you who fly faster airplanes or those with higher stick forces can attest to the fact that hand-flying becomes both physically and mentally wearing after a time, especially when flying in IMC. Your energy is best expended in monitoring the progress of the flight and doing those things an automaton cannot do. Put another way, using the autopilot whether VFR or IFR is sound cockpit resource management—and you are a resource, too!

Airline pilots routinely spend most of their cockpit time on autopilot. It saves fuel, reduces pilot fatigue and workload and helps assure that the airplane is flown accurately and in accordance with IFR procedures and ATC instructions. Use the autopilot often enough to stay in practice so you can safely engage it when you need it.

For those of you who fly with sig-

nificant others who are not pilots, the autopilot also provides a safety net in the unlikely event that you, the pilot in command, should become incapacitated. The autopilot will keep flying the plane while your passenger, hopefully, contacts ATC for help.

Avoid using the autopilot so much, though, that you permit your hand-flying skills to atrophy. Don't allow yourself to become so numb to your role that you lose situational awareness and become the autopilot's passenger. You don't want to morph into another Captain McCrea.

Proper use of your autopilot will keep you just where you should be. When flying under IFR, you will look mighty sharp to controllers watching your track and altitude on the radar screen. This can get you extra service if they believe you are on your game. No need to tell them that silicon and servos are doing the work!

Turn It Off

Should the autopilot fail any ground test before flight, or if you forget to test it, you take on unnecessary risk by engaging it in the air. Doing so can violate POH procedures and is therefore illegal.

If the autopilot trips offline in flight more than occasionally, or indicates a malfunction, perform the checklist's emergency recovery procedure if there is one and leave the autopilot off until it can be serviced.

You must know at all times who or what is flying the airplane. For instance, excessive turbulence can trip the autopilot offline. To avoid overstressing the airplane, severe up and downdrafts call for maintaining a level flight attitude, which may exceed the autopilot's capability.

Be prepared to turn Otto off if it does not behave as you expect. For instance, a runaway trim condition could cause an unusual attitude. Do not confuse the AP Disconnect button with the push-to-talk button on the left yoke. Know where the autopilot



circuit breaker (often marked with a white or yellow ring) is located. Keep your hands near the controls during a coupled approach and be ready to disconnect if things do not progress to your liking.

Each autopilot has its own flight envelope based on the airframe upon which it is installed; operating outside that envelope is dangerous. For instance, the GFC700 is not to be engaged below 800 feet AGL unless performing an approach when it must be disengaged at 200 feet AGL. It's up to you to know and obey those limits. Similarly, pilots sometimes forget that certain autopilots such as the ones mentioned above are two-axis and therefore do not manage yaw. You must keep the ball in the center.

Just because you can engage a GFC700 autopilot at 800 feet AGL doesn't necessarily mean you should, because maneuvering is the number-one cause of fatal accidents. Therefore if not on an approach, I disengage the AP at 1,500 feet AGL in Class D, within five miles of a non-towered airport and whenever VFR in or near high-density airspace such as Class B. If you have control wheel steering where you can take manual control instantly and then revert back to auto-

pilot, you can probably relax these guidelines a tad.

One last tip: Switching from autopilot to hand flying is a bit of a transition, especially after hours on autopilot. If you are going to hand-fly the arrival and landing, disconnect the autopilot and fly by hand a while to get your mind and muscles (including those foot muscles—remember the rudder?) back into hand-flying mode.

Do You Have a Proficiency Deficiency?

Answer these questions for yourself:

- Am I comfortable flying IFR with or without the autopilot?
- Could I meet the Instrument Practical Test standards or pass an Instrument Proficiency Check today with and without the autopilot?
- Do I feel well trained on my IFR-equipped GPS equipment and how it interacts with my autopilot?
- If there is a malfunction, do I know how it will affect my autopilot?
- If the autopilot fails, how will I know and what should I do?

If you can't answer "Yes" to any of these questions, then it's time for action.

Take Action

If you are uncertain as to how the autopilot works in any mode, read up on it and "chair-fly" and/or simulate it first before flying using either a flight simulator or a computer-based trainer. If you are going to experiment in the real airplane, do so at altitude, off airways and with a traffic observer pilot.

Be sure you can disconnect the autopilot—with the circuit breaker if necessary—if it feels like Otto is taking over. It can be very dangerous to overpower the autopilot while it is still engaged. The trim will work against you and you risk losing control of the aircraft.

Take a qualified instructor with you who can point out subtleties you might miss. For example, malfunctions in other equipment that either cripples or disables the autopilot are key things to know. In Cessnas, failure of the G1000 MFD will not cause the GFC700 to fail, but loss of the PFD will disable the autopilot function. Even so, the GFC700's flight director will continue to work. Do some partial-panel approaches with just the flight director to assure yourself that you can do it.

Practice is important before you use the autopilot under IFR. Get comfortable with autopilot-coupled departure, en route and approach procedures in VMC first before even venturing into "soft" IMC. Save the "hard IFR" for once you feel like you know the autopilot inside and out, including emergency procedures.

Taming Otto

Learning to fly the autopilot is as essential as learning to fly the airplane. The autopilot is not an accessory. Like the airplane, you must know its normal operation, its flight envelope and its failure modes. You are on top of your game when you become as comfortable flying with it as without it.

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