GAP
Good Aviation Practice

Night VFR

CAA
CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

Contents

Cover photo: iStock.com/Jetstream Rider

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- Civil Aviation Safety Authority (CASA)
- Federal Aviation Administration (USA)
- Aircraft Owners and Pilots Association (NZ)

See the CAA website for civil aviation rules, advisory circulars, airworthiness directives, forms, and more safety publications. Visit aviation.govt.nz.

Every effort is made to ensure the information in this booklet is accurate and up-to-date at the time of publishing, but numerous changes can occur with time, especially in regard to airspace and legislation. Readers are reminded to obtain appropriate up-to-date information.

Night VFR

Flying at night presents pilots with a new set of threats and challenges compared with flying during the day. It's essential to seek training with a flight instructor specifically for night flying. As an aid to your training and revision, this booklet looks briefly at some underlying principles and practices, including illusions, planning considerations, and handling emergencies.

This booklet is aimed at students and private pilots, and briefly examines some of the factors that are different about night flight.

All your usual flight training applies at night, but there's more emphasis on managing the additional risks that come with darkness and limited visual references. Threat and error management is particularly applicable to this situation, and is introduced throughout this booklet.

Always keep in mind:

Aviate - Navigate - Communicate.

Night is defined, for aviation purposes, as the period of darkness from the end of evening civil twilight, to the beginning of morning civil twilight (see Part 1 *Definitions and Abbreviations* for the full definition). The times for beginning and end of civil twilight are in *AIP New Zealand* GEN 2.7 Daylight Tables.

Photo: iStock.com/denizuguisa

Vision

It's useful to have a basic understanding of how the eye works at night.

Light-sensitive nerves, called cones and rods, are located at the back of the eye. These nerves connect to the optic nerve, which transmits messages directly to the brain. The cones are in the centre of the retina, and the rods are concentrated in a ring around the cones.

The function of the cones is to detect colour, details, and faraway objects.

The rods function when something is seen out of the corner of the eye (peripheral vision). They detect objects, particularly those that are moving, but don't give detail or colour – only shades of grey.

Both the cones and the rods are used for vision during daylight and moonlight.

It's the rods, however, that make night vision possible. Because the rods are distributed in a band around the cones, and don't lie directly behind the pupil, off-centre viewing (looking to one side of an object) is important during night flight.

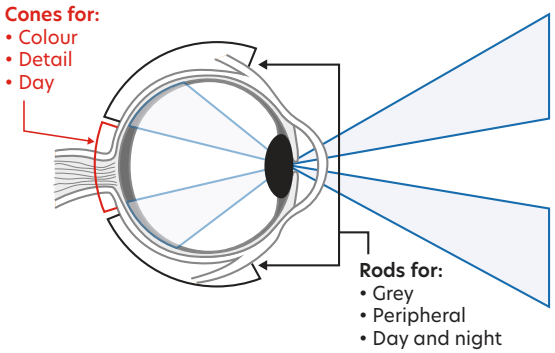
During daylight, we rely on our central vision to see fine details. We use our peripheral vision to see general features, and changes in movement or brightness. In low light, our central vision doesn't work as well, so we rely more on our peripheral vision to see things in the dark.

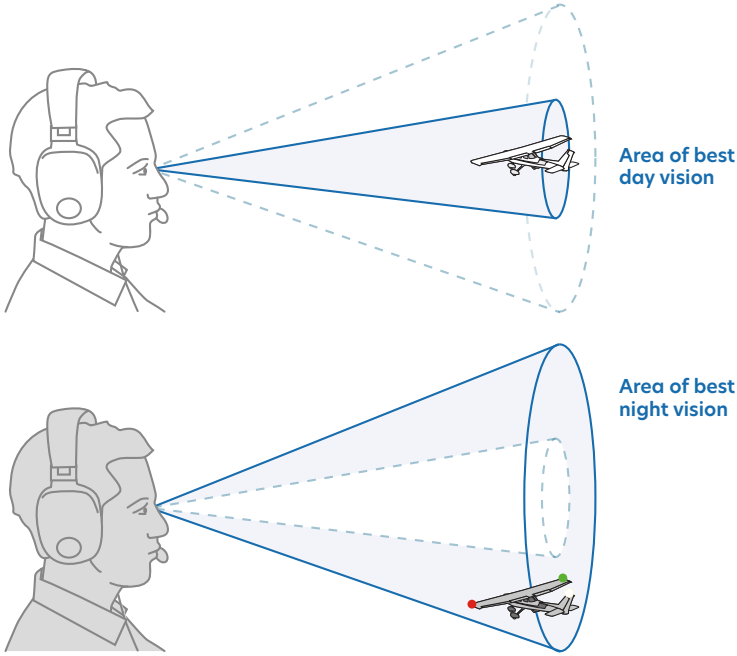
We're more likely to notice objects at night by using our peripheral vision, and maintaining a 'scanning' visual motion. When flying at night we still need to use our central vision, like when we read instruments or charts, but we also need to use our peripheral vision as much as possible.

To maximise your visual performance for night flying, take the following steps.

- Maintain good general health. Keep in mind that some medications or medical conditions may also impair night vision.
- Avoid things that impair vision performance, such as smoking.
- Allow time for your eyes to adapt to darkness.
- Avoid bright light, even when using your central vision. Keep cockpit lights and torches as dim as you can, without losing your ability to read instruments and documents.
- Use a practised scanning motion when looking outside the aircraft.
- Don't fly at any higher altitude than necessary. Visual function is dependent on oxygen levels, especially at night. Altitude that may be perfectly safe during daytime, can result in significant reduction in night vision function. Supplemental oxygen can help prevent altitude-related vision problems.

Rods and cones





Dark adaptation

Adjusting to low light is called dark adaptation. It takes a while to adjust from bright light to low light. But, when going from dark light to bright light, the effect is rapid and removes any dark adaptation that has taken place. You've probably experienced this when entering and leaving a cinema.

You need to plan for dark adaptation when preparing for night flight. Allow time for your eyes to adjust to low light after completing any tasks that need to take place in bright light, such as the preflight inspection. Avoid any bright light once you've started adapting to the dark.

To preserve your dark adaptation, consider instrument lighting levels, especially if you're using large multi-coloured LCD screens. Be careful with mobile phones too, as they can have very bright displays.

Some aircraft are fitted with red lighting to help preserve dark adaptation. If you do use red light in the cockpit, avoid having it at too high a level, reduce the intensity as your eyes adapt, and be aware that it will distort the colours on navigation charts.

Nothing to focus on

If you don't have anything to focus on, the lens of the eye relaxes to its least stretched position, focusing on a point one to two metres in front of the eye. This is called empty visual field myopia. You may have experienced this when trying to spot an aircraft against a clear sky. A similar effect happens at night – making a strenuous effort to focus on nothing won't work.

This effect is worse for pilots wearing corrective lenses, particularly bifocals or trifocals. The only remedy is to focus on actual objects, such as light sources, further than six metres away.

Photo: iStock.com/janiecbros

Illusions

It's good practice regularly refer to your instruments when flying at night, even when external lighting provides good visual cues. Visual and spatial illusions can provide misleading information, and visual reference can be suddenly lost. Use your knowledge of illusions to avoid these pitfalls.

Visual illusions

Reflections

Charts placed on the top of the instrument panel can cause reflections that have a disorienting effect. Helicopters with extensive areas of acrylic windscreen are prone to disorienting reflections on the inside of the cockpit canopy.

Flicker vertigo

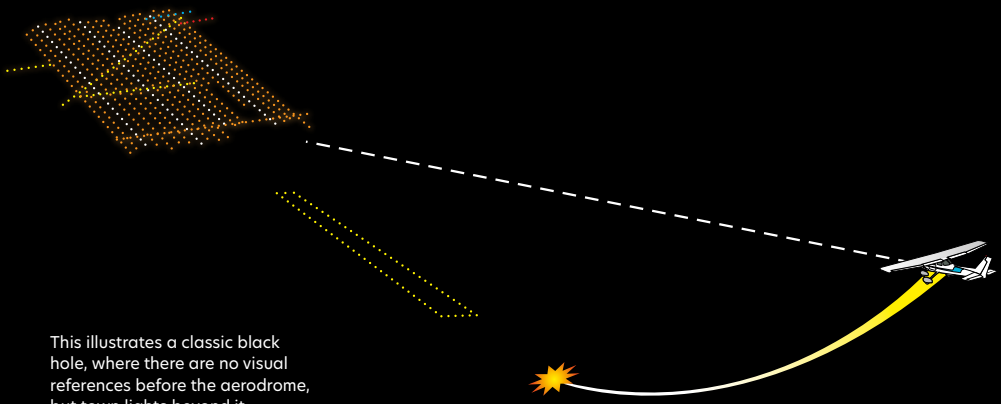
Flashing lights or flicker effects from propellers and helicopter rotor blades can cause dizziness and disorientation, resulting in a loss of situational awareness and spatial disorientation. Turning off strobes, and briefly looking away from the light source, can help reduce this effect.

Judgement of distance

Depth perception is impaired in low light. The effect is worse when the only objects visible are points of light, and there is no relative size information.

Auto-kinesis

Auto-kinesis, or self-movement, can occur when looking at a fixed light source against a dark sky, with no surrounding lights or other visual cues. This fixed light source could be a star, or a single light source in a remote area. After a while, the light may appear to be moving or oscillating, and could be mistaken for an aircraft light.
To prevent this illusion, avoid prolonged focusing on any one light, and look to one side using your peripheral vision.



This illustrates a classic black hole, where there are no visual references before the aerodrome, but town lights beyond it.

Confusing ground and star light

At night, ground lights can be confused with stars. This can lead you to manoeuvre the aircraft into an unusual attitude, to put the ground lights above you. In areas with sparse ground lighting, isolated lights can also be mistaken for stars, which can make the aircraft appear to be in a nose-high attitude, or have one wing low.

When overcast conditions block any view of stars, unlighted areas of the terrain can appear to be part of the sky. Flight over water makes you more vulnerable to this effect, and in parts of New Zealand, the lights on fishing boats can be mistaken for stars.

The black hole

The visual cues available to you when approaching a lighted area at night over unlit terrain (the 'black hole') are misleading and inadequate. The most common example of this is an approach to an aerodrome over water or unlit area. Without peripheral visual cues to help, you may have trouble orienting yourself relative to the earth. The runway can seem out of position (down-sloping or up-sloping) and, in the worst case, results in landing short of the runway.

If an electronic glide slope or visual approach slope indicator (VASI/PAPI) is available, you should use it. If navigation aids are unavailable, use your flight instruments to maintain orientation and a normal approach profile. If at any time you're unsure of your position or altitude, carry out a go-around.

Sensory illusions and spatial disorientation

For us to be able to orient ourselves in space and time, our brains have to filter and process a lot of sensory information from our environment. This information comes from our eyes, ears, nose, and skin. The vestibular organs in our ears also help us with balance, movement, and maintaining a stable visual field.

Visual information is the main sense used during flight, but when flying at night this information is reduced, and can result in sensory illusions. These illusions can be very powerful and disorienting. They can happen very quickly, as the brain tries to make sense of the information. Sensory illusions are caused by a mismatch between the information that the brain receives from the different sensory organs.

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Night flight sensory illusions include the following.

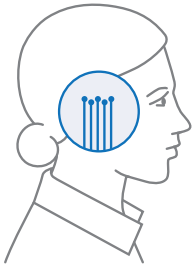
- **The leans** – Generally, this is a situation where a balanced turn has been sustained for long enough that the body compensates, and incorrectly perceives the turn as being level flight. On rolling out of the turn, the sensation is of banking in the opposite direction, even though the wings are level.
- **Somatogravic illusion** – When an aircraft accelerates in level flight, or during take-off, our vestibular organs aren't able to distinguish between the acceleration and gravity. This can result in an illusion that the aircraft's attitude is more nose-high than it is. You may incorrectly apply nose-down control inputs until the flight feels right – and the aircraft descends and impacts the ground.
- **Somatogyral illusion** – This is a false sensation of rotation. A classic example of this illusion is the 'graveyard spiral', where the illusion of an opposite-direction turn occurs after you've returned to straight-and-level. You may incorrectly adjust for the false rotation, and can enter a progressively tighter spiral in the opposite direction, resulting in aircraft breakup or ground impact.
- **Coriolis illusion** – Moving the head excessively, especially during in-flight turns, confuses the vestibular organs in the ears and can produce a tumbling sensation.

To reduce the likelihood of these illusions, take the following steps.

- **Prepare yourself preflight**
  What situations in this flight are likely to lead to illusions? What will I do if I have a problem? Am I in good health and okay for this flight? Have I followed the I'M SAFE checklist, and ensured I'm sufficiently rested? Have I given my body and brain time to adapt to night flight, before I fly? Illness, medication, alcohol, sleep loss/sleep debt, and fatigue all increase susceptibility to experiencing illusions and spatial disorientation.
- **Minimise head movements**
  During the scanning of your instruments, and outside, try to keep head movements to a minimum and move your eyes instead. Where practicable, make turns and other flight path adjustments as gentle as you can, and for relatively short durations.
- **Use the visual horizon where it is available and reliable**
  Vision is the most powerful sense for orientation.
- **Get onto your instruments, and rely on them**
  Whenever you don't have a reliable visual horizon, whenever you're doing manoeuvres that can lead to illusions, and whenever you've recognised any sort of illusion or possible disorientation.

Somatogravic illusion

Head stationary and upright

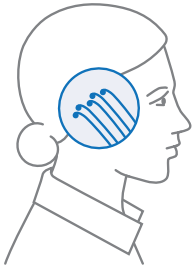


The impression is "I'm stationary and upright"

Head tilted up

The impression is "I'm pitching up"

Forward acceleration



The false impression is "I'm pitching up"

Recovery from spatial disorientation

If you experience confusing sensations at any time in flight, scan all relevant instruments before making control inputs. This is the reason there's some minimum instrument training experience required, prior to starting night flying training.

Start with the Attitude Indicator (AI). The AI provides the main picture of what your aircraft is doing. See where the nose is, and where the wings are in relation to the horizon. Note the airspeed, vertical speed, and altitude. If they indicate improper control of the aircraft, follow these steps:

- level the wings
- if losing or gaining altitude quickly, check to make sure you're not reaching critical airspeeds
- adjust power if necessary for airspeed, then smoothly apply back or forward pressure to stop vertical deviation, putting the nose of the aircraft on the AI's horizon
- when the VSI reads zero, the aircraft is in the proper attitude for level flight.

> If you experience confusing sensations at any time in flight, scan all relevant instruments before making control inputs.

Preparation

Rules

The rules for flying VFR at night are contained in various civil aviation rules, while general guidance about standards, practices, and procedures is in the Advisory Circulars (ACs).

These rules and ACs aren't explored in depth in this booklet. Anyone thinking about night VFR flight must understand the current requirements, and abide by them.

Part 61 *Pilot licences and ratings* will give you the information about prerequisites for night flight, including basic instrument time, and currency requirements. Use the related ACs for further information.

Part 91 *General Operating and Flight Rules* includes the required aircraft light and instrumentation requirements, the use of aerodromes, and meteorological minima for night flight.

Some sport and recreation aircraft aren't permitted to fly at night, so check the rule applicable to your activity, for example Part 103 for microlights, and Part 106 for hang gliders.

Passengers

Your passenger briefing is especially important at night. Warn your passengers against using bright lights, such as torches and mobile phones, that may affect your dark adaptation. When moving passengers to the aircraft, be conscious that they may not be aware of props and struts, and may not see them in the dark. Only board your passengers when the aircraft has been preflighted.

Photo: CAA

Equipment

A torch, ideally with a red filter or light, for every flight crew member is a requirement (Part 91). They're useful in the cockpit for checking things like a chart detail or an unlit gauge. It's a good idea to have two torches, or at least a second set of batteries.

If you shop around, you may be able to find torches (often the LED type) with variable power settings. When choosing a torch, consider that you may need to use it in an emergency, such as an electrical failure. Some people tie a pencil style torch around their neck, some will hold one in their mouth when needing their hands, or you could use a head torch.

Consider carrying a set of spare fuses (and know where they are).

Review equipment for use in a dark cockpit. For example, you may want your pen attached to your flight log with string, so you can retrieve it if dropped. A spare pen is a good idea.

If possible, carry a hand-held VHF transceiver for backup. If you have a comms failure, this will enable you to communicate, and to switch on aerodrome lights. Some pilots carry a hand-held GPS receiver as a backup too. You should pre-set the brightness to minimise disruption to your dark adaptation.

You should carry a mobile phone, but be cautious if you need to use it, as their screens can be very bright and could affect your dark adaptation. Store any numbers that might be useful in it, especially Airways' National Briefing Office and any control towers relative to your route. It's a good idea to have numbers of locals who can turn on aerodrome lighting, if the pilot-activated lighting fails. Your phone can also be a back up to your torch and your watch.

You should already carry a good watch or timing device, and survival kit. Consider warm clothing for you and your passengers, as temperatures are usually lower at night.

You should also carry a clean microfibre cloth, or similar, for wiping condensation from windscreens and windows. Condensation will likely form before takeoff, and before the heater can start working effectively.

A headband torch with red filter being used for cockpit lighting.

Pilot

If you're planning to fly at night, one of the first things you should do is familiarise yourself with the aircraft systems, controls, and switches. You should be able to operate these in complete darkness. To practise this, sit in the aircraft on the ground, with everything turned off. Close your eyes and reach for the intended control positions, such as the light and fuel pump switches, throttle, trim, and carb heat. Aircraft of similar types may have differences in layout.

Identify and preset avionic equipment that you know how to use (VOR, ADF, DME). You need to be familiar with the use of this equipment in daylight before using it at night.

The ability to fly the aircraft by regular reference to instruments is inherent to safe, and legal, night VFR operations.

You'll also need disciplined and predictable cockpit management for where you stow items, such as torches, pens, and charts. It's far harder and more distracting to try and find items in the dark, compared to during the day.

Consider your state of health, and fatigue. Don't plan night flying if you've been working all day.

You should have your own 'personal minimums' for flight during the day. You should also develop another set for night, considering terrain, and the different Met minima and reserve fuel requirements (Part 91).

Photo courtesy of Paul Harrison Kiwi Air Research

Preflight inspection

If you're flying at night, it's a good idea to carry out the preflight inspection during daylight. You need to be able to secure the aircraft afterwards.

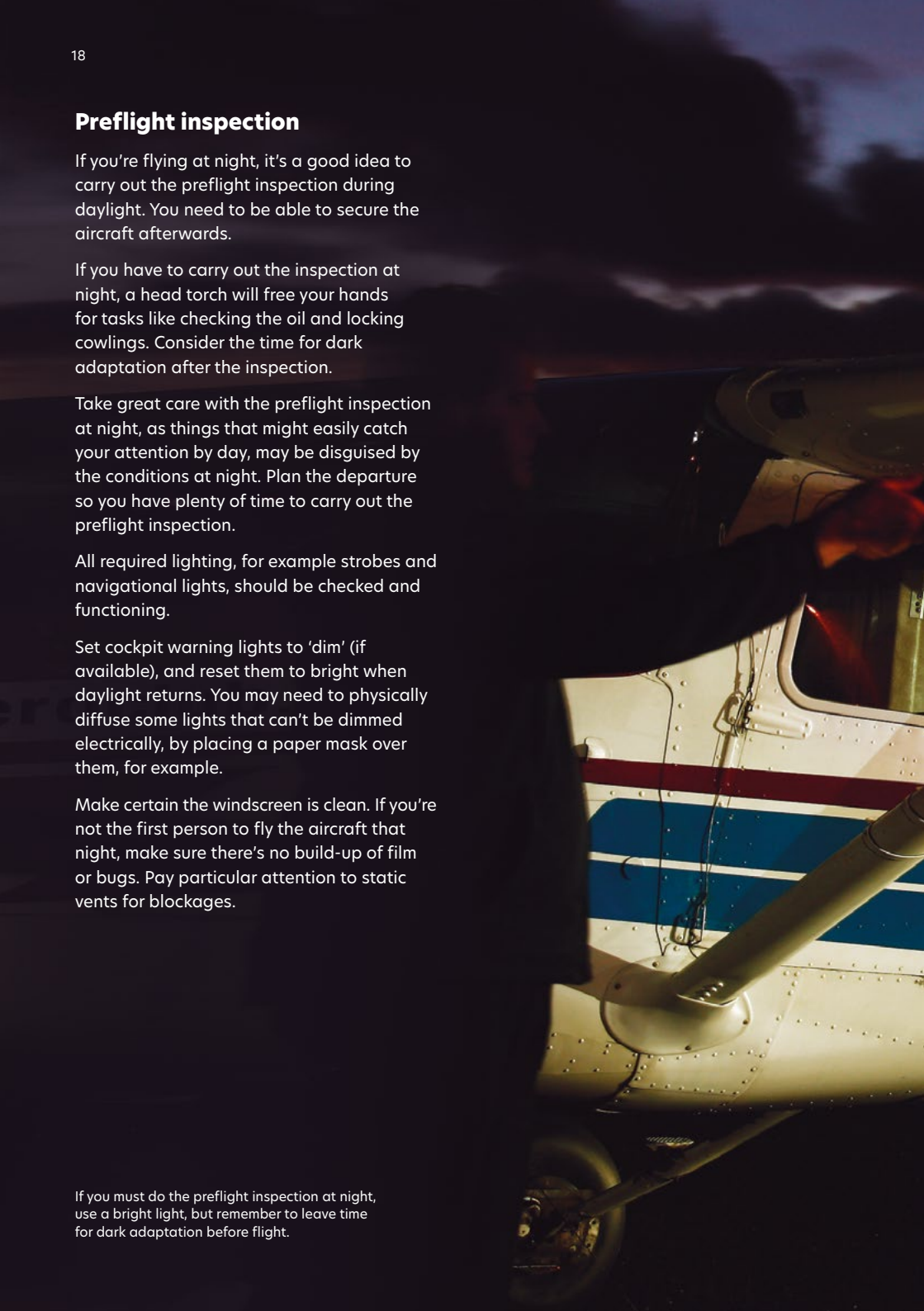
If you have to carry out the inspection at night, a head torch will free your hands for tasks like checking the oil and locking cowlings. Consider the time for dark adaptation after the inspection.

Take great care with the preflight inspection at night, as things that might easily catch your attention by day, may be disguised by the conditions at night. Plan the departure so you have plenty of time to carry out the preflight inspection.

All required lighting, for example strobes and navigational lights, should be checked and functioning.

Set cockpit warning lights to 'dim' (if available), and reset them to bright when daylight returns. You may need to physically diffuse some lights that can't be dimmed electrically, by placing a paper mask over them, for example.

Make certain the windscreen is clean. If you're not the first person to fly the aircraft that night, make sure there's no build-up of film or bugs. Pay particular attention to static vents for blockages.



If you must do the preflight inspection at night, use a bright light, but remember to leave time for dark adaptation before flight.

Photo courtesy of Paul Harrison Kiwi Air Research

Flight planning

The key to successful visual navigation at night is good planning. A good rule of thumb is, don't attempt to fly a route at night that you haven't flown during the day.

If flying cross-country at night, you should always file a flight plan, or have flight following in place. Make sure you meet the experience requirements for night flying, particularly for cross-country. You can find these requirements in the Advisory Circulars AC61-3 (PPL) and AC61-5 (CPL). In the case of flight following, it's vital that the person nominated knows exactly what to do in an emergency, and when to do it.

Normal flight planning considerations apply, such as weather, *AIP Supplements*, and NOTAMS, but there are special considerations for flight at night.

When planning your route, consider the terrain, location of townships, and suitable places for a forced landing. You need to be able to identify topographical features, and confirm your position. It's better to take a longer route over level terrain, than a more direct route over mountainous terrain.

Know which features you'll use as visual checks, and highlight them clearly on your chart. Features that can show up well at night are coastlines, rivers, towns, major roads, and aerodromes. It's good to use these features, even if they're off-track. Mark time intervals so you know when to expect them.

Large areas of water can be hazardous because of loss of horizon, lack of landmarks for situational awareness, and reflections of stars contributing to disorientation.

Finally, as you complete your planning, remember that it will take 30 minutes to adapt night vision fully to low light levels.

Weather

Weather is one of the most serious considerations in planning a flight at night. It's often difficult or impossible to see clouds, so inadvertent IMC is a major risk factor. Seriously consider this when deciding whether to fly cross-country at night. One recommendation is to climb to the IFR Minimum Safe Altitude (MSA) above the departure aerodrome, and if you can't see the way forward to your destination,- don't go. Another recommendation is to look up the IFR MSA for your route, and fly at that altitude, because of the built-in terrain clearance.

There are different legal minima at night, but if you're getting close to them, you're increasing your chances of inadvertent IMC, so consider landing or turning back. Consider what your own personal minimums will be for night flight. The weather at your alternates must be part of your plan.

It's important to check the temperature/dew point split (difference) as part of your assessment of up-to-date weather information. When the temperature drops to the dew point, or close to it, it's likely that the cloud base will lower and there could be rain or fog.

Fuel

You need increased fuel reserves at night. Consider your own personal minimum above this. Plan for diversion to your alternates. Consider availability of fuel at destination and alternates, in the event you need to refuel.

Aerodrome lighting

You need lighting at your departure and destination, and also your alternates. Familiarise yourself with the type of aerodrome lighting when planning, to aid your recognition of it in flight. You need a plan, if the pilot activated lighting fails.

Alternates

Alternates must have lighting. What's the weather forecast for your alternates? Is fuel available?

Emergencies

Are there places you can land? Do you have the right equipment and backups? Do you have plans in place for typical situations, such as a vacuum or electrical failure?

Airspace

Plan to fly as high as possible, as this will give you better terrain clearance, and more forced-landing options. The visual navigation charts have Maximum Elevation Figures (MEFs) in each quadrangle, shown in thousands and hundreds of feet above mean sea level. The MEF is based on the highest known feature in each quadrangle, including terrain and obstructions, such as trees and towers. Treat MEFs as representing solid obstacles. Add your safety margin to the MEF to determine a minimum safe altitude in the rectangle.

Operating at night

A VFR night flight should not be made under any circumstances during poor or marginal weather conditions.

A visual horizon won't always be available at night. Use your instruments, so that sudden loss of a visual horizon won't disrupt your navigation and control of the aircraft. For turning, use a medium angle of bank (not more than 30 degrees) so you don't lose orientation.

Higher relative humidity at night requires closer carb heat monitoring.

Startup, taxiing, and take-off

If there's a reasonable time between preflight and take-off, be prepared for heavy dew to form on the windscreen. If the aircraft undergoes a temperature change, like from inside a hangar to the cool air outside, beware of cockpit misting.

Make sure all the materials you may want to use on the flight are accessible, such as charts and torches. You should be able to locate them by feel.

During startup, make sure to check the electrical system, including the battery condition and generator or alternator charging rate.

Instrument checks are essential for night flight.

Use aircraft lights appropriately for the circumstances – to light your path without distracting other pilots. Your landing light, if left on, could affect the dark adaptation of other pilots.

Your impression of distance and speed will be distorted at night while taxiing. Consciously taxi at a slower speed.

Just before take-off, when lined up, check your perspective view of the runway lights, especially those beside your ears in your peripheral vision. This is the view you'll use on landing to estimate the point of touchdown.

For take-off, use the runway lighting for guidance. When airborne, monitor the aircraft attitude (positive rate of climb), direction, and speed, on instruments in order to avoid take-off illusions. With limited visual reference, track on a heading allowing for drift.

If your home aerodrome has a full suite of lights, it's a good idea to do some practice circuits at an aerodrome with just the basic rectangle of lights.

Operating in the circuit

During the downwind leg, the runway lighting is the focus of attention. Use it to adjust the circuit pattern and to allow for crosswind. If the runway lights are uni-directional, they won't be visible from the downwind leg. Circuit tracking will have to be either by reference to the direction indicator (DI), or to any available lighting in the vicinity.

Early in the airborne phase, that's to say, downwind in the circuit, or clear of the circuit if vacating, carry out an orientation look-around. Identify small communities for orientation, and as an indicator of changing weather conditions.

The base turns and base leg are flown primarily with reference to the runway lighting. You can use any approach, circling guidance, or lead-in lights that may be part of the aerodrome lighting.

Training in the circuit for night VFR will often be carried out with no air traffic control. It's more convenient in winter when it's dark earlier, so when there's a fine night, there can be a lot of traffic vying for the circuit. Training organisations should liaise and agree on a maximum number of aircraft to be in the circuit. They should also consult other operators on the aerodrome who may be operating at night.

Flying neighbourly helps everyone, so consider noise and height in relation to nearby housing.

Photo: iStock.com/baona

Leaving the circuit

Dead-reckoning navigation should be backed up by another navigation tool such as GPS, ADF, VOR, or DME. Monitor your position, time estimates, and fuel consumed.

Your preparation may have assured you the weather would remain clear for your flight, but conditions can change rapidly. You need to be vigilant for any change in the weather, but this can be difficult because it'll often be invisible. The only time you'll see fog, mist, cloud, or rain is when they're situated over a lit area. It's very easy to enter cloud without realising it.

Usually, the first indication of flying into restricted visibility conditions is the gradual disappearance of lights on the ground. If the lights begin to look like they're surrounded by a halo or glow, this is indicative of ground fog. Be careful if you attempt to fly in that same direction.

Watch for any township light patterns that adopt a different shape from that expected, which change their shape while you watch, or which disappear altogether. In such cases, there may be low cloud, fog, or terrain present.

Remember to monitor the temperature/dew point split, and access up-to-date weather. Learn to read the signs.

If bad weather does appear unexpectedly, good airmanship and a sound knowledge of weather phenomena will dictate whether you should turn back, or divert to the nearest open aerodrome. If you're in any way unsure of conditions, play it safe and land.

Approach and landing

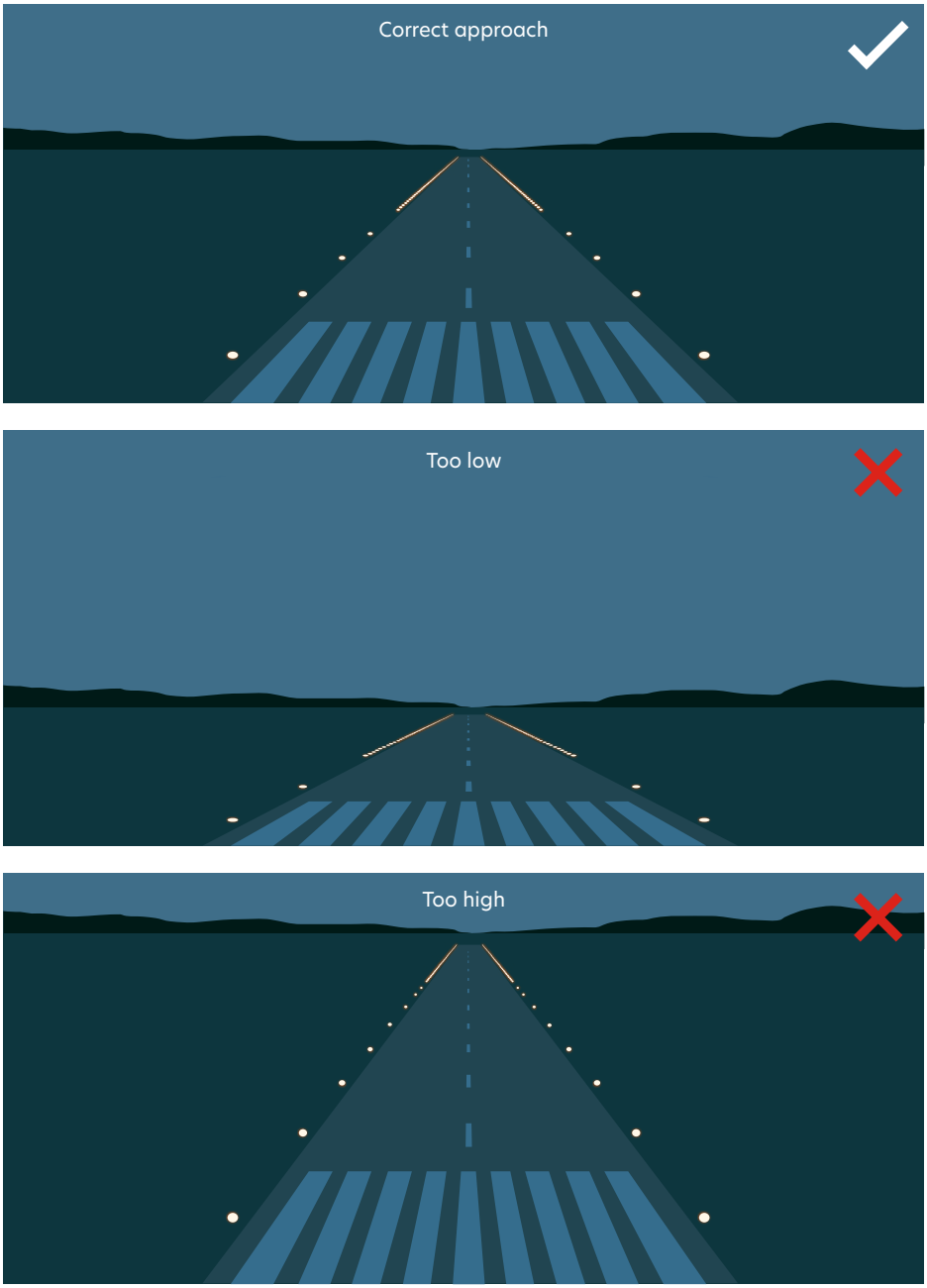
On final, maintain the correct angle of approach by referring to the approach and runway lights, unless you can see some form of approach slope indicating lights.

At night, your judgement of height, speed, and sink rate may be impaired, because there are few observable objects in the landing area. Inexperienced pilots may round out too high, until they become familiar with the proper height for the correct round-out.

Maintain the correct approach profile using the runway lights. If your approach is on the desired profile, the runway lights will appear to converge slightly, with spacing visible between the initial lights. Flare with the lights coming up to your peripheral vision level, as you observed prior to take-off.

"You need to be vigilant for any change in the weather, but this can be difficult because it will often be invisible. The only time you'll see fog, mist, cloud, or rain is when they're situated over a lit area."

Runway perspective on approach



Emergencies at night

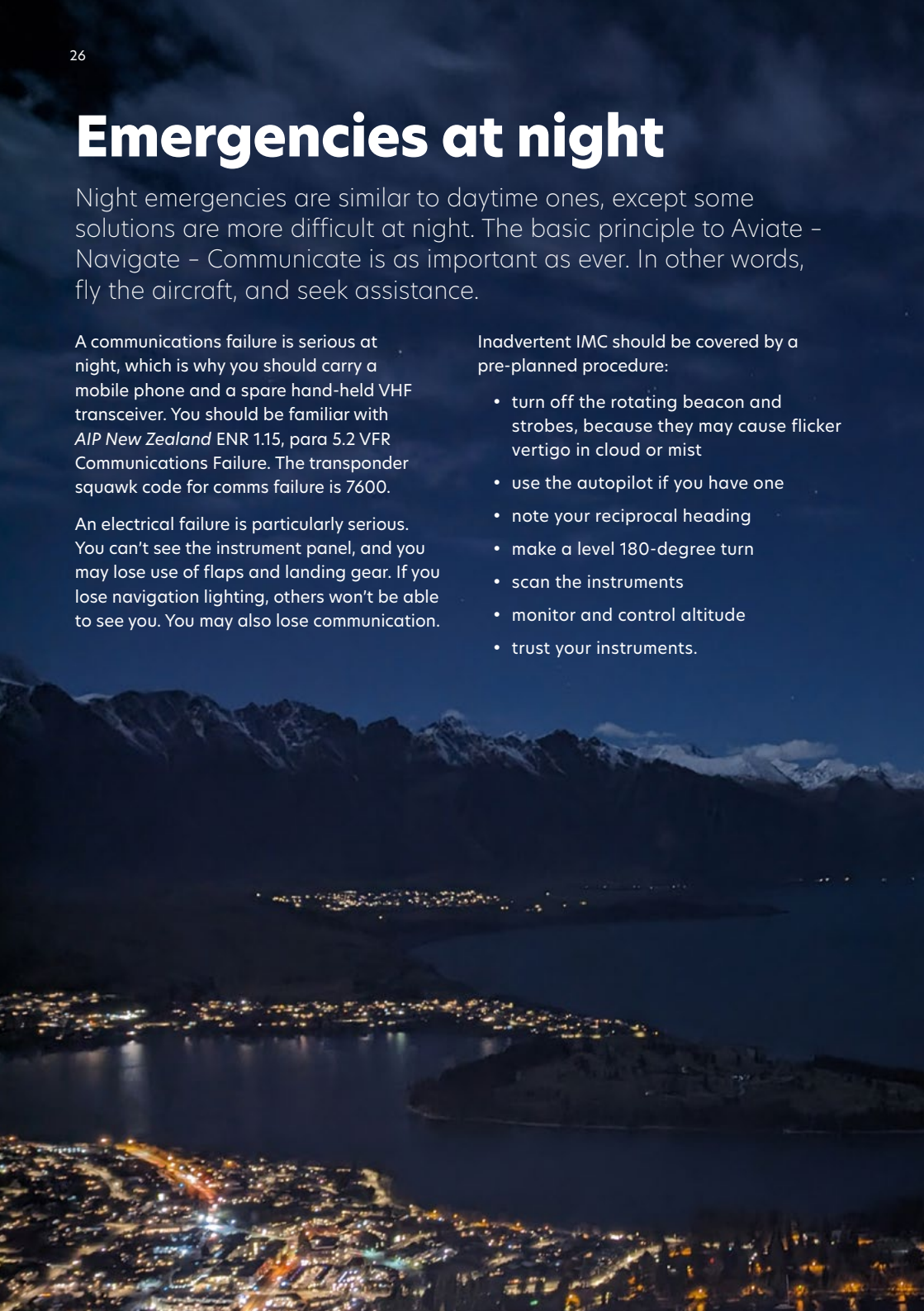
Night emergencies are similar to daytime ones, except some solutions are more difficult at night. The basic principle to Aviate – Navigate – Communicate is as important as ever. In other words, fly the aircraft, and seek assistance.

A communications failure is serious at night, which is why you should carry a mobile phone and a spare hand-held VHF transceiver. You should be familiar with *AIP New Zealand* ENR 1.15, para 5.2 VFR Communications Failure. The transponder squawk code for comms failure is 7600.

An electrical failure is particularly serious. You can't see the instrument panel, and you may lose use of flaps and landing gear. If you lose navigation lighting, others won't be able to see you. You may also lose communication.

Inadvertent IMC should be covered by a pre-planned procedure:

- turn off the rotating beacon and strobes, because they may cause flicker vertigo in cloud or mist
- use the autopilot if you have one
- note your reciprocal heading
- make a level 180-degree turn
- scan the instruments
- monitor and control altitude
- trust your instruments.



It's a good idea to practise your inadvertent IMC procedure in daylight, and get yourself checked in this by an instructor from time to time.

The loss of attitude flight (gyroscopic) instruments could seriously affect your ability to control the aircraft. Monitor the vacuum gauge regularly. If the attitude indicator is sluggish or topples, confirm the performance of the indicator by referring to the turn coordinator, or the turn and slip indicator. If you detect a fault, cover the attitude indicator to avoid any distraction. Continued flight should still be possible using the turn indicator, or a standby attitude indicator powered by an alternate power source. Being current in limited panel instrument flying is essential.

Engine failure should be treated in the same way as in daytime. If you're not within gliding distance of a known aerodrome or airstrip for your emergency landing, choose an area that is unlit (unpopulated), but near lights (close to assistance), if possible.

If making a precautionary or emergency landing at night, delay turning on the landing light if it could upset your night vision. Also, delay turning off the master switch until you're on the ground, so you have lighting assistance until landed.

For helicopters, it's recommended to autorotate by night using 'constant attitude autorotation'. This technique guards against flaring too late, and landing with excess forward speed. With a large or normal flare, the landing light will flare with the aircraft, and be useless to the pilot at the time when it's most needed. The constant attitude autorotation helps with lighting near the ground.

If you can see enough of the surface, flare slightly to ensure that the landing light still illuminates the ground beneath you. If you're having difficulty seeing the ground, then maintain the aircraft's attitude, and raise the collective to cushion the landing. If you're going to land in trees, try to enter the tree canopy with no forward speed and at minimum rate of descent, and, if possible, slightly nose-high.

Photo: iStock.com/Kathleen Lockhart

GAP
Good Aviation Practice

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See the CAA website for civil aviation rules, advisory circulars, airworthiness directives, forms, and more safety publications.

To order publications such as GAPs and posters, go to aviation.govt.nz/education.

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