

CALLBACK

From NASA's Aviation Safety Reporting System



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When Autopilots Go Bad



The three “loss of aircraft control” events in this *CALLBACK* share a common factor— an autopilot malfunction. Thankfully, they also share a common result in that the pilots involved were able to recover from the resulting loss of control.

According to the FAA¹, loss of control (LOC) has accounted for more than 1,100 GA accidents in the last decade. That statistic alone should be incentive to heed the “lessons learned” in the following reports.

“A Serious Attitude Issue”

Having experienced a similar autopilot failure in another aircraft, this Mooney M20 pilot quickly recognized the problem, but still had a “struggle” to regain control.

■ *There was no ground reference because the layer below was around 4,000 feet and no sky reference because of a high layer.... I was looking out the pilot window inspecting for ice when I noticed a slight change in the engine speed. The engine instruments read normal, then I noticed a precession on the [horizon indicator]. Just as I noticed this, the autopilot kicked off and the plane shot up hard and fast.... I instantly knew what had happened because I've owned another Mooney that had an autopilot failure and runaway trim. The plane was in a climbing, unusual attitude. Center called me inquiring about my altitude...and asked if I needed help....*

I decided that I needed to ignore Center for now and concentrate on recovering the plane which was now in a dive. I neutralized the trim, then referenced the directional gyro and stopped the turn and finally pulled gently out of the dive. When the plane was recovered, I could see a few house lights straight down...so I descended to VMC to organize myself. Just at that time someone called my tail number and asked my position and altitude. I responded that I was at 1,500 feet, but said nothing about my position because I hadn't reset my GPS or looked at my position. The relay pilot called again and said that Center was concerned about my low altitude and wanted me to climb up to 2,400 feet. When I climbed I went IMC and I could tell I had a serious case of vertigo which felt unsafe so I descended again to VMC. Several more calls were made from Center through relay pilots and then Center made it to my frequency asking that

I climb again. I felt frustrated that I was repeatedly asked to do this, but I made a decision that I was going to stay visual because I had decent forward visibility, ground reference, and I was safe. Having ground reference also made my vertigo subside....

[Ed note: The reporter was able to continue on to the original destination (but then had to contend with an emergency gear extension procedure) and concluded the report with the following remarks about unusual attitude recovery.]

Something that probably helped with the runaway trim and unusual attitude was recent training for a tailwheel endorsement that included slow flight and unusual attitude recovery training. After this event I'm quite sure I'm going to keep a routine of going out under the hood with an instructor and practicing recovery techniques. That's very inexpensive insurance.

Experimental Excitement

This loss of control event, presented from an Air Traffic Controller's perspective, highlights the team effort that helped to ensure a successful outcome for the pilot of an Experimental/Homebuilt.

■ *I accepted a hand-off from South Departure, a VFR Experimental at 10,500 feet. Since the aircraft was close to my boundary and about 18 miles from the next sector's boundary, I initiated a hand-off to the next sector. After a few minutes, I heard the South Departure Controller trying to contact the Experimental. I looked at the tag and noticed that it was no longer displaying an altitude read out.... The tag was still being tracked because I had it in hand-off status. I took the hand-off back to see if it was a radar tracking issue.... The South Departure Controller tried to get a nearby Air Carrier to reach the pilot with no luck. I used Guard frequency to try to raise him. A few seconds later we saw the 7700 code pop up and the emergency sound from the STARS (Standard Terminal Automated Replacement System) display alert. I attempted again to reach the pilot on Guard and had him “ident.” After seeing the “ident,” I had him switch to my frequency. I tried to reach him with no luck and also asked a nearby VFR aircraft if he was able to hear him respond. The pilot could not hear him. I tried again and this time got a response from the pilot. He, with very heavy breathing, said*

that he had an emergency and, "Everything is OK now." I asked his altitude and he replied 4,200 feet. After a few more routine questions I gave him a squawk and asked if he was squawking altitude. He replied that there may have been some damage to other equipment. I asked what kind of damage he had experienced and what caused the damage (bird strike or something else). He replied that it was an autopilot issue with a slipped trim wheel. I asked his intentions. He replied that he wanted to go to ZZZ.... As he was about to leave my airspace, I noticed that he was almost twenty degrees off course. I corrected his heading and gave a briefing to the Class B Tower Controller regarding his situation....

I was informed that the pilot landed safely and that the autopilot was giving him trouble so he disabled it only to find that the trim wheel had slipped and pushed the aircraft into a nose dive. He was experiencing negative and positive G's that were making it difficult for the pilot and his passenger to regain control. He finally did at around 4,000 feet. He had hit his head on the canopy and broke his headset and some other equipment. He also noticed that one of the latches to the canopy was bent so he was holding it shut during the flight....

Team work was the key here. The use of Guard, other pilots, and situational awareness helped in determining the location of the aircraft and the correct method of getting the pilot calm and under control.

"Whole Lotta Shakin' Goin' On"

The pilot of an unidentified Experimental aircraft had his hands full when a new, integrated autopilot malfunctioned. As Dave learned with the Hal 9000², it is best to cut off all power to a system that starts to develop "a mind of its own."

■ A stand-alone autopilot had been removed and replaced with the new fully integrated unit. Everything had been bench tested and checked out.... I was returning to [home base]. Weather was VMC, however I filed IFR to expedite leaving the [busy metropolitan] area. The autopilot functioned OK upon leveling at 10,000 feet, however it was "hunting for heading." As I started my descent, the autopilot developed

a mind of its own, [and] was searching for the altitude that I had pre-set in the EFIS (Electronic Flight Information System) which was driving the new autopilot. The servos were "pulsating" the control stick and I could not stop it. I slowed my descent and airspeed to try to diagnose the problem. I decided to divert to [a nearby airport] as I knew there were facilities there in the event I developed further problems. I contacted Approach and they cleared me to 7,000 feet on a heading to the airport. The autopilot would not level at 7,000 and deviated about 500 feet low as I fought the stick to stop the oscillations. Then it zoomed up to about 7,300 feet. The stick was fighting me and during the button pushing while trying to control the autopilot, I somehow lost contact with Approach Control.... I finally managed to get the autopilot off, called Approach again and they cleared me for the visual.

Once the EFIS shut the autopilot off, everything returned pretty much to normal. The remaining approach and landing were uneventful except that my body was shaking.

In retrospect, when the first issues developed, I should have canceled IFR and continued VFR. I tried the master "Off" switch as well as the "Off" switch on the stick, to no avail. As a result, I wasted valuable time as I was caught off guard by the events. ATC was very professional.... Inasmuch as it was VMC, I probably should have pulled the circuit breaker on the EFIS (which drives the autopilot), but I was hesitant to as I would have lost all navigation functions.

I have developed a habit of always flying the plane by myself for at least an hour after it comes out of maintenance before ever letting anyone else fly with me. This event strengthened my reasoning for doing that.

¹ FAA Safety Briefing March/April 2012.

http://www.faa.gov/news/safety_briefing/2012/media/MarApr2012.pdf

² Reference to a character and the onboard computer in the film 2001: A Space Odyssey

ASRS Alerts Issued in August 2012	
Subject of Alert	No. of Alerts
Aircraft or Aircraft Equipment	10
Airport Facility or Procedure	4
ATC Equipment or Procedure	5
TOTAL	19

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August 2012 Report Intake	
Air Carrier/Air Taxi Pilots	4389
General Aviation Pilots	1298
Controllers	833
Cabin	295
Mechanics	212
Dispatcher	153
Military/Other	31
TOTAL	7211