

A Heads-Up on Night VFR

With the days closing in, some pilots begin to test their luck, pushing on later and later into the darkening sky. And in some cases, that's further and further toward disaster.

"It's a truly horrible feeling."

That's the opinion of 10,000-plus hours fixed wing and rotary pilot, Grant Twaddle, describing an inadvertent entry into IMC (Instrument Meteorological Conditions) in a suddenly darkened sky.

"You push your luck," says Grant, also CAA's team leader of helicopter operations, "until you end up looking out the windscreen and all you can see is your own reflection."

The risks associated with VFR flying are heightened at night, for obvious reasons. Visual references are limited – some disappear altogether – central vision is not as efficient as during daylight, there's often nothing to focus on, but at the same time, there can be a number of visual illusions to confuse the pilot.

Grant recounts a personal experience of such an illusion.

"Some years ago I was flying at night to an oil rig off New Plymouth. It was so dark that all I could see was a pinprick of light and I couldn't tell whether it was large but far away, or small and quite close. But with absolutely nothing else to orientate me, that is what I kept looking at.

"Then the pinprick of light, which I decided was coming from the oil rig, suddenly jumped some way to the left. It was really unsettling."

The illusion is called autokinesis and arises, it is thought, from tiny, natural movements of the eye. It doesn't happen in the light because there are visual clues to correct what the brain thinks the eye is seeing.

Fortunately, Grant was able to fly IFR for the rest of the journey. The message to VFR pilots is to resist fixating on such a light, looking at it briefly only to assess if it is stationary or moving, such as another aircraft.

Spatial disorientation is another illusory risk. It can develop when there's nothing to give a pilot environmental clues as to where their body is in space, and they lose a sense of 'up' and 'down'.

An example is the 'coriolis illusion' where the pilot moves their head excessively, especially during turns, causing the balance mechanism in their ears to become confused, producing a tumbling sensation.

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These, and other dangers peculiar to night flying, lead the CAA's Principal Aviation Examiner, Bill MacGregor, to advise simply, "Fly VFR at night only if you have to."

But, he says, pilots who have no choice but to fly in the dark should be aware that their eyes will take at least 30 minutes to fully adjust to low light.

"It's called 'dark adaption', so remember to plan for that period when vision is becoming accustomed to the lack of light.

"Be aware of how sudden light and darkness can affect you, and avoid bright light after you've adapted to the dark."

Bill says the VFR pilot flying in the dark should also be on their guard for a phenomenon called 'empty field myopia'.

"That's where the lens of the eye focusses on a point just in front of the pilot, because there's nothing real for the eye to target. Pilots in such a position need to make a conscious effort to look at something further away, such as a wing tip, to readjust their focus."

If a pilot becomes disoriented by sensory illusions, Grant Twaddle advises them to refer to the aircraft's instruments, even if external lighting is quite good.

"Scan the relevant instruments, before making any control inputs."

That includes checking that the dimmer controls are set to suit the operation of that particular aircraft.

"At least two commercial helicopter accidents in the last few years," says Paul Breuilly, team leader of the CAA's safety investigators, "have identified that the crews had not adjusted the dimmer controls.

"Crews who operate in different aircraft types and type variants need to make sure they are familiar with the cockpit layout. You can have the same helicopter type with different dimmer controls and in a different position, and some even dim the warning indicator lights.

"Pilots need to be aware of this."

Preparation is Key

When *Vector* called, Pete Turnbull, CEO of the Whangarei-based Northland Emergency Services Trust, said his organisation was just beginning its annual competency check in night flying.

"We're reviewing all aircraft systems pertaining to night ops. That includes the lighting."

Pete says night flying requires preparation to be carried out with even more care than usual.

"Currency is essential, but get that in a controlled environment before you head into the night.

"Standard tips for safe flying apply even more so at night.

"You should be familiar with the territory you're flying over, and the facilities available at the other end, such as pilot activated lighting, refuelling, and runway lighting.

"Also, make sure you are thoroughly updated en route about the weather, because at night, it's obviously more difficult to know what it's doing."

Chief Flying Instructor at Kapiti Aero Club, John Harwood, suggests a torch is kept on board, for use if the cockpit lights go out.

"Head lamps are even better because they free up hands, and look in the direction the head looks. They have a bright white light, but with two clicks, some also give a nice red night-vision light."

The red night-vision light is important, because if the pilot is suddenly exposed to a beam of bright light, even for a moment, their eyes can take some time to again readjust to the relative dark of the cockpit.

"The length of time that takes will depend on how bright the light is and how long it lasts. Sustained bright light may mean it takes a full 30 to 40 minutes to adapt again to the dark of the cockpit.

"While there's nothing much a pilot can do about an unheralded momentary blast of light, if the light is sustained

they can close one eye, so that one at least maintains dark adaptation.”

John Harwood also emphasises the need for a thorough preflight inspection.

“Make sure all instruments, including lights, are working correctly, and carry plenty of fuel – because if the landing lights are out where you want to land, you may be diverted.”

Human Factors

CAA helicopter operations inspector, Jason Frost-Evans, says fatigue is another risk related to night flying, one that often goes unrecognised.

“Stick to personal minimums – use the I’M SAFE checklist. Know your limitations including what times of the day you’re at your best and worst, and get advice from more experienced pilots.

“Develop a process for even minor things, which you may not consider during the day. For instance, identifying controls by feel, or being aware of the pitfalls of trying to read a map with red sections on it, in a red light.

“As in daylight flying, but even more so, trust your instincts if you have a funny feeling about something. Your subconscious is evaluating the situation and alerting you that all is not well. Take notice, analyse what’s wrong, take action, and don’t plough further into uncomfortable or unfamiliar territory.

“Also, just because you’ve done it a few times does not make it safe. Question what you’ve become comfortable with.”

In an Emergency Situation

Solutions to emergencies during night flying are more complex.

Jason Frost-Evans says there are fewer opportunities to select ideal landing places.

“It’s also harder to see hazards like wires and slopes. Different lighting conditions can create problems with definition and depth perception.

“Identify alternative landing sites *in advance* and keep monitoring them as you fly.

“Having the right equipment on board is a must. For example, you need to have survival equipment to manage exposure, if you end up having to stay put somewhere isolated.”

John Harwood says while any type of engine failure represents a significant risk, at night the pilot has even fewer options.

“It’s all but impossible to choose a suitably lit landing area. The standard brief is to avoid the lit areas because they represent housing. Instead choose a non-lit area, but of course, a pilot should be aware such an area could contain obstacles such as trees, dunes, transmission masts, and power lines.

“A successful emergency landing at night really comes down to superb situational awareness, and thorough knowledge of the area.”

In Winter

Jason Frost-Evans says the length of day and night varies around the country.

“Night may fall up to an hour earlier in Dunedin than in Auckland,” he says.

“Places covered by snow at night will often look different from other times, because the land looks more uniform. It’s harder to see rivers, and harder to navigate.”

CAA Aviation Examiner, Marc Brogan, reminds pilots to be aware of increased traffic during the darker months.

“In winter, more aircraft are out in training flights at night, so fly neighbourly, and always be situationally aware.”

More Information

Email info@caa.govt.nz for a free copy of *Night VFR*, *Survival*, and *Winter Flying* GAP booklets, or view them online at caa.govt.nz, “Quick Links > Publications > *Good Aviation Practice* booklets”. ■