

NOT DROWNING IN THE TECH



No pilot needs to be told what a boon the glass cockpit is. But intoxication with those bells and whistles can blunt good flying skills, and has contributed to tragedies.



In April 2011, a microlight pilot lost his life on the slopes of Mount Duppa, north-east of Nelson.

The CAA safety investigation found the EFIS terrain data the pilot was using had “significant errors¹ which may have led the pilot to believe incorrectly that he was clear of the terrain ahead”.

The findings also noted the VFR flight had continued into deteriorating weather conditions and that good weather at the intended destination “may have encouraged the pilot to continue his flight perhaps based on a high level of reliance on information presented by the EFIS”.

The safety report is peppered with phrases like, “over-reliance” and “high level of reliance” in terms of the trust the pilot had in the capabilities of his glass cockpit.

The CAA’s investigator of this tragedy, Colin Grounsell, says it highlights the ever-increasing problem with pilots’ enchantment with technology.

“The tech *is* great. You can do a weight and balance calculation in just a few minutes, rather than, say, half an hour. You can also have very accurate fuel management.

“But that really critical preflight planning and preparation sometimes goes out the window. Some pilots jump in, fire up the engine and just go, because it’s costing them money the longer they muck about.”

The pilot who died on Mount Duppa hadn’t filed a flight plan. Many pilots don’t – something that CAA investigation team leader, Dan Foley, believes is the result of uncritical trust in cockpit technology.

“Some pilots rely on the tech to the degree they’re not involved in even those informal preflight actions that help keep a flight safe. For instance, standing around talking to other pilots, getting the benefit of their experience, talking about route options.

“There’s no thinking about the flight for a few days before departure. No getting out the charts and mapping the actual route, no getting familiar as much as possible with what might be encountered.”

Not abandoning the basics

CAA flight examiner Katrina Witney says the basic skills must be maintained, no matter how clever the onboard tech.

“Pilots must not forget the fundamentals of ‘aviate, navigate, communicate’ and make sure they remain proficient in basic skills and knowledge.

“Being able to navigate using landmarks, dead reckoning and completing manual calculations of groundspeed and time are just as important as being proficient in using the technology.

“There’s no doubt that technology can make routine flying less demanding. The safe and proficient use of technology, however, requires preparation, skill and a conscious work cycle. Otherwise its ability to distract is equal to its ability to inform.”

Katrina says technology introduced in the cockpit provides only the *potential* for increased situational awareness.

“It should be used as an aid to, not as a replacement for, a pilot’s skill, knowledge and situational awareness.”

In the *Vector* article “Advice from ADS-B equipped pilots” (Winter 2020), North Shore pilot Steven Perreau said of his new kit, “You can never assume that a lack of traffic on the display means there’s actually no traffic around. You’d be a mug to use it 100 percent instead of the Mark 1 Eyeball”.

In the same article, South Island pilot Ian Sinclair said, “Even though it has quite good eyesight, ADS-B IN is still only one tool in the awareness shed. Lookout, good radio work, and predictable flight patterns all need to be maintained.”

Katrina Witney agrees. “Take the time to understand the full abilities and limitations of your equipment, and that of other aircraft. Understanding those limits reduces the likelihood of unintended consequences.

“For example, being equipped with ADS-B doesn’t mean your technology will tell you the location of every aircraft in your vicinity. »

¹ The safety investigation noted that after the accident, the avionics manufacturer swiftly corrected those errors.

» “Including technology into your lookout scan, however, will aid your situational awareness.”

CAA flight examiner (helicopter) Andy McKay says a similar thing about TCAS (traffic collision avoidance system).

“While TCAS is a great tool, it’s not foolproof outside controlled airspace. Often, light aircraft in those circumstances may not have a transponder or may not have it turned on.

“Don’t make the assumption that because there are no targets on a TCAS, no conflicts are present.”

“Despite emerging technology, pilots mustn’t fall into the trap of continually monitoring the inside of the instrument panel at the expense of situational awareness outside the cockpit.

“Too often I see pilots trying to manage the systems and losing awareness of the basic principles of airmanship.

“First and foremost is a good lookout.”

When the tech fails

The CAA has numerous accounts of the ways in which tech can fail.

“...took their tablet with them and it was on three percent battery. There was no back-up.”

“The battery ran out and there was no charger on board.”

“The device overheated in the sun and it cracked the plate, making it unusable.”

“Loaded the app on the phone, without realising it was going to eat up the battery before we reached the destination.”

“The databases on the app were out-of-date.”

Again, Katrina Witney’s advice is to make sure the basics are covered, should the technology pack up.

“Pilots should always carry current hard copy plates and charts. And, of course, backup devices and chargers.”

With regards to an out-of-date database, CAA investigator Jason Frost-Evans says if the airspace the database portrays has changed, the database simply isn’t fit for its intended purpose.

“For VFR flight, the 28-day updates aren’t necessarily required, but at a minimum, when the airspace updates come out in November every year, the database should be updated,” he says.

“For commercial ops, databases should be addressed in the operator’s software configuration management.”

For further guidance, see advisory circulars AC43-15 and AC91-18 *Aircraft software configuration management*.

Rotary tech

Andy McKay says the rotary sector is in many ways outpacing the GA fixed-wing community in adopting automation.

“Autopilot ‘upper’ modes such as auto hover², SAR mode³, and flight management systems are all creeping into medium-sized helicopters,” he says.

“Even standard, light helicopters are increasingly equipped with automatic systems that monitor attitude, navigation and performance.

“Some modern helicopters even have to be flown with a dual autopilot and stability system functioning at all times – which takes them closer to an airliner in its avionics system, than the older helicopters from which they emerged.”

Andy says the introduction of such complex tech has massive implications for training.

“Part 61 sets only minimum standards for a type rating. But it’s clear that, with a type rating being competency-based, the training in advanced systems like these must exceed that of a standard type rating.

“The CAA has recently amended Advisory Circular AC61-10 *Pilot licences and ratings – type ratings* giving more information about what the CAA is doing to ensure there’s thorough training in flying complex and multi-engine helicopters.

“This advice is based specifically on the standards in the manufacturers’ training programmes, and guidelines set down by the FAA’s flight standardisation boards and EASA’s operational suitability data.”

// Make sure the basics are covered, should the technology pack up. //

2 Hover mode – uses sensors to determine height, speed and direction of machine, and flies it accordingly.

3 SAR mode – enables the helicopter to automatically fly predefined search patterns during cruise flight, and to move from cruise flight to a stabilised hover and departure.

Operators' obligations

CAA investigator David Oliver believes training in using technology needs to be part of an operator's standard operating procedures.

"Every operator should provide training in the use and care of all technologies used in the cockpit, for flight planning and for ground support roles," he says.

"This should be embedded in the operator's training programme or SOPs to make sure any variability between each aircraft or each piece of equipment is covered.

"That also would provide confidence that there's consistency of use throughout the organisation.

"In addition, each crew member needs to be trained in the care and use of every *new* piece of technology/equipment as it's introduced to the operation. That training has to be covered according to the Part 135 operator's initial and transition training programme."

For more information, see Part 135 Subpart I *Training* (135.557 & 135.559).

The same goes for private pilots

A recent 'I learned about flying from that' account highlights the need for private pilots, too, to train on their new technology.

A PPL pilot was on a cross-country flight using an EFB showing traffic in his vicinity. After a short time in the air he discovered he was being followed closely by another aircraft.

Being concerned about being so close he climbed to a higher altitude only to discover the other aircraft following him did exactly the same.

Now becoming really concerned, he performed a number of turns to see if he could spot the aircraft behind him, without success.

After speaking with his CFI, it was discovered the other 'aircraft' was, in fact, a time-delayed projection of his own.

There are also accounts of pilots not knowing the crucial difference between the blue symbols – traffic position data, which can be delayed by several minutes – and green symbols – traffic in real time – on their EFB display. »





Photo courtesy of Matt Morris-Jenkins.

» For reasons that these accounts highlight, the CAA aviation examiner for emerging technologies, Scott Griffith, says the same advice to operators about training applies to private pilots.

“There are now many excellent and affordable in-cockpit technologies available to recreational flyers. Used correctly the tech can increase safety, but there remains the obligation on anyone using these devices to seek out appropriate operational advice and training.”

Erosion of good judgement

Some pilots are so entranced by the information they’re seeing on their tech, and the way it’s presented to them, they sometimes doubt what they’re seeing with their own eyes.

CAA’s chief advisor on human factors, Matt Harris, says when automation works consistently well, pilots tend to become overly reliant on it for information about what’s happening.

“Essentially they transform from active controller to passive monitor. And while technology can provide them with a huge array of raw *data*, sometimes there isn’t enough meaningful *information* to tell the pilot of the gravity of the situation.”

In its guidance, “CFIT/Automation Overreliance”, the FAA noted that, “The most insidious aspect of automation is its propensity to breed complacency and erode pilot confidence.

“The more time we spend on autopilot, the less time is available to maintain our hands-on skills.

“Instrument approaches on autopilot are so precise that it’s tempting to ‘let George do it’ all the time. But how would you feel if ‘George’ decided to take a break in the middle of an instrument approach?”

It advises that pilots should understand how automation works and how it behaves when it isn’t working; that they understand where the automation is getting its information, and how it’ll respond if that information is missing or flawed; and to know all the ways to quickly disconnect the automation and revert to hand flying.

Installing devices

The way in which tablets and phones are carried in the cockpit or installed, even temporarily, cannot be done without thought – even where they are positioned. For instance, a device positioned in a way that reduces the pilot’s vision is obviously a risk to lookout, situational awareness, and safety.

Massey University School of Aviation CFI, Paul Kearney, says when new students were originally given a lap-held device to help their navigation, it encouraged them to have their heads down.

“So we mounted the tablets at eye height and slightly to their left. The students can look briefly at the display then look outside to confirm what it says, very quickly, very easily, and that encourages them to keep their heads up and looking out.”

A device sitting in a seat pocket in the cockpit and charging through a USB port in the instrument panel is carry-on luggage.

// **Some pilots are so entranced by the information they're seeing on their tech, and the way it's presented to them, they sometimes doubt what they're seeing with their own eyes.** //

But if it's affixed in any way to the aircraft and wired directly into the aircraft's electrical system, it's a 'non-permanent fixed installation' and must be installed in accordance with 'acceptable technical data'.

In the *Vector* article, "Is that a design change?" (Summer 2020-21), CAA aviation safety advisor John Keyzer says if a device is sticky-taped or otherwise carelessly secured to the aircraft, it could dislodge during turbulence or other manoeuvres.

"(It could) jam aircraft controls, block crew vision, or even injure an occupant.

"Devices affixed in ways such as this make the aircraft un-airworthy and therefore unsafe.

"It's also a breach of rule 91.101."

John says operators must make sure installing a device is done properly.

"In accordance with a good idea is not acceptable."

The overheating battery

"I regularly ask my students what they would do if their tablet started smoking," says CAA flight examiner Marc Brogan.

"They can't just jettison it out the window. They have to know, ahead of it ever happening, what to do."

The lithium ion battery powers our modern lives but it can also be dangerous if knocked about.

CAA flight operations inspector – and former airline captain – Owen Bieleski, says there's not a lot of difference between a B777 flight deck and an RV-7 cockpit in the basic handling of an overheating lithium battery.

"Water," he says simply. "A traditional fire extinguisher has no effect on an overheating lithium battery because it's about heat.

"Airlines use 'heat bags' which they place the smoking device into, then fill the bag with water.

"While this option may not be available to a GA pilot, they should always carry a water bottle for hydration. So remove the power supply then pour the contents of the bottle over the device.

"Just be mindful of where that water goes, as it may create a second hazard, if it's over the floor.

Owen says that if the overheating device creates an actual fire, perhaps igniting adjacent items, it's time to use an extinguisher. Get the aircraft on the ground as soon as safely possible.

"Consider making a PAN call and divert to the nearest suitable airfield."

Owen says prevention is obviously better than having to battle a lithium battery overheat, no matter how successfully that's done.

"Keep tablets off glare shields, and away from the sun. Make sure they can't be damaged by moving objects, or becoming jammed somewhere."

"Not holding their charge, overheating, shutting down regularly, or not charging efficiently may be a sign of a damaged battery.

"That might mean it's time to buy a new device." ☹️

// MORE READING

Vector Jan–Feb 2012 "Electronic Flight Bags"

Vector Winter 2020 "Advice from ADS-B equipped pilots"

Vector Summer 2020–21 "Is that a design change?"

Advisory Circular AC91-20 *Guidelines for the Approval and Use of Electronic Flight Bag Devices* – new revision being finalised.

Comments or queries?

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