



**CHARLIE PRECOURT**

COMMENTARY / FLIGHT TEST

# A Unique “Flying Simulator”

ICARUS addresses inadvertent VMC into IMC and honing IFR skills  
BY CHARLIE PRECOURT, SAFETY COMMITTEE CHAIRMAN, EAA BOARD OF DIRECTORS

**YOU MIGHT RECALL THE** story of Icarus from Greek mythology. His father, Daedalus, was an inventor who created wings of wax and warned of flying too close to the sun. Icarus defied his father’s “operating limitations” and perished in a fall when his wings melted.

Nick Sinopoli, EAA 1195058, has adapted the name to his cool invention, the Instrument Conditions Awareness Recognition and Understanding System. It is a smart view-limiting device we can wear in-flight that creates an airborne simulation of IMC conditions. It is a simple clear face mask (smaller but similar to those some folks wore in the pandemic – see Figure 1) that can be programmed to turn opaque upon command from an app. In an interesting parallel, the ICARUS device is a means by which today’s pilots can avoid a fate similar to the Icarus of Greek mythology.

Inadvertent visual meteorological conditions (VMC) into instrument meteorological conditions (IMC) flight remains a root cause in far too many of our aircraft accidents. Nick’s device can dramatically improve the ability of noninstrument-rated pilots to handle this situation. Additionally, in more advanced instrument training, the device can be used to simulate the kind of ceilings and visibilities instrument-rated pilots are challenged with

during real instrument approaches. It is literally a simulator we can take into the air and integrate with the motion and vestibular inputs we experience during flight.

Nick provides us with a demonstration of the system in a video that you can find via the link at [EAA.org/Extras](http://EAA.org/Extras). Ryan Mendon of Skybound Helicopters flew the device with FAA test pilot Dave Sizoo to show its capabilities. The device has now been adapted for use in formal training in the U.S. Army helicopter community, since inadvertent VMC into IMC is one of the deadliest emergencies one can encounter in a helicopter. The ICARUS device is your “IMC Foggles” on steroids.

Nick is the inventor and managing partner of ICARUS Devices, which he first displayed at EAA AirVenture Oshkosh 2015 at what was then our AeroInnovate program. After a friend perished in a spatial disorientation accident, Nick was determined to make a revolutionary invention that would teach pilots to survive flight into low visibility.

He graduated from Purdue University with a degree in aeronautical and astronautical engineering, is dual rated in airplanes and helicopters, and has logged time in everything from gliders to multi-engine helicopters. He also entered our EAA Founder’s Innovation Prize contest a few years ago with the ICARUS device and has made huge progress in the operational deployment of the system.

The way the ICARUS device works takes advantage of a technology known as polymer-dispersed liquid crystals. You may have seen glass walls in conference rooms that can be turned opaque with the flip of a switch to provide privacy during a meeting. These systems use the same technology, which is an electro-chromatic gel that lies inside the otherwise clear visor or glass wall. It can provide anywhere from 0 to 100 percent opacity (i.e., anywhere from clear and a million to zero-zero conditions) by varying the power applied to the visor. A cellphone app that an instructor can program and flip on/off at the right time in-flight will give the pilot-in-training the real-world impression of entering or emerging from the clouds.

The beauty of this system is that it can be turned on with as much of a surprise as a pilot might encounter in real-world inadvertent VMC to IMC flight. The instructor can then monitor as the pilot-in-training responds with the appropriate maneuver to get out of the weather, exercising proper transition to the attitude indicator and developing an instrument cross-check to maintain control of the aircraft. Meanwhile, the instructor remains in complete VMC. Every flight school should integrate this kind of device into primary training for private pilots; it is that good.

For instrument procedures training, the device can enable approaches to minimums during instrument training without having



to wait for a bad weather day. Even more impressive, an instructor can give a pilot-in-training a scenario where the pilot inadvertently reenters IMC during a circling approach and can force a missed approach procedure in a challenging situation (that actually happened to me a few years ago, but that’s another story).

What really resonates with me about the device is the ability to simulate in a real airplane. That’s what we did at NASA with the modified Gulfstream GII business jet (our shuttle training aircraft or STA) that allowed us to fly space shuttle approaches and landings in an incredibly real-world, in-flight simulation. We used to say that when we landed the shuttle, we felt like we were back in the STA.

We required right-seat shuttle pilots to have 500 STA approaches and left-seat commanders 1,000 STA approaches before being certified for space flight. There is nothing better than being able to realistically simulate while flying, since all the motions, g-forces, vestibular upsets, and the feel of the real aircraft are present. In the case of the ICARUS, an important aspect is the ability to introduce the startle response. When you use the Foggles like we have for years, there’s not much surprise when the instructor tells you to put them on or take them off. With ICARUS, you will literally forget it’s on your head until the visibility drops in front of you! You can learn more about ICARUS at [IcarusDevices.com](http://IcarusDevices.com).

In this column a couple of months ago, I wrote about the great progress we’ve been making with the Redbird simulators in the Pilot

Proficiency Center (PPC) at Oshkosh. The simulators have been a big hit at AirVenture, and we are now expanding their use to year-round training opportunities. EAA’s Jeremy DeRuisseaux is preparing an advanced IFR clinic that will leverage yet another technology that takes the pilot into the real world while in the simulator. It’s called the PilotEdge app, and it allows you to train IFR while speaking with live ATC. Actual FAA controllers can train with you and will issue all clearances and instructions from their own training center on the other end of the PilotEdge connection.

We’ll give you more on that next month, but the Pilot Proficiency Center is gearing up to provide these experiences at AirVenture this summer. The Redbird sims have a pretty nice visual scene generator, so the use of ICARUS in the Redbird is a great way to prepare pilots for its use in the airplane. Be sure to stop by the PPC at EAA AirVenture Oshkosh 2023 and try out the ICARUS smart view-limiting device in a Redbird. Bone up on your inadvertent VMC into IMC training or your ability to break out at minimums or execute that flawless missed approach. Oh, and don’t let your wings melt! See you at Oshkosh soon.

Fly safe!

For more on ICARUS, see “Twenty-First Century Training,” *Innovation*, December 2022. – Ed. EAA

Charlie Precourt, EAA 150231, is a former NASA chief astronaut, space shuttle commander, and Air Force test pilot. He built a VariEze, owns a Piper JetPROP, and is a member of the EAA board of directors.

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