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### **1 INTRODUCTION**

A CAA study examined 166 fatal accidents to UK light aircraft. That review was published as [CAP 667](#) 'Review of General Aviation Fatal Accidents 1985–1994', and this highlights some of the points made. Most accidents are the result of the pilot's actions. This includes their skill level and, most important of all, **the decisions that they make**. This leaflet details some of the factors that can affect how the pilot's decisions do – or don't – keep the aircraft in one piece and the occupants safe.

### **2 TO GO OR NOT TO GO**

#### **a) Weather**

Probably the single most important factor in General Aviation flight safety is the decision of a pilot to begin, or continue, a flight in unsuitable weather conditions. As one might expect, weather was a major factor in fatal accidents: over 80% of Controlled Flight Into Terrain (CFIT)

accidents happened when the pilot either continued flying into adverse weather, or did not appreciate the actual effects of the weather conditions. Of those pilots who lost control in Instrument Meteorological Conditions (IMC), only one had an Instrument Rating.

Crosswind landings seldom result in fatalities, but they still feature in many accidents resulting in broken aircraft and painful injuries.

Weather does not stay constant, it doesn't always do what the forecast predicts, and it can deteriorate very fast. Respect the weather, and the implications for flight safety. That doesn't just mean **other** less experienced people who can't fly so well are the ones who should respect the weather; it means **you**.

The European GA Safety Team has published a useful '[Weather Anticipation](#)' leaflet on their website: [www.easa.europa.eu/essi/egast](http://www.easa.europa.eu/essi/egast).

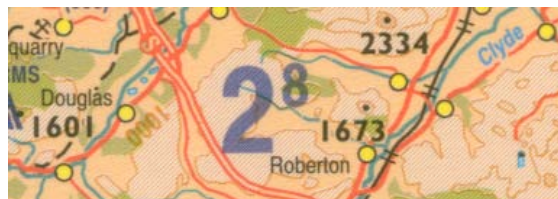
## b) I Can't Turn Back Now!

Weather can, and will, change en-route. It is essential that the pilot is prepared and willing to divert or turn back if conditions deteriorate. It does not reflect badly on your ability as a pilot if you turn back in poor weather. In fact, it reflects **good judgement and realistic assessment of the situation**. It is also important that diverting is feasible in practical terms. Have you got enough fuel, money to get home, or pay for a hotel? Have you promised to be somewhere important? **Never** put yourself in a position where you would not feel able and willing to turn back if necessary. No Monday job is worth dying for on a Sunday, so carry your driving licence and credit card.

The decision to turn back will be made easier if you have decided in advance what your **minimum VFR flying altitude** should be. It also helps if you have practised flying the relevant manoeuvres **on instruments**, for example: a 180° turn and if necessary climb to a higher Minimum Safe Altitude (MSA).

## c) Chain of Events

In aviation accidents, it is common to find a chain of events where one shortcut or poor judgement leads to another. For example, the apparent 'cause' of an accident may be that the pilot has attempted a landing in marginal weather conditions, has not diverted or turned back despite reducing visibility, or has descended below MSA to try to establish their position. Consider why they chose to do this – was it really an isolated bad judgement, or could they have been short of fuel due to poor planning and lack of contingency time?



A simple way to calculate MSA is to add 1,000 feet to the Maximum Elevation Figure (MEF) in the relevant chart lat/long square. Remember that good planning, proper use of forecasts, awareness of terrain features en route and relevant safety altitudes are not just good practice – they save lives.

## d) But I've Done it Before!

Why do some highly experienced pilots believe that they can safely fly in marginal conditions, ignore their MSA, or attempt extreme aircraft manoeuvres? One reason could be that either they, or others that they know, have done it before and 'got away with it'. This may well be true, but it certainly does not prove that it is safe. Imagine if your son or daughter tried to convince you that it was quite safe for them to cross a busy road blindfolded, because they did it yesterday, and survived? What would you say to them?

## e) But I know someone else who does it!

People vary in all kinds of ways: experience, concentration, skill, how they are feeling on a certain day, how much sleep they had, how much sleep they need, the after effects of recent illness, and their personal or domestic circumstances. If someone else, on a particular day, can land in a marginal crosswind, it does not mean that you can necessarily do the same. The fact that **you** can does not mean that you should encourage **someone else** to do the same.

Being a competent pilot means correctly assessing your own limitations on a particular occasion. It does not mean pretending that if someone can do it, then everyone can do it every time; or that if someone else is doing it, that necessarily makes it safe or wise.

#### f) Exercising Sound Judgement

Pilots enjoy a great deal of freedom. Regulatory authorities place a great deal of trust in the pilot to exercise competent judgement concerning flight safety. Qualified pilots are thought to be capable of making responsible decisions about whether it is safe to fly, taking into account their experience level, aircraft type, location, personal physical and emotional state, and prevailing or expected weather conditions. There are two serious threats to the use of this judgement: the pilot may have an excessively optimistic view of the situation or of his own ability; or he may be persuaded by other people to proceed with a flight **against his better judgement**. How can this happen?

#### g) But You Promised!

Never promise to fly on a certain day, or to be somewhere important if you can only get there by flying. If it really is important to be there, leave yourself time for alternative surface transport. Tell friends or relations that you **may** be able to take them flying **weather permitting**. Better still, keep it as a 'surprise', decide on the day if you feel prepared and fit, the weather is fine, and the aircraft is serviceable, and offer to take them flying. They won't know you had to book the aircraft a month in advance. It is

always disappointing to cancel a flight if non-aviator people, especially children, are looking forward to the trip. This is particularly true if the reasons are not easy for them to understand.

#### h) Peer Pressure

There will always be people who will pressure you in subtle ways to take risks that you don't feel comfortable with. They can be prevalent in clubrooms, asking you if you flew on a certain windy day, and smiling smugly if you say that you cancelled whilst they braved the crosswind, low cloud or lack of horizon. "*You diverted? What an idiot! I'd have carried on and got there...*". Perhaps they would; alternatively they might have carried on and **not** got there. Perhaps they are just full of bravado and wouldn't have carried on at all. Perhaps they have more experience, a better-equipped aircraft, or suicidal tendencies. It doesn't really matter. The fact is that the world of aviation relies on competent and independent pilot judgement, and the pilot is **you**. If you are swayed by clubhouse buffoons, then you are more afraid of their dubious opinions than of your own death or, more importantly, the safety of your passengers. If this applies to you, you may not have the character that is expected of a pilot licence holder.

#### i) Audiences: are you impressing anyone?

In the review of fatal accidents, more than half of the low flying and aerobatic accidents involved an 'audience' – seldom at a formal air show, but more often to impress friends on the ground, at the

clubhouse, or even passengers taken for a flight. The temptation to 'show off', to impress those watching, proved fatal in too many cases. (In fact, the 'audience' are not necessarily filled with admiration while watching these antics. They may simply be wondering when the accident will happen, and what this person is doing with a licence.) Before you decide to take such a risk, ask yourself: *would the people who are watching be prepared to risk their lives to impress you? What would you think of them if they were?*



*Are you impressing anyone?*

#### **j) Joint Decisions**

A joint decision made by a group of like-minded people is usually more extreme than the decision that any one of them, alone, would have made. Pilots tend to be, by their nature, fairly adventurous individuals who are willing to face a certain amount of risk in order to pursue their activities. Beware of the committee decision: 'we'll give it a go!'

### **3 DIFFERENT RISKS FOR DIFFERENT PEOPLE**

#### **a) Age Groups**

The review of fatal accidents suggested that the risks for young pilots were a little different from those of more mature years. Young pilots – especially young male pilots – sometimes took quite unnecessary risks in terms of low flying and

aerobatic manoeuvres, often in front of friends or others watching (see 'Audiences' above). Older pilots seem less tempted to perform spectacular or risky manoeuvres, but they may take a different kind of risk. Pilots who fly into terrain, under full control of their aircraft and without any significant technical failures are, on average, older than pilots involved in other kinds of fatal accident. Typically, these pilots continued flying into adverse weather conditions, and/or ignored their MSA (if indeed one had been calculated).

#### **b) Total Experience Level**

Pilots involved in the fatal low flying and aerobatics accidents are usually highly experienced. Perhaps they believe that because of their very high hours, they can fly safely in these very unforgiving regimes. Pilots in fatal CFIT accidents are also typically very experienced. Again, they may believe that their long experience might allow them to fly safely in conditions that others are advised to avoid. If this thought ever enters your mind, remember that all of those highly experienced pilots in the fatal accident reports also thought that '**it would be all right**'.

Pilots with low flying hours may be vulnerable to a different kind of accident. Those with very low hours feature less in the accident reports than those with 200–500 hours. The latter group seem to be more likely to lose control of the aircraft during visual conditions. This is probably not very surprising, given that these pilots are still quite inexperienced, and may be moving for the first time toward some slightly more ambitious flying.

### c) Use It or Lose It

Recency may also be a safety issue; the fact that you could do something perfectly six weeks ago does not mean you can immediately do it now. A skill is like a message written in chalk on an outdoor wall – **it gets eroded a little every day**. If the writing is retraced repeatedly it will become more enduring. Even then, it will be eroded eventually if it is not periodically refreshed. Skills are refreshed via practice, annual or recency checks or post-qualification training.

## 4 ONLY HUMAN

### a) Trust Me, I'm a Pilot

Despite what some people may think, pilots have normal human limitations. The fact that pilots are trained, experienced and competent, does not mean that they will always perform perfectly; that they will never experience an 'off day', overload, illusions or distorted perceptions; or that they will never make a mistake. Everyone recognises that physical parts of the aircraft have a certain expected failure rate, and this is (correctly) seen as a realistic, normal performance level. Human pilots also have a 'realistic' performance failure rate, and it is **not** zero.

### b) To Err is Human

One characteristic of human beings is that **we all make mistakes**, no matter how well trained, competent, careful, or skilled we may be. **Nobody** is immune from errors, and the person who imagines that they are infallible is the most dangerous of all.

There are two general classes of error:

- 'slips and lapses' include 'finger trouble', errors in data entry or recording (such as writing down the wrong digits), or not noticing that an instrument reading has changed; and
- 'mistakes' refer to actions that the pilot makes intentionally, and executes correctly, but they turn out to be a bad plan.

In general, mistakes are more easily reduced by training, but they still can and do happen. The important thing is to recognise and rectify mistakes – and to learn from them. Slips and lapses can happen to anyone and are, if anything, more likely in highly skilled, experienced people.

### c) Believing is Seeing

There are well-known optical illusions that can affect pilots' judgement, e.g. height perception when approaching sloping runways. In other circumstances, there can be a mental distortion that is nothing to do with visual illusions as such, but can be just as dangerous. Human beings are selective about what they 'see'. If a person believes something to be true, then they will tend to 'see' only those cues in the environment that are consistent with that belief, treating these as positive confirmation that the belief is correct, and 'not see', 'blot out' or ignore any evidence to the contrary.

Unfortunately, pilots are no exception to this rule. If a pilot has formed the belief that he is at a certain geographic location, then his mind may try to organise whatever cues are present in a manner that will

confirm this belief. This means that conscious cross-checks to look for differences to expectation are critically important, and frequently a feature of aviation procedures. This principle can even apply to the expectation that instruments should be showing a certain reading, or hearing an ATC clearance that is expected or usual. It is vital that instruments are actually read and messages are really listened to, with at least some anticipation that they may **not** say what you expected. It is difficult for anyone to accept this about themselves, especially if they are highly technically qualified and experienced. Believe it: if you are human, this **does** apply to you.

#### d) Stress

Stress is a familiar feeling to most people. When people are stressed, their judgement can be affected, and their thinking may be unclear. They may suffer from 'tunnel' thinking, concentrating on (or over-reacting to) one particular problem to the exclusion of all else. This is dangerous. If there is a problem in flight, **the pilot's first priority must be safe flight**. Attention to a faulty radio, airsick passenger or navigation problem **must** be a secondary task. If you are feeling stressed before a flight, consider whether you should cancel. If you can foresee a period of high workload during the flight, rehearse it mentally, prepare as much as possible ahead of time and, above all, remember that your first priority at all times is to **fly the aircraft**.

## 5 ONLY A MACHINE

### a) Trust Me, I'm Electronic



*A deteriorating situation*

Just as human beings can make errors, mechanical and electronic devices can also be faulty. THINK about what your instruments should say – do a mental 'reality check'. Always cross-check with a second source (e.g. landmarks in the outside view) if possible. Change – especially movement – attracts attention from our senses, but a static condition, or a very slow rate of change, is more likely to go unnoticed. It is important to check all instruments regularly - never think that your attention will automatically be drawn to a deteriorating situation. If your fuel gauge is stuck on full, the needle will remain steady, although actual fuel levels will be dropping. There will be no rapid movement or change to attract your attention.

### b) Electricity

You may have electric flight instruments, or even engine controls. Know your own system, and if the generator fails be ready to follow the Flight Manual drills, which probably include landing as soon as practicable.

A blown fuse or popped circuit breaker is protecting you and your aircraft. If you need the service and the rating is low, only try one reset, but allow adequate cooling time.

### c) GPS



GPS is a common accessory for GA pilots. It can be tremendously helpful at times and is probably an overall safety 'plus'. However, a few words of caution (see *SafetySense leaflet 25 – use of GPS*):

- **Never** use GPS as your primary means of navigation.
- **Never** use it to land in poor visibility (and that means you too, helicopter pilots!)
- **Never** spend time head down, fiddling with GPS, and ignoring the outside world.
- **Never** believe GPS data without question. It is NOT infallible and it CAN go wrong.
- **Never** fly in conditions that you would normally avoid, because you believe GPS will reduce the risk and get you there safely.

## 6 HOW ACCIDENTS HAPPEN

### COMMON SCENARIOS IN A CAA REVIEW:

#### a) Controlled Flight Into Terrain



In a controlled flight into terrain (CFIT) accident the pilot does not lose control, and the aircraft has not failed. They simply fly into the ground, often hills or mountains. The

pilots who had fatal CFIT accidents were typically over fifty years old, and very experienced. More than a third were flying in their home base local area, and accidents were not restricted to mountainous regions. Of all CFIT accidents, 82% included unwise reaction to weather conditions (such as continuing to fly into worsening weather) and 64% had not adhered to their MSA (if they had calculated one at all), trying to get 'below the weather', or hoping to confirm their position. More than a third found out too late that they had made an error in navigation.

#### b) Loss of Control in VMC



Loss of control in visual meteorological conditions (VMC) is almost as common as CFIT. In the accident review, it was noticed that many of these loss of control accidents involved an unfamiliar situation, a distraction or a minor technical failure. The inexperienced pilot was probably coping quite well, until they were overloaded by some unforeseen event. This is probably difficult to avoid, but it is worth rehearsing – even mentally – exactly what you would do if you had a technical failure, or encountered a distraction. Also, remember that if the flight you have planned is going to require 100% of your current skill capacity to cope with it, then you won't have anything left in reserve for unplanned or unusual events that crop up.

### c) Low Flying/Aerobatic

Highly experienced young male pilots (often with an informal audience) who fly low and perform aerobatics without adequate height are putting themselves and others at risk. Accidents are not unusual in these circumstances.

### d) Loss of Control in IMC



More than three quarters of the pilots killed when they lost control in IMC were flying in instrument conditions without an instrument qualification. Disorientation can affect anyone, particularly those who have not been adequately trained to fly on instruments, **and kept in practice**. It is important to be able to see and recognise cloud ahead early enough to avoid it safely. Even an IMC rating does not impart sufficient skill for prolonged, intentional flight in instrument conditions. Unless you are in regular instrument flying practice it should only be regarded as a **minimum skill** to 'get out of trouble' if an unintentional excursion into IMC occurs.

And finally, the bottom line is:

**Don't gamble; safe flying is ENJOYABLE flying.**

## **7 SUMMARY**

Most pilots want to enjoy the freedom to fly when, where and how they want to, whilst maintaining safety for themselves and others. The way to achieve and sustain this situation is to:

- **be realistic about the weather;**
- **work out a Minimum Safe Altitude (MSA) and keep to it;**
- **use your judgement responsibly, don't be pressurised to fly;**
- **know your own limitations;**
- **prepare thoroughly:**
  - \* **allow for contingency**
  - \* **have enough fuel**
  - \* **be prepared to divert;**
- **rehearse possible 'situations';**
- **use good practice in your planning and flying; and**
- **not take unnecessary risks.**

This will avoid the need for additional regulations and restrictions, and give you safe, enjoyable flying.