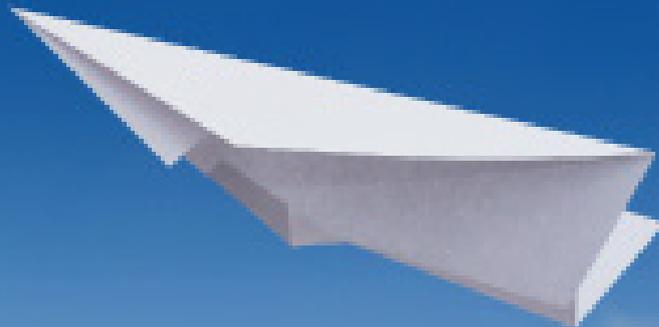


Clued up

**GA
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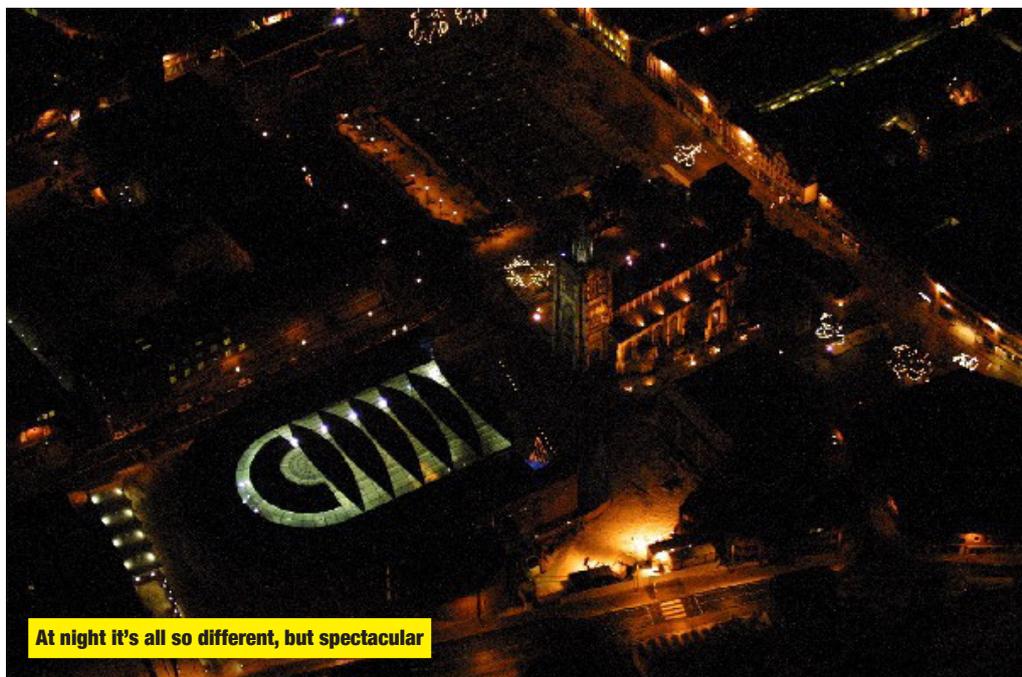
Fly by night

Night flying offers a whole new experience, but there are a few dark matters worth bearing in mind

It had been a great day out. Accompanied by a few work colleagues, we had eaten lunch at 'Sharky's On The Pier' before spending the afternoon in the glorious Florida sunshine relaxing on the beach where sharks' teeth can be found in the sand giving credence to the restaurant's name. As the sun set across Venice, Florida, we walked back to the flying club to get showered and changed before climbing aboard our trusty chariot – a rented, and somewhat sun-faded, Cessna 172.

Despite having flown a reasonable number of night flights across many countries, this one was memorable because of the ability to extend our day out and enjoy the incredibly still air and clear moonlit sky on our return. In these pre-GPS days, the flight back was more relaxed than normal as navigation was kept simple by keeping the Gulf Coast out of the port window and the starboard side lit up by the bright lights of Sarasota which drifted serenely past as we flew northbound.

Night flying offers a whole new experience to the private pilot, with



magical views of the airfields and cities below. Features you might use for navigation during daylight can all but disappear, providing a whole new aspect to your airfield and the surrounding areas.

Towns and cities become prominent features, with water masses, smaller roads and terrain disappearing into the night sky.

Night can bring calmer winds, quieter radio communications and much smoother

flying conditions. Colours of the airfield, taxiway and runway lighting are now more relevant as the detail we are used to seeing becomes lost to the darkness. With shorter days and more changeable weather during our UK winters, flying at night also means there will be more opportunities to maintain existing proficiency while learning or consolidating new skills.

Where possible I try to conduct pre-flight inspections in daylight prior to a night flying sortie, however there are occasions where this needs to be done in the dark. Rotating propellers are almost impossible to see, so additional care is needed when heading out to the aircraft. Relatively simple tasks, such as checking the fuel sample for water or refuelling, require a bit more thought as to how to perform them in the dark.

Many airports and airfields have poor lighting, so there's a real risk of striking other aircraft or obstacles while taxiing out. Some older pilots will remember the 1970s public information film telling drivers 'Don't dazzle – dip your headlights'. Delving into my Human Performance books, I'm reminded that we have rods and cones in our eyes to provide vision and colour. Rod cells are used for night vision and require a dark adaptation period before reaching their maximum retinal sensitivity; typically, a period of 30 minutes or more. Looking at bright lights such as camera flashes can destroy night vision: the modern trend of obtaining a 'selfie' might require a further period of night adaptation before setting off...

For those still using a paper navigation log and chart, a suitable red light will be fine in the cockpit. Electronic charting and navigation aids should be turned to night mode, with the brightness and colour adjusted to adequately display the route and airspace.

When planning, it's worth considering airfield options in case of a diversion. Many airfields in the UK will only be open and available for night flying on set days of the week and before a specified time. You might also include in route planning a path that takes advantage of the fewer available airports en-route that are open. Pilot Controlled Lighting (PCL) is now approved for use in the UK but not yet common, so you might need to check which airfields are going to have the lights turned on.

As well as a less direct routing, with the recent introduction of Part-NCO you might need extra fuel to satisfy the minimum



Just how bright should cockpit lighting be?



Obstacles can be harder to see

fuel requirements for EASA aeroplanes conducting VFR flights at night. Whereas the day requirement is for a minimum of 30 minutes, at night NCO.OP.125 mandates planning more generous fuel reserves requiring a minimum of 45 minutes of fuel on landing.

Without clear visual reference, our vestibular system (the sensory system that plays a major part in controlling a sense of balance and spatial orientation) can produce a somatogravic illusion under high acceleration or deceleration. This can be described as feeling a strong pitching sensation which might be experienced during a take-off or go-around at night or in IMC. Training and recent experience in night flying helps overcome this sensation that tells us, incorrectly, to pitch the nose down.

In the absence of a bright moon and clear skies, it can often be difficult to see unlit terrain. This can lead to the 'black hole' phenomenon which is evident at my local airfield where, from one of the runways, the departure path is towards rising ground making it difficult to



Gyro pilots can get a night rating

determine pitch attitude after take-off due to an absence of a visual horizon. Where a well-lit area, such as a town, appears to blink or suddenly disappear, there may be something between you and those lights that you can't see such as cloud, an obstacle, or rising terrain.

A significant issue at night is that you often can't see clouds until it's too late and you've already flown into them, so additional care should be taken when planning, and while gaining experience, to allow greater margins for VFR flight at night than for daylight flying to avoid inadvertent flight into IMC.

For anyone who has flown, or intends to fly, single-engine piston at night, I'm sure you'll have considered the possibility of engine failure and the subsequent actions. Inevitably, it will also be a topic of discussion with fellow flyers. Statistically, it's no more likely to occur than during the day, with ground and flight training including risk management and appropriate in-flight actions.

Airfield and runway lighting can be somewhat dimmer than the surrounding



Pre-flight checks...



...take on a new meaning

town and city lighting, so do be prepared to search for a while. Circuits can be more demanding as the airfield disappears into the darkness when downwind.

In visual conditions where the runway lighting is difficult to see, you might be able to ask the controller to increase the intensity of the lighting. I've also had occasions where I've asked for it to be turned down because it had been too bright.

At night, the vertical profile can be more difficult to assess by runway aspect alone, with visual slope guidance often being provided. Under the guidance of an instructor, part of the flight training includes landing without aids such as VASIs and PAPIs.

Although new pilots might be a little apprehensive about the challenges night flying presents, it's enjoyable and rewarding – and not as difficult as you might think. Flight training includes a mixture of instrument and visual flying skills over a relatively short course. For those fearful of examinations (and examiners!), there's a syllabus of ground and flight training to complete, yet there are no theoretical or practical examinations to pass at the end of the course to obtain the Night Rating.

Training for it consists of just five hours flying with a Flight Instructor at a Registered Facility or Approved Training

Organisation. Before commencing training, UK NPPL(A) and LAPL(A) holders must have completed the basic instrument flight training required for the issue of the PPL. The course includes a minimum of three hours dual instruction training in operations at night, navigation, visual circuits and dealing with emergencies. Dual navigation training must be at least one hour of training, with at least one cross-country flight of 50km (27nm) or more. Solo training includes at least five solo take-offs and five full-stop landings.

Unlike a SEP Class Rating, a Night Rating doesn't have an expiry date, so if you don't manage to do any night flying during the year you'd do well to regain proficiency with an instructor before acting as PIC next winter – but there are no further tests or checks. To carry passengers at night, you must hold a Night Rating and have completed three take-offs and landings in the preceding 90 days including one take-off and landing at night. Holders of an Instrument Rating are exempt the night recency requirement.

With or without a Night Rating there are a number of additional planning considerations when flying in the winter months. Following a delayed instructional sortie I recently landed back at a farmstrip rather later than planned, and was reminded of the fact that deteriorating light conditions can be difficult to judge

from altitude and occur somewhat quicker in the winter months. Reducing visual definition or resolution, cars with their headlights on and street lighting, are all good clues as to the lighting levels at ground level.

Following a number of amendments to the Air Navigation Order, there have been some exciting developments in the UK over the last 12 months. NPPL holders can now add the Night Rating to their licence. Congratulations must also go to Ian Bryant and Steve Boxall on obtaining the first UK gyrocopter Night Ratings.

Overall, obtaining a Night Rating is a great way to develop and expand skills, and provides an amazing flying experience while improving on the usability and utility of your licence. For those who already hold a Night Rating, keeping it current is a gratifying way to maintain your flying proficiency through these darker winter months. ■

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NIGHT FLYING TIPS

It's dark out there – so let's look a little more deeply at the hazards related to night flying

In the UK many aerodromes have operational hour limitations that might be set down in planning regulations or just to be good neighbours to local residents, so the opportunity to fly at night can be limited to the winter and early spring months.

So what hazards are there when operating during these months and at night?

WEATHER

On nights suitable for flight there might be high pressure leading to clear skies or a high cloudbase with good visibility and light winds.

But welcome as this weather is for flying, it can lead to a rapid air temperature drop when the sun goes down, so it's important to be aware of the freezing level as any amount of moisture on the airframe might freeze.

Never fly in known icing conditions unless the aircraft is cleared for it, and even then it might only be cleared for light icing conditions.

If you do need to descend from an icing level to try to melt ice from the airframe be wary of high ground you simply can't see – use the Maximum Elevation Figures (MEF) depicted on the chart.

We all know it's the season of mist and fog, but the forecast should warn of it: the trend indicator 'BECMG' means significant change in conditions is forecast during the two hours after the observation. It may also be followed by a time group and 'FM' from, 'TL' until or 'AT' at.

PREPARATION

Night pre-flight inspection also takes on a new meaning: do the nav lights, landing/taxiing and anti-collision beacon(s) all work? Any airframe ice needs to be removed, but be careful to not push it into the control surface hinges or the pitot-static system. As there can be a greater risk of water condensing in fuel tanks, ensure fluid is removed from all water drains.

For comfort you'll want to ensure the cabin heater/demist is working, but think about the last time you used it, a fault might allow carbon monoxide into the cabin (the first signs are often a headache).

For engines with a carburettor, the alternative air or carb heat control should be used as per the Flight Manual or Pilot's Operating Handbook, but it's worth using full carb heat periodically anyway – and keeping it on for long enough to be effective.

VISUAL ILLUSIONS

While the visibility on night flights can be stunning, there are also illusions (referred to in the main article) to be aware of, especially on approach.

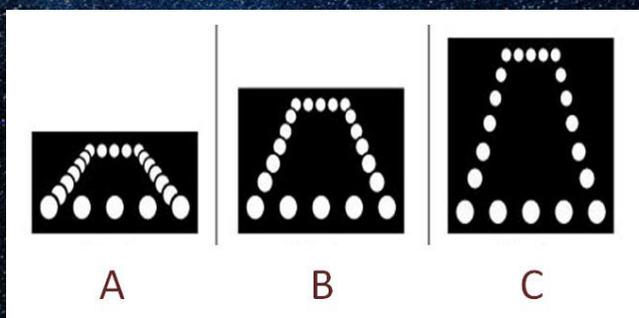
Any unlit areas can lead to the 'black hole' scenario. This effect, sometimes called the 'featureless terrain illusion',

fools pilots into thinking they are higher than they actually are, leading to dangerously low approaches.

Perception scientists disagree as to the exact cause, and it's likely that no single theory fully explains the phenomenon. The most extensive study was conducted by Boeing researchers after a series of airline 'black hole' accidents in the 1960s. Using a flight simulator, Boeing instructor pilots (with more than 10,000 hours each) conducted entirely visual approaches to runways in black hole conditions. Without the aid of altimeter or glide slope information, most pilots flew excessively low approaches and crashed into terrain short of the runway.

While man-made obstacles near an airport such as buildings or towers are normally lit in the dark, natural ones such as hills or trees obviously aren't, so, unless there is exceptional illumination such as a full moon on new snow, they'll be largely invisible. This factor greatly increases the potential of flying into the ground and numerous such accidents have occurred, so follow the APAI or PAPI (if available) indications or keep your focus on the runway edge lights to provide an aspect on the runway.

Another significant night visual approach risk stems from the way we interpret visual cues. Consider the runway light illustrations: *Which indicates the aircraft is on the correct flight path for the approach?**



With the increase in the number of pilots complaining of laser lights being pointed at aircraft, be extra vigilant if you hear such reports.

TRAINING

As mentioned in the main article, if you haven't flown at night for some time seek some refresher training – it's also an opportunity to identify what regulations have changed since you last flew at night. For instance, are you aware of SERA and the requirement for a flightplan for any VFR night flight? It can be abridged and filed by radio, but it's now a requirement.

Finally, enjoy night flying it can be a stunning experience.

Justin Willcocks – CAA, GA Unit

*Yes, it's B