

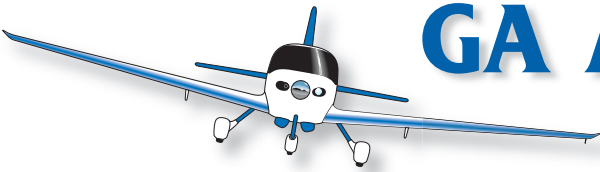
CALLBACK



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GA Advanced Cockpit Incidents

An ever-growing number of GA aircraft are equipped with some, or all, of the following advanced cockpit systems:

- **EFIS (Electronic Flight Instrument System), in which multi-function "glass" displays replace traditional instruments for providing flight and navigation information**
- **FMS/FMC (Flight Management System or Flight Management Computer)**
- **GPS (Global Positioning System) with moving map**
- **TCAS (Traffic Alert and Collision Avoidance System)**
- **Integrated autoflight/autopilot systems for IFR and VFR flight operations.**

As use of these technology marvels grows, ASRS is also seeing more reporting of GA advanced cockpit systems incidents. It is clear that new technologies are placing higher demands on single-pilot resource management – the need to "fly the airplane" and effectively use advanced cockpit systems at the same time.

This month we look at a sample of GA advanced cockpit incidents reported to ASRS, and identify common issues in using new technology systems. These issues include complacency, lack of advanced systems knowledge, over-reliance on automated systems, and distraction associated with programming tasks.

Advanced Cockpit Complacency

A Bell 407 helicopter pilot was lulled into complacency by a well-equipped aircraft and a nice day for flying.

■ *Event:...Aircraft penetrated Class D airspace...without Tower authorization, and possibly penetrated Class C airspace without Approach Control authorization. Situation was caused by poor situational awareness. Summary: The helicopter was almost brand new, and the pilot had flown this particular aircraft for about 1 hour. The aircraft was equipped with very sophisticated navigation equipment, with which the PIC had very limited experience. Equipment was...[an] EFIS and GPS. Pilot was unfamiliar with the functionality of these two excellent systems, and the ability to display relevant information (airspace boundaries, in particular). The presence of this high performance avionics equipment, coupled with nice VFR weather, produced a complacent attitude with this pilot, regarding his ability to track his exact position...Corrective actions: 1) Gained more*

experience with GPS, will obtain simulator software. 2) Gaining more experience with EFIS, hope to attend system training course. 3) Stronger focus on precise navigation / maintaining situational awareness.

Advanced Systems Knowledge

Several GA pilots learned the hard way that programming intricacies are best learned on the ground, not in the air. A PA-28 pilot lost situational awareness while attempting to understand the "message" function of an advanced GPS.

■ *VFR flight plan...I was using GPS for first time as PIC (without instructor). I had an introductory flight with an instructor one week prior and I felt I knew how to use the direct function, which was the only GPS function I was going to rely upon. It was a replacement for the RNAV system I had been using on older Arrows...Shortly after departure, I began receiving airspace messages. I was having trouble figuring out how the message function worked, and how to make the messages go away without losing my 'direct to' setting. I received repeated airspace messages while flying at 2,600 feet, even though I was still below and clear of Class B airspace. I became confused about which keys...to use to make the messages go away... I believe I became distracted by this and also started discounting the airspace messages. Because I was using the GPS, I was not following my track closely on my sectional chart. After I passed SSW of the closed [airport], my position was close to the bottom edge of the sectional and I flipped it over to look at my anticipated course. At that point, I lost situational awareness and mistakenly believed I was out from under the Class B airspace and initiated a climb to 3,500 feet MSL. At around 3,300 feet MSL, the controller asked me what I was doing, told me to ask for clearance before climbing into the Class B airspace and then cleared me into the Class B airspace at or below 3,500 feet MSL.*

Another pilot drifted off course while attempting to program an unfamiliar GPS.

■ *Departed Runway 23 and became distracted while trying to enter a waypoint into a GPS unit which I had not previously used. I recognized I was off course and immediately made a turn back towards my desired heading. It is possible I entered the Class B airspace at its most southern portion, where controlled airspace begins at 2,200 feet MSL. My altitude was 2,500 feet MSL. In hindsight, it would have been prudent to have spent some additional time familiarizing myself with the GPS unit, and entered the waypoint prior to departure.*

| ASRS Alerts Issued in December 2007 | |
|-------------------------------------|---------------|
| Subject of Alert | No. of Alerts |
| Aircraft or aircraft equipment | 15 |
| Airport facility or procedure | 3 |
| ATC procedure or equipment | 10 |
| Chart, publication, or Nav Database | 1 |
| Company policy | 1 |
| Total | 30 |

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| December 2007 Report Intake | |
|--------------------------------|-------------|
| Air Carrier/Air Taxi Pilots | 2933 |
| General Aviation Pilots | 728 |
| Controllers | 71 |
| Cabin/Mechanics/Military/Other | 140 |
| TOTAL | 3872 |

Over-Reliance on Advanced Cockpit Systems

A couple decided to go flying in their glass-cockpit equipped C-182 on a nice evening. The forecast weather looked good, so they pressed on to their destination, leaving their charts in the flight case. All seemed to be going well, until they received “heart-stopping news.”

■ *We began normal broadcasts on UNICOM 10 miles west of ZZZ...We thought it was odd that no one came back with an airport advisory but continued with normal broadcasts, looked at the windsock and entered a downwind for Runway 13. We saw a Mooney waiting for takeoff and also thought it was a little strange that he was not talking on the radio but once again it is not all that uncommon for uncontrolled airports. Our belief that ZZZ was uncontrolled was supported by the fact that the GPS showed the airport as magenta and did not show a Tower frequency. While we were on high final, the Mooney pulled out onto the runway for takeoff and we elected to go around. We remained offset to the west so we could watch the Mooney's departure path. At the time we also saw 2 helicopters in the pattern and then someone came on UNICOM and told us to contact Tower. This, of course, was heart-stopping news, but we contacted the Tower and then obtained a phone number for later contact.*

Of course, after any incident, there is much review as to why this happened and it was a valuable learning experience for both of us...In this case, we relied on our automation and the fact that we have always known ZZZ airport to be uncontrolled. As it turns out, even though we had been updating our avionics systems and the airplane had in fact just come out of annual where they updated everything, the update that shows in startup was prior to the installation of the Control Tower. We are now in the process of finding out why, even though the updates appeared to ‘take,’ they did not. We do carry a set of current charts in the airplane, however on that particular day, we believed we had all the relevant information we needed and chose not to pull them out. In the future, our planning will be more thorough.

Air carrier pilots who fly GA aircraft for personal or recreational purposes often report to ASRS that partially automated GA aircraft require a more disciplined instrument scan. One such pilot, accustomed to the built-in “protections” of the air carrier Flight Management System (FMS), experienced an altitude deviation while monitoring the VNAV page of the GPS.

■ *On IFR flight plan, under ATC control, Approach assigned me a descent from 8,000 feet to 4,000 feet.*

Aircraft operated was a Maule M5 equipped with GPS, which I operate for personal pleasure and business flights. My full time job is flying air carrier aircraft with FMS.

While descending, I began monitoring the VNAV page of the GPS since descent was initiated a bit later than normal. I rarely use this page since its functionality seems awkward compared to the FMS I use at work. A VMC day seemed a good time to use it.

There is no altitude alerting system on the M5 and the GPS will build a profile all the way to the set point, in my case,

destination. No protection is provided for intermediate level-off as in the air carrier aircraft.

I focused mainly on the descent profile, being accustomed to this on FMS aircraft, and missed my assigned altitude. Approach queried my altitude when I was at 3,500 feet (4,000 feet assigned) and I realized I had blown it!

...Most IFR GPSs use a VNAV function that provides very few protections to this scenario. They are advisory in nature, but the pilot may be led to focus on them....

Stepping from a technologically advanced aircraft into a partially advanced aircraft can lead a pilot astray as he/she loses system protections that have been previously available.

Distraction By Glass Cockpit Programming

Modern digital avionics systems have unique operating techniques and unique functionalities. An unintended consequence of this complexity is that it may create “what’s it doing now, what’s it going to do next” scenarios for unwary pilots, such as this flight instructor and student.

■ *My student and I were flying an Eclipse jet doing practice approaches. We were holding over the VOR and commenced the Runway 33 approach with the goal of doing a circle approach to a missed approach. Inbound towards the VOR, the student was trying to input the minimum descent altitude via the FMS keyboard. He had inputted it correctly so that the aural warning would announce, ‘Approaching minimums’ and ‘Minimums,’ but was trying to set the MDA into the altitude select window so the autopilot would level off at the inputted MDA. The current avionics suite in the EA50 has a feature that when the navigation page is selected, it returns to the communication page after 30 seconds automatically.*

After the student realized he did not ‘drive’ the MDA up to the altitude pre-select, he pushed the concentric knob which would normally drive the minimum altitude to the altitude pre-select window, but at this time the navigation page had returned to the communication page. This caused the communication frequencies to switch over, which made our standby frequency active and we did not catch this. After level-off at MDA, we heard radio chatter but something didn’t seem right and we then changed the frequencies appropriately.

At this time Tower called and said they tried calling us. We apologized, completed the approach and left the airspace. We were given a number to contact Tower.

Upon landing we contacted Tower and he advised us of the impending situation that could have occurred. We told him what happened and he said this was not the first time this happened with the avionics in the Eclipse jet in regards to communication.

What we learned from this was to ALWAYS verify the transmission frequency as part of the scan because of this 30-second change of [pages] that is standard on the current avionics suite, and be VERY aware of our frequency after the minimum altitudes are selected and driven to the altitude select window.