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## The problem with Threats and Errors

While threats can be predicted, errors can creep up on you



**Steve Forward**  
Director (Aviation)

**Everyone's talking about Threat and Error Management (TEM) these days but what's it all about and how do we do it? Put simply, TEM is all about thinking ahead and anticipating what might go wrong. To cut a long story short, threats (and hazards) are the adverse things that might come along and bite you on the bum as you go about the business of aviation, whilst errors (and mistakes) are the things that you yourself might do wrong for any multitude of reasons.**

Threats can often be predicted if thought about enough (e.g. weather, busy airspace, poor aircraft performance) but errors can creep up on you from seemingly nowhere as part of the human condition where we can all get distracted, make mistakes, miss vital information or lose capacity and situational awareness for any number of human factors reasons.

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Figure 1: The Human Factors 'Dirty Dozen'

Threats are often situation-dependent in that certain things apply to certain flight regimes, but some are universal to all elements of flying and that's why we spend so much time training ourselves to be situationally aware of the aircraft and our surroundings. Some threats are latent and unpredictable, (e.g. a worn engine component that's about to fail or an equipment design feature or fault that you might not have seen before), and some are a real and present danger that can be anticipated (e.g. that deteriorating weather forecast that we're flying towards).

It's impossible to list all the threats in aviation because the list is pretty much limited only by your imagination (but if you want to look into threats and hazards further then there's a thing called 'bow-tie' analysis that safety experts often use to review safety risks in particular areas – see the CAA website link [here](#)).

The key thing to do for day-to-day operations is to think about the likelihood of things that might conceivably happen to you and the aircraft and then form a contingencies plan that allows you to either deal with them or avoid them all together. In risk management theory this is framed in what's called the four Ts of **Treat** – do something to reduce the effect of the threat'; **Tolerate** – accept the threat is there but have a plan to deal with it if it occurs'; **Terminate** – stop doing what you're doing or were planning to do if the threat is too great'; and **Transfer** – get someone else to deal with the threat if you can't!.

A good old 'what if' session will reveal what's important to your flight on that day by focusing on the existential things like keeping control of the aircraft; having enough fuel to fly; having options to land somewhere safely; keeping out of controlled airspace; avoiding other aircraft; and having a contingencies plan for what you might do if there are technical issues/emergencies such as if the engine stops at any stage.

As I mentioned previously, errors are somewhat more difficult to anticipate and are influenced by a whole host of things such as personal circumstances, mood, competences,

distractions, capacity, arousal levels and task saturation that all influence our decision making capabilities and proneness to making mistakes and errors. For the purists, a mistake is doing the wrong thing by accident, whilst an error is doing the wrong thing due to lack of knowledge – for most of us the distinction is academic, you still get the wrong outcome!

One thing that can help in identifying where we might make mistakes/errors is to think about human factors systematically and, at CHIRP, we have started to use the 'Dirty Dozen' as a way of characterising where we might 'fail' as humans on a day-to-day basis as we go about our flying activities. An honest and ongoing appraisal of these 12 aspects can go a long way to identifying areas of our personal weakness or susceptibility to making mistakes/errors.

In this edition we've started to experiment with giving our thoughts on relevant Dirty Dozen aspects for each report. These are intended to provoke discussion about what to think about in similar circumstances and are not intended as a critique of the performance of those actually involved. It's a work in progress so we welcome your thoughts as we try to introduce this without being judgemental of individuals.

TEM can be equated to 'good airmanship' in many respects; both are about thinking ahead and anticipating events rather than being reactive. As it says in the very last sentence of CAA Safety Sense Leaflet 1e '[Good Airmanship](#)', *"Pilots exercising GOOD AIRMANSHIP never sit there 'doing nothing', they always think 15 to 20 miles ahead"*; we could just as easily substitute 'GOOD TEM' for 'GOOD AIRMANSHIP' in the above, both when we're airborne and when we're planning the flight. And as a final thought, TEM doesn't end when you get out of the aircraft after the flight; take some time to honestly review your flight and your performance, and feed any lessons into your TEM assessment for the next flight so that you continuously improve your TEM awareness (and tell CHIRP if you have some lessons that you'd like others to benefit from when things didn't quite go as planned/hoped!).

**ILAFFT  
OMG**

Your recent ILAFFT about weight triggered a memory from the past that forever has left me very careful about weight and performance.

I had a share in a PA-28 Cherokee Archer 181, which I was told would 'carry anything'. Came a big adventure, I flew three well-fed priests from Blackpool to Tarbes-Lourdes for their Lourdes pilgrimage. Three days later, the amazing amount of luggage that piled into the Archer hardly registered. So there I sat at the northern end of the 3000m runway, full fuel, three fat priests and me at 15 stones(ish), waiting 5 minutes after a large commercial departed from the other end - I was far too clever to get caught in wake turbulence on that calm day.

The altitude (1300ft), temperature (25 degrees) and wind (calm) caused no thought for me; well, 3km of runway, where was the problem? Off I went, lift-off no problem, but then...absolutely dismal climb rate, any faster than 70kt and we barely climbed at all. I then became acutely aware of the Pyrenees mountains five miles ahead. Suddenly to the front of my mind, in large letters, came 'Hot, High, Wind, Weight, Stall, Spin'. I did not dare risk more than about 5 degrees of bank, terrified of a stall, and the Archer came round, oh, so slowly. I actually considered putting it down on whatever was in front rather than stall-spin. It eventually came round

with about a mile to spare, and very slowly climbed to the north over flat countryside.

It turned out that the priests had all bought several cast-iron statuettes to add to what was probably an already overloaded aeroplane. And to complete my feeling of incompetence, it eventually dawned on me that I could just as easily have taken off from the other end, heading into flat terrain. But then I wouldn't have learned as much...

**Dirty Dozen Human Factors**

CHIRP does not conduct detailed investigations into reports and so, although we do contact those associated with an event to try to gain as much understanding of the relevant background whenever we can, we are well aware that we may not have all of the information or context that might be applicable to a particular event. As such, CHIRP does not make definitive judgements as to any Human Factors aspects that may or may not have applied, and we do not associate any such assessments to individuals' performances. However, in order to provide food for thought when considering aspects that might be pertinent in similar circumstances, we offer our thoughts on the 'Dirty Dozen' Human Factors elements that were a key part of our discussions about individual reports. Individual reports now show these thoughts at the end of the CHIRP Comment.

The current CHIRP 'Dirty Dozen' taxonomy is as in the table below.

| Dirty Dozen Title    | Descriptor  | TEM           |
|----------------------|---|---------------|
| <b>Stress</b>        | Feeling anxious or threatened by overbearing influences                 | <b>Threat</b> |
| <b>Fatigue</b>       | Extreme tiredness from prolonged activity                               | <b>Threat</b> |
| <b>Pressure</b>      | Compulsion or anxiety to satisfy demands                                | <b>Threat</b> |
| <b>Resources</b>     | Lack of sufficient/suitable means for the task                          | <b>Threat</b> |
| <b>Distraction</b>   | Attention diverted from task by external factors                        | <b>Threat</b> |
|                      | Attention diverted from task by internal mis-prioritisation             | <b>Error</b>  |
| <b>Awareness</b>     | Inputs not available  | <b>Threat</b> |
|                      | Inputs not assimilated or sought  | <b>Error</b>  |
| <b>Knowledge</b>     | Information not available   | <b>Threat</b> |
|                      | Information not obtained or understood                                  | <b>Error</b>  |
| <b>Communication</b> | Information flow or misunderstanding from others                        | <b>Threat</b> |
|                      | Information flow or misunderstanding to others                          | <b>Error</b>  |
| <b>Teamwork</b>      | Effectiveness of others   | <b>Threat</b> |
|                      | Effectiveness to others   | <b>Error</b>  |
| <b>Assertiveness</b> | Indecisive, diffident or incurious                                      | <b>Error</b>  |
| <b>Complacency</b>   | Disregard for risks, over-assumption of ability or habitual behaviour   | <b>Error</b>  |
| <b>Deviation</b>     | Normalisation of divergence from formal procedures or taking short-cuts | <b>Error</b>  |

# REPORTS

## Report No.1 – GA1312 – Obstructed Trim Controls

**Report text:** Immediately following rotation, the aircraft [an EV97] continued to pitch upward rapidly. Significant forward control inputs were required to keep the aircraft within flight envelope. Pre-flight checks indicated no obstructions or issues with trim control. In addressing the issue, it was found that the passenger seatbelt had become entangled in the trim control lever during boarding, but only compromised the control when the passenger moved during the take-off sequence. This pulled the elevator trim to its maximum deflection, forcing a significant nose up movement. The seatbelt adjuster was jammed in the trim groove and required significant force to remove. Following removal of the seatbelt from the trim control, the aircraft did not exhibit any unusual control movements and the flight continued without incident.

During pre-flight checks, the trim displayed no issues and on visual inspection it was not immediately obvious that the passenger seatbelt was fouling the controls. A physical check of seatbelts is now included in the pre-flight checks, as well as increased consideration of the trim movement. I understand that the EV97 trim is known by the CAA, or at least by AAIB - they've flagged it to owners a few times as being powerful if inadvertently hit, and they suspect but cannot prove that it was contributory to some loss of control incidents. I haven't read any reports before of the seatbelt obstructing the mechanism. The trim lever is located between the seats, in the same area the seatbelt hard connections are located.

**CHIRP Comment:** Trim 'runaway' is not one of those things that everyone thinks about when they run through their contingencies brief prior to take-off, and it's certainly a salutary lesson for us all. Startle-factor might be an issue if something like that happens but we should always be ready for things to go wrong as we get airborne, and one of those things could be control force issues. In such circumstances, holding the aircraft attitude steady against adverse control inputs whilst getting away from the ground is the key advice.

The LAA and BMAA have previously separately evaluated the EV97's trim during flight test programmes and concluded that although it is known to be fast-acting and powerful, it can be counteracted by pilot input at all times. More generally, seatbelt security is an important pre-flight/pre-take-off check, especially without a passenger, and best practice is to ensure that seatbelts (and other equipment/items) are secured properly with no loose ends that might get caught in controls etc.

## Dirty Dozen Human Factors

The following 'Dirty Dozen' Human Factors elements were a key part of the CHIRP discussions about this report and are intended to provide food for thought when considering aspects that might be pertinent in similar circumstances.

**Awareness** – inputs or cues not assimilated or sought (positive visual and functional check of controls and trims before take-off)

**Communication** – information flow (passenger briefing

about care to avoid fouling of controls or trims by straps/clothing etc)

**Complacency** – assumptions (positive visual and functional check of controls and trims before take-off)

## Report No.2 – GA1313 – Reduced Power after Take-off

**Report text:** I'm a (300+hrs) PPL holder and fly frequently with other pilots and passengers. On a bright breezy summer's day, myself as P1 and three non-pilot passengers flew in a PA-28 180hp Archer uneventfully to [Airfield] and spent a very enjoyable time there. Late afternoon we got back in for the return flight. I'd checked the fuel, weather and my moving map was all set. All was well and we now had an 18kt wind straight down the runway for take-off which, as a tailwind, would push us home faster.

I always use my Pooleys PA-28 checklist and, taking my time, did so as we started up, did power checks and pre-take-off checks. We were then cleared to line up and take off. Being a [long] runway and entering at the [xx] hold, which is about half-length, I had checked and knew we had more than sufficient to get airborne safely. Having lined up, stopped to check the DI and my moving map were all correct, I applied full power and we began the take-off roll. A quick gauge check and I noticed the RPM was about 100 below what I expected but we were accelerating rapidly and into the brisk wind were soon airborne and commencing a right turn climb out. I then noted that our rate of climb was 400/500FPM not the usual 700FPM.

Saying to myself (passengers enjoying the view and oblivious anything was other than normal) this is not a crisis but something isn't right I duly checked mixture fully rich, flaps up, fuel pressure & oil pressure in the green, carb heat cold but cycled with RPM drop & recovery. I decided to continue the climb to 2000ft then level off and make a left orbit to the north of the field as I didn't want to get too far away if I did have an engine problem. I would then take another look at the situation. I considered it to be a situation that was not an emergency because the engine was smoothly producing power and all indications were normal though a bit low on RPM. I elected not to advise ATC at this stage as was now clear of the ATZ on the Approach frequency with a Basic Service. Level, and ensuring primarily I flew the aircraft and about to commence the LH orbit, I went through all the key checks:

- Mixture rich
- Change tanks fuel pressure good – no change in RPM
- Oil pressure & Temp both nicely in the green
- Carb heat cycled with RPM drop & recovery but still low.
- Alternator online and charging
- And finally Mags on 'both' only to find that the key was set to only one Mag not both. Turned to both and the RPM instantly increased as did the rate of climb to 700FPM.

We then continued on course for a pleasant uneventful flight home. The checklist states "Magneto - on Both, check master on" but I had somehow left the switch on one magneto not both. Back on the ground at home base I checked the switch carefully, it wasn't loose and positively clicked to each position for each mag and both so not at fault. The situation was of my making. The degraded engine performance had a degree of risk by reducing the climb rate but as we weren't flying towards high ground and

were climbing I consider it in the low category, however had the selected mag failed it could very quickly have become a full blown emergency which, with a little more diligence on my part, I could have and should have avoided. Lesson learned.

**CHIRP Comment:** Although there are of course engine-specific tolerances for achieving maximum rpm during take-off, experiencing much-reduced rpm after applying full power is a serious issue that should immediately ring alarm bells. The reduction in power could be for any number of reasons ranging from magneto failure, FOD partially obstructing airflow, or even imminent engine failure so, if there is sufficient runway available, pilots should consider immediately aborting the take-off in such circumstances and stay on the ground.

Although there was plenty of runway available in this instance, a good rule of thumb for assessing performance is to calculate the expected take-off run required for the pertaining conditions and then identify a stop point 1/3 along this distance such that if the aircraft has not achieved 2/3 of the required airspeed by this point, the take-off should be aborted.

If a problem like this is encountered shortly after take-off then don't forget the option may also be available to land ahead on long enough runways. And don't be shy of speaking to ATC if you are trying to resolve an issue once airborne. Not only will it help them to make preparations in case you do need to return to the airfield, but they can also help you by advising of any other aircraft or obstacles in the area that might be a potential threat whilst you are heads-in trying to sort out the problem.

It's easy to be wise after the event about the thoroughness of checks etc but we are all human and sometimes make mistakes. The key thing is to establish why the check was missed in the first place. We don't know for sure, but could there have been distractions at that moment in time which might have caused the pilot to miss a part of the checklist and not ensure that the magneto selector was at both? If you are aware or suspect that you've been distracted, disturbed or rushed during checks, best practice is to return to the start of the appropriate section of the checklist and start again. Also, when carrying passengers, brief them about the need for a 'sterile cockpit' at important times such as pre-take-off, take-off and landing so that there are no extraneous conversations that might cause such distractions.

Finally, this report demonstrates well that both magnetos are required for maximum engine performance, the second one is not there just in case the first one fails! One of the immediate actions on experiencing low power during the take-off or climb should be to check that both magnetos are selected on.

### Dirty Dozen Human Factors

The following 'Dirty Dozen' Human Factors elements were a key part of the CHIRP discussions about this report and are intended to provide food for thought when considering aspects that might be pertinent in similar circumstances.

**Pressure** – compulsion or anxiety to satisfy demands

(press-on-itis to achieve the task)

**Distraction** – attention diverted from task by internal mis-prioritisation (check-lists and procedures)

**Communication** – information flow (passenger briefing about sterile cockpit requirements)

**Complacency** – disregard for risks, over-assumption of ability (positive action on encountering reduced performance during take-off)

### Report No.3 – GA1314 – Overtaken in the circuit

Report text: After deciding that this would be the day that I would take my children flying for the first time, I arranged with the tower at [home aerodrome] to make one circuit and full stop landing before then taxiing back round, checking the situation on the back seats, and heading off again for a local flight if all was well.

The one circuit and full stop was uneventful, and the decision was made to stick to Plan A and taxi back round to the hold for a short local VFR flight to the West of the airport. We departed and all was well - the children had grins as big as the Cheshire Cat while blissfully staring out the windows. Upon returning to the circuit after about 20 minutes flying, we entered the ATZ from the North West (deadside) and descended to circuit height. Upon crossing through the overhead, we joined the circuit downwind left-hand for runway [xx]. At this point, I recall that I was told by the FISO that there was one other aircraft on short final and I was "number 2". The aircraft that was on short final landed shortly thereafter.

When late downwind, another aircraft [Aircraft Type] popped up on frequency and reported "4 mile long final". I heard the FISO ask the [Aircraft Type] to "report 2 mile final". After then making my own downwind call and turning base, the FISO passes on to me that another aircraft is on a 4 mile final. Before hearing the [Aircraft Type] on frequency I had assumed I was "number 1", but knowing there was an aircraft out there on long final was now making me doubt this depending on his range and speed.

When descending on base leg, I saw the [Aircraft Type] at about my 2 o'clock and, knowing they would be faster than me, decided there and then to position behind it, keying the radio to inform the FISO as such. I remember thinking that there could be no way it was at 4 miles when originally reported, and by the time it reported "2 miles" (i.e. when it should have been entering the ATZ) it was on short final and I was turning on to final behind it, even by this stage having slowed down as much as possible to allow for spacing.

I followed the [Aircraft Type] in and did my best to slow up, but eventually had to go around anyway, partly owing to them taxiing right to the far end of the runway, which I know they were fully entitled to do, but riled me a little at the time having just been overtaken by them in the circuit. After another circuit, our landing was uneventful and my young passengers were still very pleased about their first flight with Dad.

I subsequently called the tower for a debrief and was told that the [Aircraft Type] (who was on an IFR flight from Liverpool) had somehow mistakenly established himself on the ILS approach for [nearby airport] who were not best pleased about this given there was a jet inbound and

so vectored him away and handed him off to [home aerodrome], hence the first call he made was "... <call sign>, 4 mile long final".

The FISO on duty was a bit perplexed by this too and agreed that he should have joined deadside and integrated with the circuit, as per the aerodrome's procedures. The FISO added that sometimes there has been known to be confusion with how the handoff is given to IFR traffic; if [nearby airport] say something along the lines of "you are cleared to enter [home aerodrome] VFR", this can be assumed by some to mean "cleared to land" and obviously results in confusion when they discover there is other traffic already in the circuit. The FISO said that this type of thing does occur reasonably often, usually with faster aircraft joining via [nearby airport].

The FISO suggested, as per their procedures, that if spacing with an aircraft ahead is insufficient, that the base leg is extended on to the deadside before reintegrating with the circuit again. But in these circumstances when already descending on base leg and only then seeing the other aircraft which was much closer than had been reported, what I did was correct.

The published procedures for [home aerodrome] state that long finals may be possible dependent on circuit traffic, but those joining from the [nearby airport] CTR should normally join overhead at [height] and descend dead side to integrate with the circuit traffic. This certainly did not happen in this case and, while I empathise with the [Aircraft Type] pilot who was probably under a high IFR workload in a fast aircraft anyway without being additionally chastised by ATC, I think only highlights more strongly the need for all pilots to understand their destination aerodrome procedures and obtain a full and detailed briefing beforehand if unfamiliar.

I think it also impresses upon pilots the importance of safe slow flight techniques to assist in the integration with other circuit traffic and an unknown aircraft appearing ahead. Sudden control inputs here to try and correct the situation when already flying slowly at only 800' AGL could have had disastrous consequences.

**CHIRP Comment:** The situation was not specifically one of having been 'overtaken in the circuit' but there was certainly a potential conflict between the reporter's aircraft on base leg and the other aircraft on 'long' final. This situation of straight-ins versus circuit traffic is one that often causes concerns and needs careful consideration by both aircraft commanders to ensure that the aircraft integrate with each other. Ultimately, it was for the other pilot to conform with or avoid the pattern of traffic formed by other aircraft in operation (as required under [SERA.3225\(b\)](#)) when they joined long final but, in this respect, the only 'priority' that can be applied per se is to the aircraft that is the lower on final.

To be fair, the situation the reporter faced with the erroneous call by the other pilot will not have helped their ability to plan for deconfliction. More generally, although not the case in this incident, such circumstances could also easily result at mixed-use airfields if larger aircraft such as Bizjets for example conduct straight-in approaches where it is probably preferable that the

lighter aircraft gives way (even if they were not specifically required to do so) because the prospect of larger aircraft trying to conduct visual circuits is probably a worse outcome.

The other pilot's mistake in wrongly making an approach to the nearby airport will no doubt have flustered them, and it's easy to think that they might then have been task-focused on making their subsequent approach perhaps to the detriment of their appreciation of other traffic in the circuit. The reporter saw and acted on the potential conflict, which is all that can be asked, and they adopted exactly the right mindset in making sure that they avoided the other aircraft rather than 'standing on' their track and flying into conflict. Whether to slow down or go-around from base leg is a decision that is situation dependent, but great care needs to be taken when slowing down in such circumstances so that the stall is not approached (especially if you then need to turn onto final).

We all need to think about what we would do if confronted with another aircraft as we position on base leg/final, and an early decision to go-around is often the best course of action so that a subsequent stable approach can be made using the normal parameters. This is not to imply that the reporter had pressed on in this case (although they probably could have gone around earlier from base leg) but it might be that they had been lulled into a false sense of security by being informed that they were No2 to another aircraft on short final that they had then seen land (even though AFISOs cannot give sequencing instructions) and so the inference that they were now No1 might have influenced a decision to go-around later than desirable.

On a final note, this incident could easily be classified as an Airprox (albeit one in which there was no risk of collision due to the reporter's actions), and CHIRP strongly advises pilots who encounter similar situations to make a report to the UK Airprox Board (UKAB) who will be able to investigate the incident with all the resources that they have available. They can review radar traces, measure the separation between the aircraft and will likely be able to get the other pilot's perspective of the incident and whether they saw you. The UKAB will also log the incident and draw any valuable lessons from it, which is important in their work of trying to reduce incidents in future. Reporting to the UKAB is simple, either use their website [www.airproxboard.org.uk](http://www.airproxboard.org.uk) or their app which is available by searching for 'Airprox' in the appropriate app store. The UKAB are a friendly bunch who will be very keen to progress reports and will provide you with a fuller resolution than we at CHIRP can.

### Dirty Dozen Human Factors

The following 'Dirty Dozen' Human Factors elements were a key part of the CHIRP discussions about this report and are intended to provide food for thought when considering aspects that might be pertinent in similar circumstances.

**Pressure** – compulsion or anxiety to satisfy demands (especially after having made an error like an approach to the wrong airfield)

**Awareness** – inputs not assimilated or sought (positive check of the circuit if joining straight-in)

**Communication** – information flow (confusion about the position call of the other aircraft)

## Report No.4 – GA1317 – Mag Switch found selected to 'BOTH' with key removed

**Report Text:** I was asked to park the club training aircraft, a C152, in the hangar for the night and I needed to rotate the propeller by hand in order to attach the towbar to the nose gear leg. Before touching the propeller I checked the mag switch, (a key operated multi-position barrel switch) and saw the key removed. It didn't look quite right however, and on closer inspection I could see that the ignition barrel switch was in the BOTH position, with the key removed, meaning the mags were no longer earthed, but LIVE. I inserted the key, which the barrel accepted, and rotated the switch to OFF. The fault was not immediately repeatable, in that I could not remove the key with the switch selected to BOTH. Observations were reported to the club. Lesson learnt: not to trust the key removed as a positive indication of mags off.

The flying club has investigated, has taken a written statement from all individuals involved, and has disseminated the information about the event to all club members as an immediate awareness measure. The switch in question has been investigated and the fault has been reproduced [see photograph]. As such, it is intended that the switch will be changed. The fault occurred when the key was inserted upside down, and there is anecdotal evidence that this has been seen with this type of switch in the past. I have subsequently filed an MOR, the switch has been replaced, and internal club reporting rules amended to capture events such as this.

**Manufacturer Comment:** Thank you for bringing this matter to our attention. A cursory review of our database for this type of issue did not find any other reports of operators being able to insert the key upside down. Our database is dependent on customers and operators reporting issues to us; however, unlike large aircraft they are not bound to report issues, so most do not, especially on the older out of production models. It was interesting that the issue could be repeated if the key was inserted upside down. One of our Affiliated Service Facilities was visited and a few checks made on several [Aircraft] that had the same ignition switch as the one in the report. (Based on the image provided).



Attempting to insert the key upside down using the ignition key supplied with the switches and also some keys that had been locally cut as spares, we were unable to fit a key into a switch in the upside-down position. In a serviceable switch this would take an amount of force and determination on behalf of the operator to achieve and one would suspect that removal of the key would be equally difficult.

Technicians at the Service Facility also stated that it was their practice after carrying out engine ground runs to stop the engine using the mixture control, then to try and remove the key with the magnetos selected to both, then the left and right positions, to ensure it is not possible to remove a properly inserted key in any position other than off. The Service Bulletin previously discussed may not be applicable to the part number of the ignition switch fitted

to the aircraft in question but it does highlight the danger of a "live" ignition switch. The overall conclusion is that the ignition switch barrel has been worn allowing the key to be inserted upside down, or the key used was worn or not the correct key for the ignition switch.

**CHIRP Comment:** This is a great example of why there is a need to follow standard safety procedures, which, as individuals, we add to based on personal experience. It was a really good spot to notice the lock looked unusual, and excellent that further investigation was actioned. The reporter filed an MOR to the UK CAA, and CHIRP thought it prudent to inform the Manufacturer to widen knowledge of the possible dangers involved with this 'motor car design' from the last century.

Ultimately, this incident had very serious safety implications and well done to the reporter for trusting their instincts to make sure that they verified the actual condition of the switch rather than just relying on the fact that the key was removed. The issue of worn keys and mag switches is not a new one, many older aircraft suffer from this problem but the reporter had done the right thing in raising the issue with the club concerned, and they had done the right thing in having the switch replaced. Although worn switches may well be common, they should not simply be accepted as such because dangerous situations like that reported could have serious consequences. The main lesson is to physically check the position of mag switches and not rely on the key being absent to assume the mag switch is off. Finally, the old adage of 'always treat a propeller as live' is still pertinent, and we commend the reporter for their rigorous approach to their checks.

### Dirty Dozen Human Factors

The following 'Dirty Dozen' Human Factors elements were a key part of the CHIRP discussions about this report and are intended to provide food for thought when considering aspects that might be pertinent in similar circumstances.

**Awareness** – inputs not assimilated or sought (magneto switch not at off when key removed)

**Deviation** – normalisation of divergence from formal procedures or taking short-cuts (removal of key without selecting magnetos to 'off')

## Report No.5 – GA1318 – Possible Class D infringement

**Report Text:** I had flown back from Belgium on Friday, and found then that my friends were taking their aircraft to [maintenance airfield] for avionics work on Monday. I emailed them on Sunday and offered to fetch them back, which was arranged for "after meeting for lunch at [Airfield]" owing to expected morning haze. I slept very badly Sunday night. My wife got up very early for golf and I remained asleep. My watch was left upside down in my electric watch winder and what I thought was after 0800 was almost 1330 when I got up. I telephoned my friends, but they had just landed at [maintenance airfield] - otherwise I would have said I would be unable to come.

I had checked NOTAM, weather, and the [maintenance airfield] information in Jeppesen late Sunday night, and made a flight log using the forecast of upper level wind and TAF available on Sunday night. In view of the forecast light

wind, and the Jeppesen information, I was expecting [runway] for landing. I had done my basic training at [maintenance airfield], and knew the entry procedure and taxi route to the old [maintenance location]. I set up only the [maintenance airfield] NDB, and a 'Direct To' on the GPS. I was surprised by the bad visibility, and wasted time looking for [entry point] whilst going west, not, it would appear, keeping the proper NW course. I then checked the ATIS using my old No1 25khz radio before calling App on my new No 2 8.33 radio. I was then very close to the CTR. Had I been on a better course I would have had more time. I was told to continue on a long final and call tower. For some unknown reason I tried to call tower on the No 1 radio, which was not successful, so only got onto Tower on quite short final. I then tried to go to the old [maintenance location] apron and missed my turn. I called ATC (I think Approach/Radar) as requested from the [maintenance location] telephone, but our conversation was interrupted by "an incident".

I have viewed GPS tracking data from my Golze weather receiver. This only shows periodic fixes, not tracks, but indicates that I was 500ft below the Class D when becoming aligned with the final approach track. I was not awake/alert enough to fly at the time; that was the main cause of this disgraceful incident. I should not have gone, or else taken an hour to wake up more and get some refreshment. Having both my radios 8.33 capable would have prevented me from trying to set an unavailable frequency. If feeling sleepy I should not be flying.

**CHIRP Comment:** Firstly, CHIRP commends the reporter for their frank and open report in describing an incident that was not their finest hour. It takes real courage to do so, and is in the finest traditions of making safety information available to all for the benefit of others who might otherwise fall into the same trap. The reporter identified a number of things that they might have been done differently in other circumstances and the important thing now is to take those lessons onboard and resist the same temptations again.

Reports such as these about things that 'nearly went wrong' provide a host of lessons that are useful education for all so please do send them to CHIRP for wider publication – you do not need to be concerned about being identified, we take great efforts to disidentify any reports we publish so that reporters can feel safe in sending in their experiences and lessons for others without fear of personal condemnation.

Fatigue and fitness to fly is not just an issue for the commercial world but needs to be considered by all pilots so that we avoid making mistakes when we are tired. The handy mnemonic IAMSAFE is a good way of reviewing yourself to see if you are fit to fly, not only in respect of fatigue/tiredness but in other physiological aspects. But you must do so honestly and thoroughly. Personal performance and tiredness are notoriously difficult to self-evaluate (we all tend to over-estimate our abilities), and so it takes real discipline to admit to ourselves that we perhaps shouldn't be flying, driving or operating machinery when we are below par.

CHIRP thinks that the IAMSAFE mnemonic should be more widely publicised than the current 'IM SAFE' in the Skyway Code because IAMSAFE also includes the important 'Attitude' aspect of whether you are emotionally ready and focussed on the flight so

we've written to the CAA to see if they might update their publications. Another factor in this incident was self-induced pressure to fly because of a sense of duty to friends or others who might be relying on you. Again, it's easier said than done, but we must all resist such temptations to 'press on' out of a misplaced sense of duty when we're unfit, the weather is poorer than expected, or some other problem arises that we know we shouldn't overlook but are tempted to do so to 'get the job done' and not let others down.

- I** – Illness (do I have any symptoms that might affect my ability to fly?)
- A** – Attitude (am I emotionally ready and fully focussed on the flight?)
- M** – Medication (am I taking any prescription or over-the-counter drugs that might affect my performance?)
- S** – Stress (am I under pressure or have any worries and anxieties?)
- A** – Alcohol (have I been drinking within the last 24 hours?)\*
- F** – Fatigue (am I tired or not adequately rested?)
- E** – Eating (am I adequately nourished?)

\*Railways and Transport Safety Act 2003 Part 5 'Aviation: Alcohol and Drugs' S.93 'Prescribed limit' states:

- (1) A person commits an offence if—
  - (a) he performs an aviation function at a time when the proportion of alcohol in his breath, blood or urine exceeds the prescribed limit, or
  - (b) he carries out an activity which is ancillary to an aviation function at a time when the proportion of alcohol in his breath, blood or urine exceeds the prescribed limit.
- (2) The prescribed limit of alcohol is (subject to subsection (3))—
  - (a) in the case of breath, 9 microgrammes of alcohol in 100 millilitres,
  - (b) in the case of blood, 20 milligrammes of alcohol in 100 millilitres, and
  - (c) in the case of urine, 27 milligrammes of alcohol in 100 millilitres.

### Dirty Dozen Human Factors

The following 'Dirty Dozen' Human Factors elements were a key part of the CHIRP discussions about this report and are intended to provide food for thought when considering aspects that might be pertinent in similar circumstances.

- Fatigue** – extreme tiredness from prolonged activity (not sufficiently rested and alert)
- Pressure** – compulsion or anxiety to satisfy demands (a sense of duty to others to fly)
- Distraction** – attention diverted from task by internal mis-prioritisation (Aviate, Navigate, Communicate rather than letting things like weather/ATIS/radios become the centre of attention)
- Awareness** – inputs not assimilated or sought (seeking assistance from others such as ATC when things don't go to plan)
- Complacency** – disregard for risks, over-assumption of ability or habitual behaviour (thinking that being familiar with procedures/airfield will mitigate lack of detailed planning)