MAY 2023

UK Civil Aviation Authority

DISTRACTION

AND INTERRUPTION IN GENERAL AVIATION OPERATIONS

SAFETY SENSE

SS31

YOUR SAFETY SENSE LEAFLET FOR:

DISTRACTION AND INTERUPTION IN GENERAL AVIATION OPERATIONS

Distraction and interruption are unavoidable aspects of flying that require consideration and mitigation.

Many occurrences, serious incidents or accidents have been caused by apparently trivial distractions or interruptions, with examples including loss of control, collisions, aircraft configuration errors or airspace infringements. In most cases, the attention of the pilot or crew was diverted from the primary task of flying and navigating the aircraft.

With the right strategies and self-discipline in place, it is possible to be more aware of the dangers and reduce the risk to your flying.

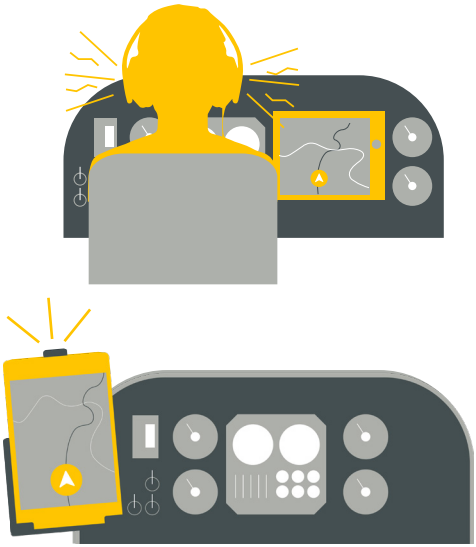
Consider mitigations within your Threat and Error Management (TEM) approach. More information on TEM can be found on the Airspace & Safety Initiative website.

DISTRACTION VS INTERRUPTION

Distraction

Pilot **distraction** may be defined as a process, condition or activity that takes the pilot's attention away from the task of flying the aircraft. Distractions may be transient and cause short term lapses of attention, or they might be continuous and cause an associated reduction in mental capacity. A distraction could be anything from an annoying interference noise in your headset to a mental preoccupation with something unrelated to the flight.

Although interruption and distraction are often interchangeable, there are differences. An interruption normally requires a more specific judgement of the new task or factor and the extent to which you are required to engage with it. A distraction may also prove disruptive, but it normally lacks the necessity to consciously shift your existing focus.



Interruption

An **interruption** may be defined as an unanticipated factor or task that develops and requires your attention. You will normally have to judge what reaction is necessary to the interruption and may have to modify or suspend an existing task or area of focus.

For example, this might be a passenger suddenly complaining of feeling ill, an unexpected call from ATC or a warning light in the cockpit. There is normally a requirement to resume the original task after the interruption has been dealt with.

THE THREAT

Distractions and interruptions are a threat because they create demands on our cognitive systems that humans are not well designed to cope with. Distractions can be insidious and we are often unaware of the negative effect on our focus.

When presented with an interruption you must normally:

- make rapid judgments about which task to pursue;
- consider and act on limited information from a range of sources; and
- rely on memory for successful resumption of the original task.

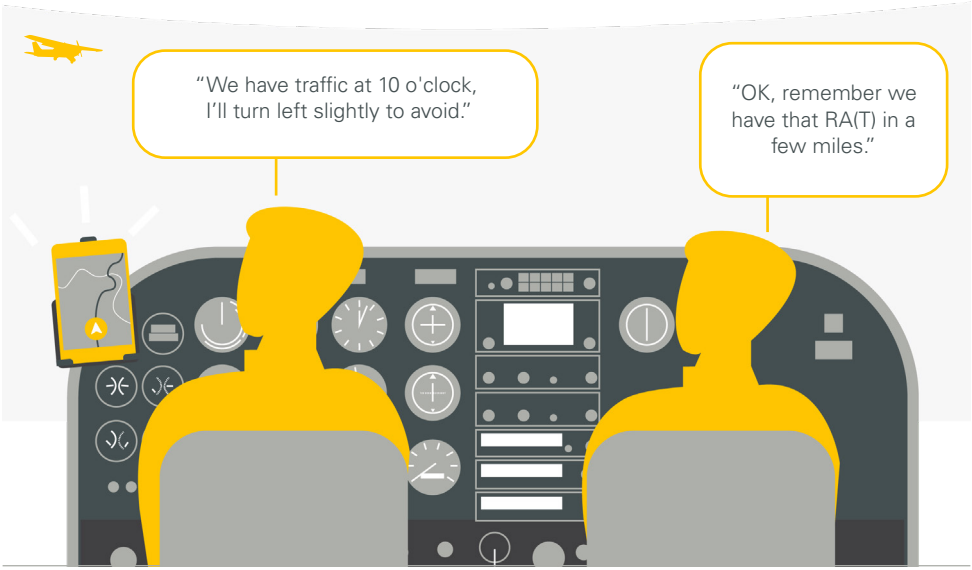
Having been interrupted, we may forget to resume interrupted tasks in a timely manner or even at all. The memory for intentions, known as the 'prospective memory', is how we recall the necessity to complete certain tasks in the future. However, this can be unreliable if an existing task requires a high level of mental capacity.

Often an interruption is so abrupt and salient that we do not consciously encode an intention to resume the interrupted task. In addition, we are not very good at multitasking and so must normally choose whether to continue with the original task or divert to the interrupting task.

After the interruption or distraction has passed, new task demands can then arise, which then further divert our attention from remembering that the original task has not been completed.

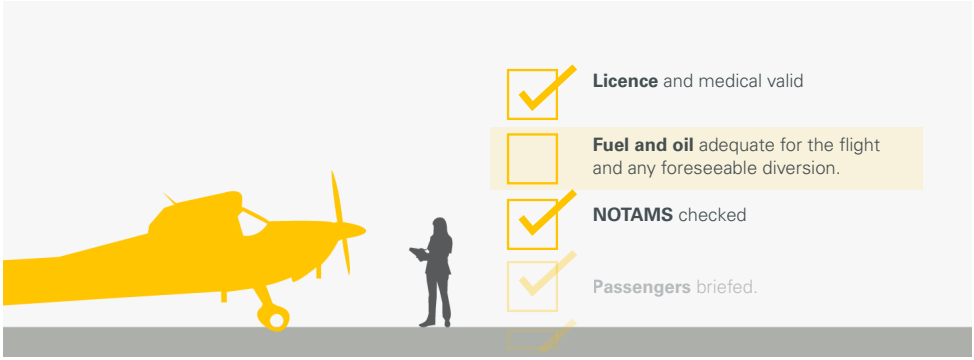
Even if we do remember to resume the original task, we may struggle to recall its exact status, making errors in completion more likely.

In a multi-crew environment, effective crew resource management (CRM) allows better management of interruptions. However, as a single pilot you are much more reliant on your own planning and memory, to ensure the flight is managed effectively.



PRACTICAL SCENARIOS

Pre-flight preparation



Effective preflight planning will make you more resilient to distractions and interruptions during the flight. Consider the specific threats and errors that may occur. It is also important to avoid distraction and interruption while conducting your flight planning activities.

Establish a routine for preflight planning. Allow adequate time to plan and prepare for the flight. More guidance is available in the Skyway Code and SSL 5: Flight Under VFR.

Particularly during the preflight check of the aircraft, remove as much distraction as possible. Treat interruptions, for example by passengers or ground staff, as red flags. Defer either the check or the interruption, do not attempt to deal with both simultaneously.

Case Study

During the preparation for a cargo flight, the pilot of a BN-2 Islander was engaged in a discussion regarding a company employee and whether they could be accommodated on the flight. The aircraft crashed shortly after take-off. The AAIB noted:

"The aileron gust lock was not removed prior to flight, resulting in loss of control after take-off. Distracted by efforts to accommodate a non-revenue passenger on this cargo flight, the pilot did not complete a pre-flight check or check the full and free motion of the flight controls before take-off."

Passengers

Passengers can be a major cause of distraction and interruption, particularly if they are unfamiliar with flying in light aircraft.

If taking several passengers on a flight, consider leaving them in a comfortable location away from the aircraft, while you focus on any fight planning activities or conduct the pre-flight inspection.

Bring them to the aircraft once you are ready and allow extra time to conduct a safety briefing.

During the flight, be conscious of when you engage with your passengers. Diverting attention to check passenger wellbeing or answer questions has been cited as a contributory factor in several airspace infringement events.

Common passenger related issues include:

- Feeling ill
- Wanting to see a particular landmark
- Conversations during critical phases of flight

Establish before the flight if there is any area or feature that they would be interested in seeing and build this into your pre-flight planning. Entering into discussion about the route and making ad hoc changes to your plan during the flight may lead to a higher workload and distraction, with the associated risk of navigational errors.

Whilst it is important to take good care of passengers, this must be balanced with the need to always be monitoring the flight path of the aircraft. More guidance is contained in SSL02: Care of Passengers in General Aviation Aircraft.

Case Study

A private pilot was keen to take a friend for their first flight. A previous flight had been cancelled due to poor weather. The pilot knew his friend was nervous and wanted to make the flight as enjoyable as possible.

While the weather was better on the day of the flight, it was a little turbulent and the pilot was concerned about how his passenger was feeling:

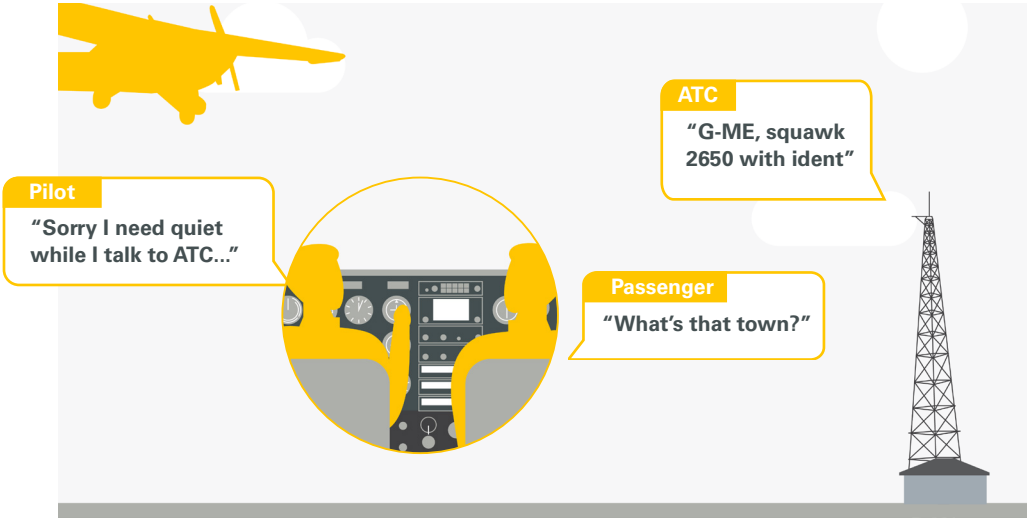
"…as we departed it was quite bumpy and I thought my passenger might be worried. There were some updrafts and I was concerned for his comfort…"

The pilot was experienced and very familiar with the airspace around the airfield. Shortly after take-off, the flight infringed controlled airspace vertically by 200 ft.

When asked as to why the infringement occurred, the pilot suggested the primarily factors were:

"A combination of the turbulence causing the aircraft to rise and fall quickly and having a passenger on their first flight, to whom I was devoting some attention. I've no doubt that if the passenger hadn't been there then I wouldn't have infringed. If I'm in a critical, sensitive phase of the flight, I should not be distracted".

Passengers - Continued



Some GA pilots may consider the sterile cockpit concept to be reserved for commercial air transport operations, but it is important to recognise that conversation is a powerful distractor. As part of your briefing to the passengers, explain the sterile cockpit rule and ask them not to talk or interrupt you during critical phases of flight such as take-off or landing, except in an emergency. Identify periods of the flight in which passenger interactions may prove too distracting and consider eliminating non-essential conversation, for example when navigating complex airspace.

Even when reassuring passengers, be conscious of the importance of your primary task, to aviate. While interacting with passengers, make a conscious effort to continue your lookout scan and monitor your VFR Moving Map device.

Case Study

The pilot of a PA-28 was approaching the Manchester Low-level Route (LLR) and advised the previous Air Traffic Service Unit that they were going to squawk 7366 and change to Manchester Radar on 118.580 MHz.

The frequency was selected and midway through the transponder selection the passenger asked a non-critical question; the pilot stopped what they were doing and answered. Upon restarting the action of selecting the correct squawk, they instead selected 7000 and therefore entered the LLR without being in compliance with procedures in lieu of a verbal ATC clearance. The pilot was interrupted at a critical stage of the flight.

‘Dropping’ the Aircraft

A sudden interruption or distraction may cause the pilot to ‘drop’ the aircraft, either through startle effect or an instinctive reaction to the perceived issue. Regardless of the situation, always verify and stabilise the aircraft’s attitude and flight path, before reacting to the interrupting factor. Focusing on the aircraft’s flight path will also reduce the effects of startle. Flight path deviations caused by interruption can be mitigated by ensuring that the correct power setting for the phase of flight is set and the aircraft is in trim.

Examples might include dropping a kneeboard or pen, or the door opening in flight. At low level, attempting to reach down into the footwell or close the door could have fatal consequences. Reduce the possibility of loose articles in the cockpit and be familiar with the appropriate actions for a door opening in flight. Always fly the aircraft.

Case Study

The Cessna Caravan was returning from a parachute drop. The aircraft landed hard and short of the runway threshold. The AAIB noted:

“During the final approach to land, the pilot became distracted when he attempted to retrieve his kneeboard, which had fallen off the right seat into the footwell while on the downwind leg. Upon looking up after recovering it, the pilot found the aircraft was at a very low height. He therefore initiated an abrupt pitch up to arrest the rate of descent. The aircraft touched down hard in the undershoot. The pilot suffered minor injuries and the aircraft was significantly damaged.”

Technical Interruptions

Interruption by complex technical difficulties is less common in general aviation than commercial air transport. However, GA pilots must still be cognisant of distractions such as cockpit warnings or interactions with the avionics or VFR Moving Map devices.

Interactions requiring prolonged 'heads down' inside the cockpit should be kept to a minimum and should be interspersed with verifying the aircraft's flight path and maintaining a lookout scan.

Common distractions might include:

- looking at charts or a VFR Moving Map device, or dealing with unfamiliar equipment;
- malfunction warning or abnormal system indication; or
- responding to other notifications or alarms, such as when approaching controlled airspace.

Technology in the cockpit can be very distracting, the effects of this will be reduced by knowing how to operate your devices correctly and doing most of the configuration on the ground. Know how to set functions such as airspace warnings or task reminders in a manner most optimal for the flight.

When presented with a cockpit warning, verify the indication and then confirm the aircraft's flight path is stable and correct. When a pilot fails to assimilate what the warning or interruption is telling them, their focus will tend to become trapped in diagnosis and discard other tasks, including monitoring of the flight path.

Maintaining a good knowledge of aircraft systems and non-normal or emergency procedures will allow you to deal with technical interruptions and distractions more effectively.

Case Study

A C172 landed heavily, damaging the aircraft. The AAIB noted:

"Soon after take-off a red warning light illuminated on the instrument panel. The pilot identified it as a STARTER warning light. When downwind the pilot realised he was too close to the runway. ATC informed the pilot that, as the wind was very light, he could land on any runway. On final approach the pilot realised he was too high and too fast. Believing he had an engine problem, he was reluctant to fly a go-around in case it aggravated the problem. He subsequently landed "extremely" heavily and bounced 2 or 3 times. After landing the pilot realised that he had misidentified the warning light. It was a Low Voltage warning light."

Searching for traffic

Looking out for other traffic is an important element of VFR flight. During the cruise phase of flight, maintaining a lookout should occupy most of a pilot's time. However, searching for conflicting aircraft has been identified as a factor in several loss of control accidents, airspace infringements and the omission of actions such as lowering the landing gear at the appropriate time. This often occurs near busy aerodromes, where high cockpit workload can be compounded by the distraction of other traffic.

Case Study

The pilot of an aircraft had departed the ATZ and was 8 NM east of the aerodrome when they became aware of traffic inbound to the aerodrome; whilst searching for the traffic the pilot became distracted and did not level off at the planned altitude of 1,300 ft. The subsequent climb took the aircraft 400 ft vertically into the CTA above. The pilot was not using a VFR Moving Map or Electronic Conspicuity device to assist in their situational awareness. In reviewing the occurrence, the CAA noted that the unknown traffic posed no risk and the aircraft passed each other with a lateral separation of at least 2 NM.

Whilst searching for other aircraft in the circuit is important, after a while you must interrupt your search and return to verifying the aircraft's flight path and conduct any applicable pre-landing checks. Carefully planning your arrival, knowing the aerodrome procedures and making radio contact in good time will all reduce the likelihood of being distracted by other traffic at a critical point.

Case Study

The pilot of a Zenair Zodiac lost control in the circuit. The AAIB noted:

"During an overhead join, the pilot became distracted by other traffic in the circuit. While he manoeuvred his aircraft to ensure safe separation with the other aircraft, the airspeed decayed to a point where the left wing dropped, and the aircraft entered a steep nose-down turn or incipient spin. The aircraft struck the ground in a level attitude and the pilot was uninjured."

Air traffic control

ATC calls at inconvenient moments are a classic interruption in flying. Air traffic controllers do not know what is going on in the cockpit when transmitting a message and it is important to manage the impact of radio calls such that they do not divert you from flying the aircraft. When you receive a question or instruction from ATC, quickly assimilate how time critical it is and how disruptive responding may be.

An instruction to change flight path must normally be responded to and acted on immediately, but if for example ATC ask you for an ETA that is some time in the future, do not be afraid to respond with 'standby' if the answer is not immediately available.

'Standby' is preferable to giving an uncertain response or trying to work out the answer before responding – this will only cause ATC to call again. If the question requires some calculation or discussion, finish or consciously delay other tasks before determining the answer.

Personal issues

Issues such as illness or stress represent a significant human factor in many incidents and accidents. Often incidents involve behaviour or omissions thought uncharacteristic of the individual involved- for example taking an apparently rash decision or forgetting a vital action. Normally conscientious pilots can be affected by external factors and experience a loss of cognitive performance.

Such issues may be a general distraction during the flight and have the effect of reducing mental capacity. The mind of the pilot may also drift from the task in hand, which will reduce the effectiveness of the prospective memory.

For GA pilots, a degree of self-awareness is necessary. In times of personal upset or stress it may be prudent to refrain from flying or take mitigations such as reducing the complexity of your flights or flying with another pilot. Building in margins of free time around your flying plans will also assist with transitioning to the correct mindset and remove the distraction of time pressure.

Stress

fatigue

Anger

MITIGATION STRATEGIES

Be aware

Research suggests that the disruptive effects of distractions and interruptions can be reduced by making us aware of our vulnerability to them.

Distractions and interruptions may be subtle and insidious. We are usually aware when we have been interrupted, but distractions often creep up on us without obvious warning.

How to react

Treat all distractions and interruptions as red flags. Having been distracted or interrupted, we need to ensure other critical tasks are not neglected while the matter is dealt with. We then need to return our attention to the original task or area of focus.

This often does not happen because:

- You forget to resume the original task; or
- A further task now requires our attention.

When you become aware of a distraction or interruption positively identify it as such and:

- Pause before responding and avoid rushing unless it is critical to do so;
- Assess the priority of the interruption and what other tasks should be suspended or modified. For a distraction, assess how to mitigate it;
- Make a mental note to return to the same place before the distraction or interruption, verbalising the intention may help make it stick;
- Specifically make a note when the distracting task finishes, thereby providing a cue to return to the original task; and
- During longer interruptions, multitasking may be necessary to ensure other core tasks are not neglected, such as maintaining a visual lookout.

It is vital to delineate the end of the distraction or interrupting task as a cue to resume the interrupted task and recover situational awareness:

- What was I doing?
- Where was I interrupted?
- What do I need to do to get back on track?

DISTRACTION AND INTERRUPTION - IN GENERAL AVIATION OPERATIONS

Managing multitasking

Flying will always require a degree of multitasking, however it is not a natural human strength. The necessity for multitasking can normally be reduced by better planning and prioritisation.

The brain cannot truly divide its conscious focus, however it is possible for some basic tasks to be performed subconsciously while other more conscious tasks are completed. For example, a proficient pilot will be able to simultaneously maintain the aircraft's flight path while holding a conversation with a passenger, but would find it very difficult to adjust a setting on a VFR Moving Map device while also making a complex radio transmission.

When attempting more than one complex task at a time, what is happening is a switching of focus between tasks back and forth, something that the human brain is not always very effective at doing. The switching of focus can be improved with practice and discipline, but less current pilots will struggle with multitasking efficiently.

Even tasks that may be subconscious, such as maintaining the aircraft's attitude, do require some sensory input, such as looking at the horizon. As the complexity of the task rises, more conscious attention will be needed to complete it; for example, in heavy turbulence maintaining straight and level may require almost the entirety of our focus, with very little mental capacity for anything else. In such situations of high workload, distractions and interruptions can be very destabilising.

As part of your Threat and Error Management, identify periods of high workload during the flight in which distractions and interruptions are likely to be more disruptive. Reduce the necessity to engage in ancillary tasks during these periods. For example, consider when you will need to climb or descend, engage with ATC or navigate complex airspace.

Use quieter periods of the flight to conduct items that are easily forgotten such as 'FREDA' checks or tasks such as updating avionics or the VFR Moving Map device.

Unanticipated interruptions may force you to engage in multitasking, but better management of foreseeable tasks will make you more resilient to this.

Managing checklists

Simple but crucial tasks such as changing fuel tanks, applying the carburettor heat or lowering the landing gear are often forgotten when a more arresting interruption or distraction suddenly presents itself.

If the distraction or interruption occurs during a written checklist, for example ATC asking you to move while you are doing pre-departure checks, keep hold of the checklist and place a finger at the point where the disruption occurred. If unsure, start the checklist again.

Unless it is critical to immediately respond to an interruption, it is normally better to complete shorter checklists before diverting your attention – for example the landing or 'joining' checklist for most GA aircraft is normally short and may be completed from memory. Doing so will reduce the likelihood of items, such as fuel system configuration, being forgotten after your attention has been diverted.

If interrupted during a longer check, return to the start of the item you were engaged in at the time of the interruption. After longer or more disruptive interruptions, running a 'FREDA' check may be appropriate to ensure no essential routine tasks have been forgotten. Good practice also includes setting timers or identifying points in the flight at which you will check certain items or conduct a general cruise check.

Lessons from commercial air transport

Aircraft configuration errors are a major threat in commercial air transport operations; for example, not setting the flaps correctly for takeoff will likely have fatal consequences. In response to this threat, standard operating procedures and checklists have been continuously improved.

Accidents such as the one below prompted a widespread procedural change in airline checklists – most operators now specify that the flaps and other critical items such as the pressurisation system should be checked as part of the 'pre-taxi' checklist. The logic being that while the aircraft is stationary, interruption or distraction is less likely. Whilst this arrangement is not infallible, it has reduced the number of accidents caused by aircraft configuration errors.

Case Study

In August 1988 a Boeing 727 was moving slowly in a long taxi queue for departure from Dallas-Fort Worth, Texas. While the crew were running the checklists the air traffic controller unexpectedly told them to move up past another aircraft to the runway, and 30 seconds later cleared them for take-off. The crew rushed to complete preparations for take-off, and omitted to set the flaps and slats. Unfortunately, the configuration warning system, which should have alerted the crew that the aircraft was not properly configured, was not operative at the time. The aircraft stalled shortly after lift-off, crashing beyond the end of the runway.

Interruption of checks - Continued

Experience in commercial air transport operations has shown that in situations of high pressure and distraction, the quality of focus on tasks may reduce – for example a pilot may respond to a checklist challenge 'Flaps' with 'Set' or call out the normal flap setting, without verifying the actual position of the flaps.

Whilst in General Aviation aircraft the consequences are not normally as severe, checklist and procedural discipline are nonetheless important for avoiding errors and omissions in the configuration of the aircraft or avionics.

Case Study

An aircraft was at the runway holding point for some time awaiting departure during a busy flying flying day at the airfield; landing light and strobes were switched off and the transponder was set to Standby. The pilot identified a gap between the landing traffic and decided that there was sufficient time for an expeditious departure. In their haste to depart, the pilot was distracted from completing pre-departure checks and did not select the transponder to ALT. They entered the Transponder Mandatory Zone (TMZ) above the aerodrome without the aircraft's transponder being active. Other safety critical items in the pre-departure checks could also have been omitted.

Another common scenario is distraction in the aerodrome circuit and failure to complete a landing checklist. In an aircraft with retractable landing gear, this often results in landing with the gear up. Consider the point at which you will lower the landing gear and make an additional check once on final approach. For example, if you anticipate the circuit being very busy, it may be advisable to complete the landing checklist prior to circuit entry.

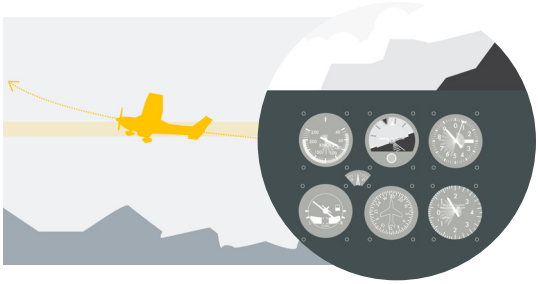
Case Study

The pilot of a Piper PA28R failed to lower the landing gear prior to landing. The AAIB noted:

" Whilst on the downwind leg the pilot became distracted by a lower-level helicopter that appeared to be joining the circuit directly on the base leg. This led to an interruption in his pre-landing checks, before the landing gear would have been lowered. The landing gear remained retracted, and the aircraft landed gear-up."

Verify your flightpath

Unanticipated distractions and interruptions will likely occur at some point during a flight. Every situation is different but particularly in the single pilot environment, no matter what the distraction or interruption may be, verification of the aircraft's flightpath must always take place with the appropriate frequency.



Summary

Some common GA related issues and how to deal with them:

Passengers
Manage them both on the ground and in the air.

ATC
Do not be afraid to say 'standby'. Do not drop the aircraft to fly the radio.

Fly the aircraft
Whatever the situation, return your focus to the aircraft's flightpath at regular intervals.

Prepare
Effective preflight preparation and threat and error management will make you more resilient to distraction. Anticipate distractions as much as possible both on the ground and in the air.

Checklist discipline
Consider how to make best use of checklists.

Threat and Error Management
Use TEM to anticipate high workload, distractions and interruptions during the flight. Plan essential tasks to minimise the risk of errors.