Mike Goulian Aviation
Pro Tip of the Month - Automation Best Practices by CSIP Lex Crosett

The glass cockpit avionics we have in current generation Cirrus aircraft provide wonderful capability and contribute to safety improvements in many ways. The situational awareness provided by newer cockpit displays and electronic flight bag applications, along with the traffic and weather data from ADS-B and XM are a real boon to safety. These capabilities almost seem like cheating when compared to the steam gauge, whiz wheel, approach chart, and flight service station lifestyle of the past.

The Garmin GFC700 Automatic Flight Control System (AFCS or autopilot) is fully integrated with the Perspective + flight management system (FMS) that helps in many flight modes. The AFCS offers under speed protection, hypoxia detection and automated descent, and the optional Electronic Stability Protection System that activates when pilots depart the normal attitude envelope (pitch, bank). These capabilities contribute to a lower workload and help prevent accidents.

The best part of flying a Cirrus is the capability of the airplane to fly in many types of weather with great situational awareness, high speed, and long range. Your Cirrus can take you to many exciting places, and the automation on board can make these trips more enjoyable and safer.

If you're like me, however, you have likely asked yourself these questions when operating the Cirrus flight management and automated flight control systems:

- What's it doing now?
- Why is it doing that?
- How do I make it stop?
- How can I avoid that next time?

Let's review these scenarios along with recommendations to counter unexpected autopilot excursions.

What's it doing now?

Before engaging the autopilot, make a habit of setting and verifying that the flight director is in the appropriate mode by reviewing the scoreboard (top section of the PFD). Once you are satisfied with the selected modes, engage the autopilot, then *recheck and confirm the autopilot modes selected*. If the modes are incorrect or the autopilot did not engage properly, push the red disengage button, and start over with the flight director only.

And continue to hand fly the airplane!

Why is it doing that?

It is important to be methodical when operating the flight director/autopilot and making rapid changes. Slow down inputs and verify the modes selected after each input. Consider following these best practices:

- **Move or change bugs before changing autopilot modes.** When ATC calls with a change, acknowledge and then move bugs (altitude, heading, CDI, etc.). Then fly the flight director commands or engage the autopilot to do the same. Never fly through the bugs you set.
- **Apply lateral inputs (heading, navigation) before vertical inputs.** If you need to change altitude and heading or navigation, acknowledge and make the lateral (HDG, NAV) change first, then the vertical change (FLC -> climbing, VS -> descending). Don't make both changes at once.
- **Do not remove your hands from the controls until you have verified the modes in the PFD scoreboard.** This works the same way when the pilot flying and pilot not flying confirm the positive exchange of controls. If it helps, you can say to yourself, "You have controls." when enabling the autopilot. Until you are sure all is well, you should not remove your hands from the controls. *This is especially important when at low altitude* – for example while executing a missed approach in Takeoff/Go Around mode.

How do I make it stop?

When the autopilot sends the airplane on an unwanted excursion or alarms and disconnects, you should reestablish control and start at the beginning. There can be a significant startle factor if you have not been actively monitoring the system when the autopilot disconnects.

Don't madly try to repair a bad situation with additional flight director and autopilot inputs. Flying the airplane with raw data and adding the flight director back when you are able is the best approach.

Every pilot should step down the level of automation in use and hand fly in these situations:

- Change of runway and/or instrument approach
- Weather-related change of plans
- Unexpected icing encounter

The autopilot in your Cirrus does not manage aileron trim, so a sudden autopilot disconnect in icing conditions could lead to entry into an unusual attitude or a large excursion in heading. Keep your hands on the controls when disconnecting the autopilot and think: "I have controls."

Remember that the autopilot does not understand "**DO IT NOW**" the same way pilots do. If you need to alter course or altitude quickly (traffic alert, TAWS warning, etc.), disconnect the autopilot and hand fly the airplane.

If you make a mistake that results in an unusual attitude excursion, disengage the autopilot and regain level flight (Power, Bank, Pitch) as your priority. After that, hand fly using raw data while reloading the flight director modes from the beginning and checking the automation scoreboard for correctness. And it's always good to make appropriate apologies to ATC if you took a wrong turn or blew through an altitude.

How do I avoid that next time?

Most pilots make small mistakes on every flight. You can avoid these types of mistakes by developing good flight director and autopilot usage habits. Check your inputs and make careful and sequential changes as you change flight regimes. Staying engaged with the automation and being ready at the controls, especially near the ground, is key.

Recommendations

Cirrus pilots are eager to use automation and they should do so. Here is a set of safety recommendations to maintain your confidence and proficiency in hand flying.

A. In good weather, consider using the flight director only to hand fly departures and arrivals, leaving the autopilot to fly the cruise phase of the flight. This practice will help you maintain proficiency.

B. Hand fly approaches with raw data only occasionally to stay sharp without automation.

C. Practice partial panel approaches with your favorite Cirrus instructor at least every six months.

When your “spidey sense” indicates things are not going well, it may be time to disconnect the autopilot and fly the airplane. Remember, you are not an automation manager – you are the pilot in command.