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How Safe Is Light Plane Envelope Protection? - Plane & Pilot Magazine

4-5 minutes



Garmin G5

With the widespread availability of envelope protection for light planes, the question has to be asked, how safe are these technologies and how easy is it to disconnect from them in an emergency?

Envelope protection got started in light GA in the 1960s, when

Mooney introduced its Positive Control, manufactured by Britain Industries from Tulsa, Oklahoma. PC, as it's referred to by Mooney aficionados, is essentially a full-time autopilot that keeps the wings leveled unless the pilot presses a yoke-mounted button to make turns. The technology was polarizing, then and now. Some Mooney flyers loved the system and others hated it, with few pilots staking out the middle ground. Even today, some owners of early model Mooneys keep the PC installed and others take it out or disconnect it.

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The term “envelope protection” is the subject of a bit of controversy, as some contend it applies only to systems that can not be overridden, while others, like us, favor a less-restrictive description. Regardless of what you call them, these systems are more sophisticated than even the relatively advanced PC system in old Mooneys. Garmin’s Electronic Stability and Protection (ESP) has led the way. It’s installed in thousands of planes as part of one of several different Garmin flat-panel avionics suites and is incorporated into the GFC500 and GFC600 as well as in the Experimental market G3X Touch. ESP provides protection against a number of loss of control scenarios, including overspeed, underspeed, overbank and excessive pitch, to name just some of the features. **Like Positive Control, ESP is always on, meaning that even when you have the autopilot switched off, you’re still protected.** To allow pilots to work around the edges of the envelope, the system introduces a gentle resistance that

eventually becomes a nudge and then a strong resistance pushing the controls back in the right direction the farther you stray away from the protected envelope. Pilots can disable ESP in the system's settings or by pressing and holding the control wheel steering button or autopilot disconnect button on the yoke.

Likewise, the STEC 3100's protections are always on, but in this case, you can turn them on or off by turning the flight director on or off. Even then, you can disable envelope protection in other ways, by pressing the autopilot disconnect switch on the yoke and by turning the autopilot off. One nice feature is that even when the flight director (and, hence, envelope protection) is switched off, the system will still provide audible warnings of risky envelope trends.

Envelope protection is also available on other automatic flight control (autopilot) systems, including on Avidyne's sophisticated but easy-to-use DFC90 autopilot. Avidyne's Envelope Protection (EP) is built into the DFC90, and it issues aural warnings while it "dynamically controls the flight of the aircraft in order prevent stalls or overspeed situations that might otherwise be induced by the autopilot or flight director commands." You can turn off active EP controls by disengaging the flight director and/or the autopilot, and while the system will no longer actively correct the aircraft's flight path, the pilot will still get audio warnings and PFD visual cues of unsafe flight conditions.

All three of these envelope protection systems incorporate a single button the pilot can push at any time with the autopilot on or off that will attempt to quickly return the plane to straight and

level controlled flight.

So, to answer the question, how safe is light plane envelope protection? The answer seems to be “very.” These systems all help protect from loss of control accidents while being simple to turn off in situations when the pilot just needs to hand-fly, now.

This story was part of a bigger feature on the potential dangers of automation.