SO, JUST WHAT ARE THE MAIN ISSUES IN GA?

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Category: General Aviation

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Editorial

You might be surprised by some of the problems and how to deal with them

As I write this editorial we're just over halfway through the year so I thought it would be useful to give an idea of the main themes reported to CHIRP in the first 6 months.

The sundial chart at the end shows the associated top GA Key Issues on the inner circle and their relevant sub-issues on the outer wheel. Each report we receive can be ascribed more than one Key Issue or sub-issue and so care needs to be taken in interpreting the chart because one report might feature in a number of sectors but the aggregated results are informative in showing what the main themes have been so far this year.

In this respect, **'Procedures'** represents the most common theme to date, representing 21% of the issues we've had reported. Most of the problems we've seen have been in the faulty application of, or did not follow, procedures. But a sizeable chunk also covers lack of understanding and poor knowledge so there's definitely a case for reviewing some of those aspects of flying that you're uncertain of or don't encounter on a day-to-day basis so that you understand and are ready to apply the correct procedures whenever called on – time to review your aircraft's pilot's operating handbook and your home base airfield operations manual perhaps.

'**Defences**' refers to how well we are equipped to anticipate and deal with problems that arise. Some problems are difficult to anticipate because they may be insidious in their manifestation, but one of the things we can help ourselves with here is in conducting a thorough Threat and Error Management (TEM) process to assess what might go wrong and what risks might be present. Threats relate to the external things that might go wrong, whilst Errors relate to things that we might get wrong ourselves. TEM is the deliberate thought process that we should conduct before (and during) a flight so that we continually review what we're about to do so that we can anticipate problems. There are of course endless things that one could list as potential problems but focusing on the existential ones is a good start: what would I do if my take-off performance doesn't match expectations; what if the enroute weather isn't as good as forecast; what would I do if the engine quits or runs rough; do I have a Plan B if my destination airfield is closed or weathered out; what would I do if I had a comms failure; have I properly studied the destination airfield topography and strip lengths etc?

'**Communications – External**' is all about making ourselves understood, and understanding what's being said to us. I featured this in the recent GA FEEDBACK Ed 145 editorial so I won't labour the point except to highlight the need to use the recognised phrases and pro-words on the radio rather than cool and trendy slang, and to speak clearly and deliberately so that everyone else has the chance to understand exactly what you're saying. Safety Sense Leaflet 22 provides a good *aide*

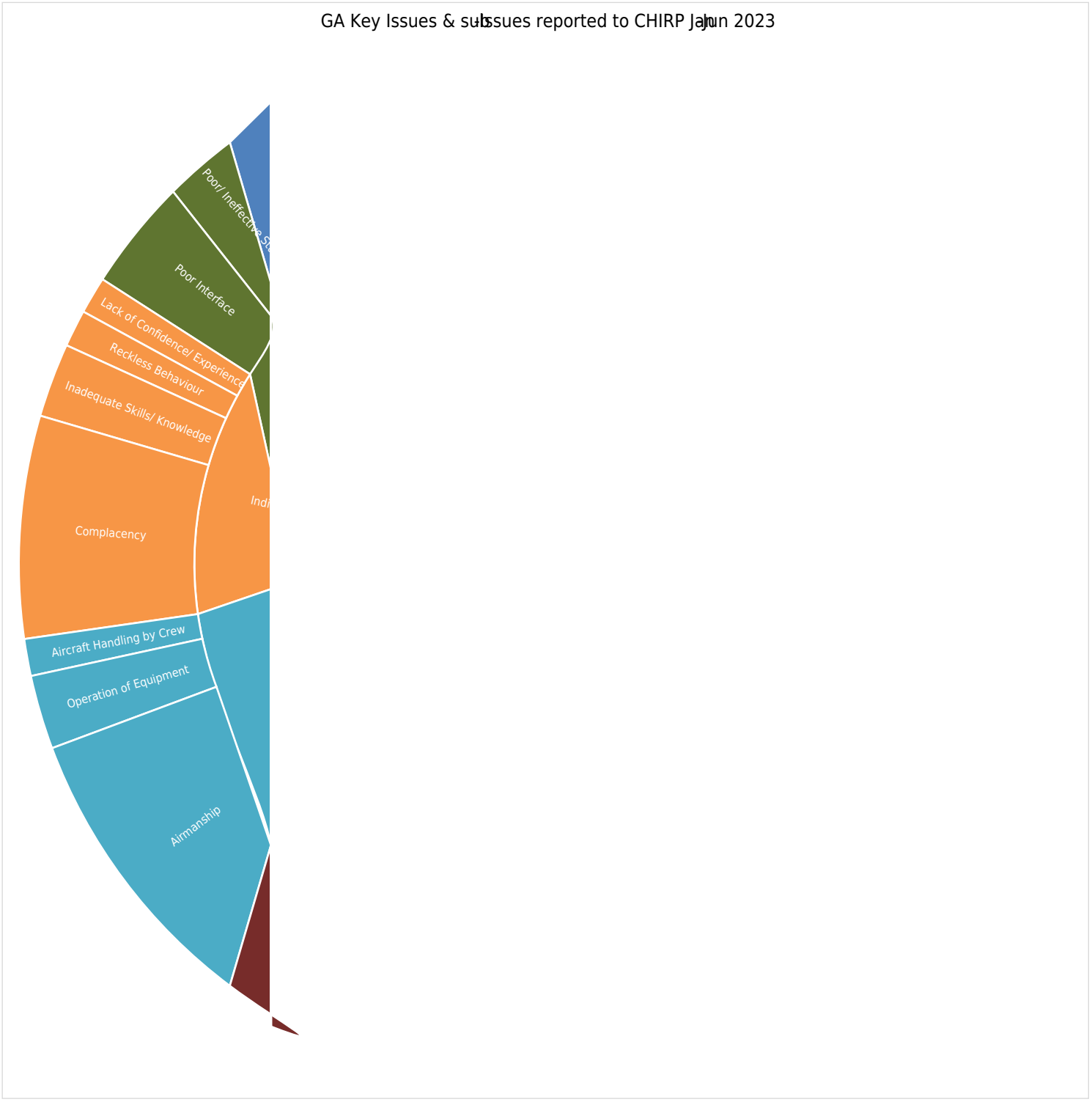
memoire about communications and radiotelephony in general that's not too heavy going so it's worth a read.

'**Situational Awareness**' and '**Airmanship**' often go hand-in-hand so it's not surprising that, together, they represent a largish chunk of the issues that we see. Improving Situational Awareness often comes down to taking advantage of all the information sources that are available to you so that you can synthesise the best understanding you can about what's going on. Thorough pre-flight planning, electronic navigation aids, Electronic Conspicuity systems, being on a useful frequency, listening to and passing information to others, and making use of ATC when it's available are all ways of building as comprehensive a picture as you can. Airmanship is then, to a large part, often about how you use that picture to best advantage through the 3 'C's of Caution, Consideration and Courtesy for others, and then making appropriate decisions to choose the best course of action.

Finally, '**Individual Error**' covers a wide range of actions that may or may not be circumstantial and are mostly unintentional. Never forget that you're human, and humans make mistakes and errors, so it's back to that TEM thing again where you need to be honest in your personal analysis of your weaknesses and potential lack of experience or currency! The exception being 'complacency', which is pretty much an own-goal in performance terms. 'Don't assume, check', and 'Assume makes an ass out of u and me' are well worn phrases but their meaning is clear. Every day is a learning day in aviation so don't accept poor planning, poor behaviours, 'that doesn't look right but I'll carry on' or 'it'll be OK this once' because that'll be the day something comes and bites you on the bum.

The bottom-line? CHIRP provides a vital safety net as another route to promote change when the normal channels of reporting aren't delivering results, you don't feel able to report through formal Occurrence Reporting systems, and for collecting reports with safety concerns that did not meet the threshold for normal reporting and would otherwise have gone unwritten. We rely on you to report Human Factors aviation-related safety concerns to us so that we can both help in their resolution and highlight relevant issues to others. Reporting is easy by using either our website portal or our App (scan the appropriate QR code shown or search for 'CHIRP Aviation' – avoiding the birdsong apps that come up!). In our reporting portal you'll be presented with a series of fields to complete, of which you fill in as much as you feel is relevant – not every field is mandatory, but the more information you can give us the better. Although you'll need to enter your email address to get access to the portal, none of your details are shared outside CHIRP, and we have our own independent secure database and IT systems to ensure confidentiality.

GA Key Issues & sub-issues reported to CHIRP Jan-Jun 2023



Engineering Editorial

Fuel Filters and Filling Points

A couple of concerns about fuel systems came to our attention recently and so I thought that there would be value in raising awareness and possible further discussion about Fuel Filters and Filling Points.

CHIRP recently received a report relating an incident with an aircraft that had been in storage during COVID. Fuel had been left in the fuel tanks for quite some time. The pilot decided to drain the main tank and add fresh fuel. This flow of fresh fuel, unbeknown to the pilot, drew all the debris in the tank to the Gascolator.[1] The Pilot typically drained some fuel from the Gascolator before flight and, seeing nothing of concern, flew the aircraft only to suffer a misfiring engine and a precautionary landing.

On inspection, the Gascolator was completely contaminated with accumulated foreign object debris (FOD). Including particles far too large to exit through the Curtis drain valve, which would have given an indication of a fuel contamination issue. The first area of concern is that metal Gascolator bowls do not allow easy visual inspection of water and FOD levels. A glass Gascolator bowl would be ideal for a visual inspection but can also be a really good unintentional source of fuel in an accident. Unfortunately, clear plastic bowls could be prone to discolouration and/or embrittlement from contact with the fuel.

[1] A gascolator, also known as a main line strainer, sediment bowl or fuel strainer, acts primarily as a fuel drain for water and small particles of sediment and is usually found at the lowest point of an aircraft's fuel system. The gascolator is located below the level of the aircraft's carburettor and fuel tanks and on light aircraft is commonly located on the front of the firewall, as low as possible. There are two types of gascolators: those tapped for a primer port and those without. If equipped with a primer port the aircraft fuel primer will take its fuel supply from the gascolator, used for engine starting.

Secondly, the size of the Curtis drain valve in this case meant that the larger FOD items were retained and so nothing untoward was noticed. As an aside, FOD build up can sometimes contaminate drain valve seals with particles which can cause the valve to leak. So, not only should you be checking the drained contents for contaminants and water, but also check that there is no drip/flow after closing the valve because this can be another indicator that there's FOD in the fuel. Whilst on the topic of drain valves, note that some are able to be locked in the drain position (i.e. the valve can be twisted to hold open on a detent as shown in the picture). AAIB Accident report G-BZDA described an incident where power was lost due to fuel starvation when one of these was left in the locked open position. This resulted in an associated CAA Special Notice (SN-2021-005 now rescinded) that highlighted the risks associated with lockable gascolator drains and was later amended to include a recommendation that aircraft be checked for appropriate placarding at the next scheduled maintenance event.

Finally, although the pilot was being rightly cautious about flying with fuel that had been in the tanks for some time, it is not sufficient simply to drain and refill fuel tanks following a prolonged period on the ground. Contrary to CAP 1919 'Safety advice and tips for pilots returning to GA flying post COVID-19', which simply recommends draining and replacing fuel, after significant periods on the ground the whole fuel system needs to be fully flushed and cleaned because the fuel may have degraded to the extent that particles may be present in any part of the system; the tanks, fuel lines, gascolator, fuel injectors/carburettors etc all need to be checked and cleaned to ensure they are not contaminated or blocked with debris.

Moving on to Fuel Filling ports, our US NASA equivalent, ASRS (Aviation Safety Reporting System), recently issued an Alert Bulletin in reference to Cessna 172 Fuel Tank Filler Tube Integrity (ASRS

Report No 19944807, see text below). CHIRP contacted Textron and it would seem this has been a concern including other types for a considerable period. The likely cause is that those refuelling the aircraft are placing a strain on the filler neck with the refuelling nozzle. This, like the Gascolator issue above, may apply to a range of aircraft types from various OEMs. Vigilance is required to ensure that the individual carrying out refuelling takes the strength of the filler neck into consideration, and some recommend that the person conducting the refuelling places the fuel hose over their shoulder so that the weight of the hose is not bearing directly onto the filler neck itself; this is especially relevant to high-wing aircraft where the extra length of hose from the ground can significantly increase its weight and therefore the strain on the filler neck. This may further require a formal competence assessment of staff or club members who carry out frequent refuelling duties.

ASRS Report No 1994807 text:

> *… I departed ZZZ in a C172 with a student working on his instructor rating. Shortly after take-off we smelled raw fuel fumes and returned for a landing. The scent of the fumes got stronger in our descent. The student asked me to land. On the ground he told me he got a migraine headache from the fumes. It appeared he was incapacitated from the fumes. If he was by himself this could have been deadly.*
>
> *The plane was withdrawn from service and the fuel tank sent to a welding shop. Apparently the filler tube developed a crack where it is welded to the gas tank. We were lucky that there was no fire or explosion, as in Aircraft Y. This was the second time this year that this fuel tank leaked. Last [eight or nine months ago] I refused to fly the plane after smelling fumes on another training/demonstration flight. The plane continued to be operated by other instructors and students, despite my emailed warnings to them, until it was pulled from service for its 100□hour inspection. The fuel tank was apparently sent to a welding shop for repair.*
>
> *I spoke with another Aircraft Inspector who works for a different school and was told that this was a common problem in their Cessna aircraft. This Inspector believes the problem is caused by the fuellers letting the fuel nozzle apply too much force on the filler neck. Our Inspector/Director of Maintenance thinks this is caused by the fuel tank walls or top flexing, and causing stress cracks where the nozzle is welded. Person A at Company confirmed that a lot of Cessna fuel tanks have cracks where the filler neck joins the top of the tank. They seem to think it is from the fuellers letting the nozzles put too much pressure on the filler necks. However, they said the top of the tanks also develop cracks.*
>
> *The Cessna leaking fuel tanks appear to be a systemic problem …[Regulator] should warn pilots to have mandatory fuel tank inspections [and] ground the aircraft anytime there is the smell of fuel in the cockpit or fuel stains behind the filler caps or under the wing above the door. Some operators have taken the step of not filling the fuel tanks to the top. However, in a descent, there will be fuel*

behind and consequently above the filler neck to create a pressure head to drive fuel through the crack in the neck weld. Partially filling a tank with a known leak should be considered operating an aircraft in a reckless manner…

Phil Young CHIRP Engineering Programme Manager

Comments on Previous FEEDBACK Editions

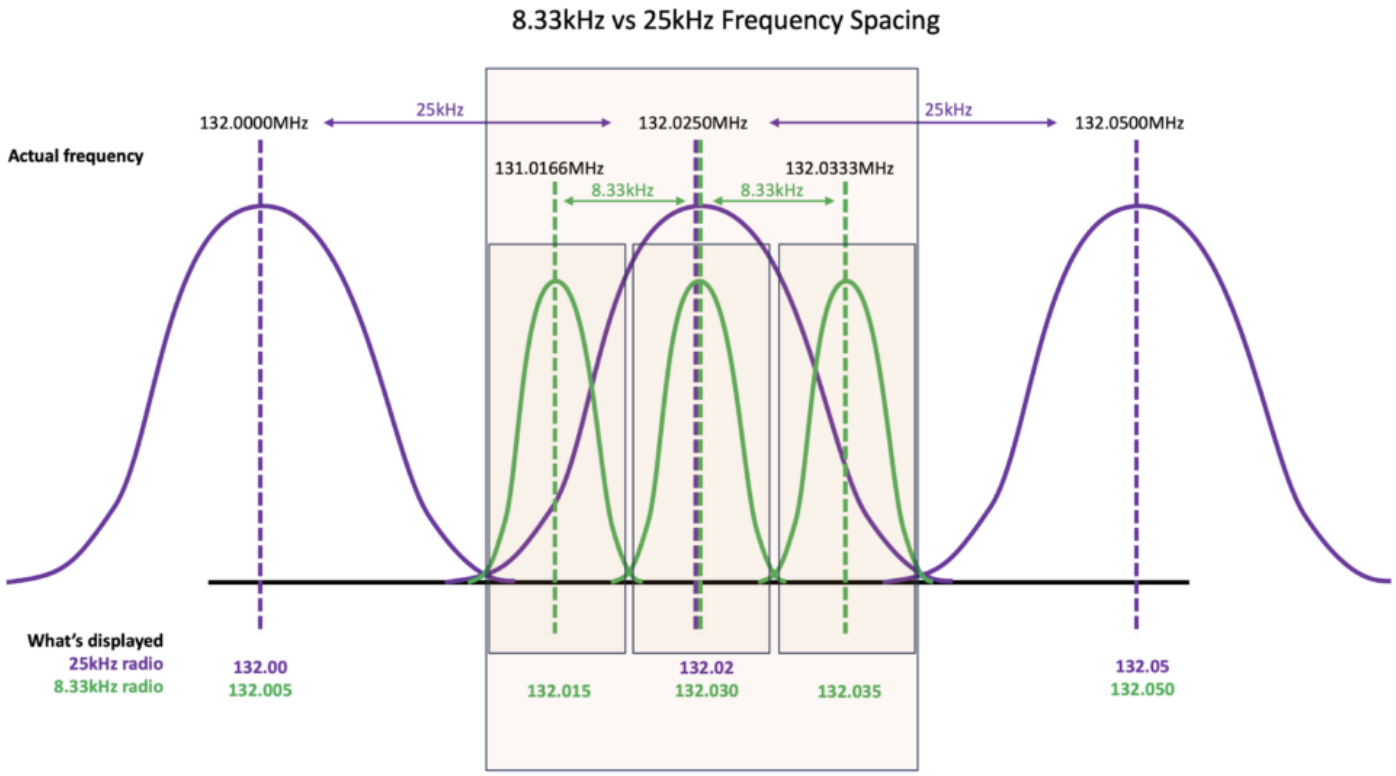
Comment No 1: Gone dotty? Dear CHIRP, the last issue [GA FEEDBACK Edition 96] was a thought provoking and enjoyable read as always, for which many thanks. Just one minor point from the "Speechless?" comment [regarding making contact using the speechless code when experiencing a microphone failure]. There is no letter corresponding to four 'dashes' (long bursts) in morse code. Four 'dots' (short bursts) corresponds to the letter 'H'. A relatively minor point I suppose, but morse code identifiers are still used by NDBs and VORs so we should try to be accurate.

CHIRP Response: Dash it all, it's a fair cop, I got carried away with meeting publishing deadlines for the last edition and confused my dots and dashes! The comment should have read:

*For those who may not be familiar with the speechless code, it was conceived as a military procedure used to enable a set of yes/no questions to be asked by ATC when an aircraft had a microphone/voice-transmit problem. The procedure can be initiated by either the pilot or the controller depending on who recognises there's a problem. If it's the pilot who realises they have no voice transmission then you initiate the procedure by pressing 4 times on the transmit button to send out 4 bursts of carrier-wave (4 ~~dashes~~ **dots** being morse 'H' for 'Home')*

Comment No 2: 8.33kHz radios. I thought the attempt to clarify 8.33kHz spacing was very poor. The "house" analogy was confusing and inadequate. Remember "One picture is worth a thousand words". It would have been much clearer using a diagram showing how the peak signal strengths fall off when measured at frequencies departing from the original – a Bell curve. Start by showing two adjacent 25kHz channels as originally operated, then insert more 8.33 channel bell curves showing how much narrower the curves are, with reduced chance of receiving an adjacent channel. CAP1573-833-Ground station offers some information in tabular form, unfortunately using 118.00 as an example. This is in the frequency range allocated to navigation channels, not voice comms.

CHIRP Response: Although we would contest that signal strengths fall off in the shape of a bell curve from the peak (band-pass filter technology is generally much flatter at the top and sharper to fall off than that) we know what the contributor means. In an effort to please all camps, here's a graphic depiction of 8.33kHz vs 25kHz frequency spacing represented by bell curves and houses! The 'bell curve' graphic shows, for example, that an 8.33kHz radio tuned to 132.035MHz has potential overlap with the 25kHz frequency 132.025MHz, which is why you might receive 132.025MHz but may not necessarily be able to transmit back (or vice versa).



Comment No 3: QFE vs QNH. Further to the Feb 23 GA edition [GA FEEDBACK Ed 95], I periodically fly between White Waltham and North Weald, both of which have ATZs which are coincident and below the CTA. One insists on the use of QFE to avoid infringement, the other QNH. Which is correct? QNH wins for me (and the rest of the western world).

> **CHIRP Response**: The debate about QNH vs QFE is a perennial topic that has protagonists on both sides and a long list of comments in support of both views; some are pro-QFE, some are pro-QNH. There are no doubt sound reasons for some airfields going either way, and the debate about QFE vs QNH in the visual circuit and immediate environs is well-rehearsed by both camps. I don't think anyone can disagree about the use of QNH for transits overall, but some hold to the value of QFE in the visual circuit for simplicity of operations. At the risk of sloping shoulders, perhaps the time has come to have a serious national review and debate, if only for the benefit of consistency and commonality.

I Learned About Human Factors From That (ILAHFFT)

I'm a GA pilot who utilises my small-group PA28 Warrior II for recreational purposes. At the point of writing, I have logged 296 flying hours of which the majority are on type, I've expanded my knowledge base by undertaking my IR(r), I fly often to stay current, and I have capabilities that have

a limit in GA terms. I was undertaking a very routine and non-eventful flight from my home airfield in Norfolk to an airfield in East Riding. After a few hours at our destination, it was time to return home. As I departed with my passenger, I thought the journey back would be as uneventful as our arrival, how wrong could I be.

On departing the East Riding airfield area I changed frequency to Humberside Radar. Climbing through 2500ft, my passenger asked me what had appeared on the lower part of the front screen on his side of the aircraft. At first, I could not see what he was referring to, then a further smear appeared. I initially thought that it was water, however within seconds the liquid began to spread in finger formation up the front screen and I could quite clearly see that it was yellow and quite thick! Oil! On turning my vision back to my side of the screen, I noticed that the liquid had now also appeared on both sides and it was quite quickly covering the screen and blocking my visibility entirely. This is the first picture my passenger took.

Quite quickly our position worsened when the oil started to spread in a similar fashion along not only the front screen but also the side windows of the aircraft. Very quickly the passenger window became completely blocked and my side window provided only a partial lower view. I immediately knew this was not going to play out well. I was at this point a little unsure of what that outcome would be or how bad the situation would become, but various thoughts quickly ran through my

mind.

Within a minute of the incident commencing the only visual aspect I was left with was a small section on the lower left of the front screen allowing me to see downwards but not forwards. Having the small direct view window (which is very difficult to actually use to fly with), I was able to utilise this to crab the aircraft a few times to try and provide some form of directional guidance and a visual mind picture of what was ahead (a town and a big river!). On checking the Temperatures, Pressures, and all other gauges I was somewhat surprised and relieved to see that the aircraft was performing correctly and not indicating any system fault (yet). I was not sure how long this position would last, and I knew I had to get on the ground and very quick. I immediately spoke further to Humberside Radar and requested a divert to them. After some standard communication, we established that a straight in approach onto runway 20 with a tailwind was a better option than flying an approach to the in-use 02 runway. I am very grateful for my instrument training, having practiced numerous and various approaches into Norwich, Cambridge and Southend I have always taken the view that an SRA approach, (irrelevant of my skill at flying a plate procedure) would always be my chosen method should the need arise. That need was right now.

The CFI at my flying school (an excellent instructor) had made me practice SRA approaches – it was during these practice approaches that we discussed in detail how an SRA approach is much easier on the workload than a full procedural approach if in trouble. I did not have the approach plates for Humberside to hand, and whilst I am aware how to import them onto Sky Demon whilst flying, my workload was somewhat stretched trying to ensure my passenger was ok (he was exemplary and very helpful) and I was trying to run through various scenarios that could play out and my planned actions should the engine suddenly stop or should I see flames.

As we commenced the SRA procedure, I instigated the wings-level auto pilot (something I practiced a lot after obtaining my IR(r)) and began to concentrate on the instruments and gauges in front of me. Having plugged in a direct route to Humberside, I commenced the extended SRA from Hornsea and utilised the instruments and sky demon to point towards the runway 20 heading. The direct route from Hornsea to Humberside is 21nm and according to Sky Demon 13 minutes, that 13 minutes felt a lot longer!

Whilst concentrating on the ‘Aviate, Navigate, Communicate’ process dealing with issues right there and then, it suddenly occurred to me that in all my instrument training I had never actually landed the aircraft as part of the procedure (there was no requirement to) and all of my approaches and missed approaches had been flown on a QNH setting terminated at either the decision height or via a missed approach go-around procedure, either way they had all been based on the ability to see the runway! This position was something quite different.

A brief discussion with the controller confirmed that I would not actually be able to make a decision as I could not see ahead or out of the side window, hence at 600ft or 300ft there was only one way

this was going to end, I was landing, and landing very much blind! I asked for the QFE and began focusing on how to land the aircraft, not only with a tailwind, but with the sun beaming into the cockpit and having no forward or side vision. I quickly established that to crab or fly any other unusual approach would potentially put further stress on my mental state, and I did not want to keep adding additional power to stabilise the aircraft should a crab with a tailwind put me off track. I was also conscious that I was maintaining a steady descent which was confirmed as part of the SRA approach with the controller. Little power bursts were also creating further oil spurts, oil spurts meant less oil which could result in less pressure, less pressure meant a rise in temperature, the combination of those together made for an even worse scenario than I was trying to control.

As the descent continued I was able to crab a couple of times had managed to glimpse the runway and the large expanse of grass to its left. I knew that if I could get to the threshold, I could drop a third stage of flap quickly and I would land before the end.

I fully appreciate the concerns the controller would have had, a GA aircraft with no visual front or side aspect being talked through a procedure into an active airport with a 21-mile approach, whilst not knowing if the pilot was instrument rated or the level of experience or currency of the pilot. I believe our mutual understanding of the position became clear when I advised that I would not be able to follow through with a decision height confirmation as I had no ability to see to make that decision.

At the point I realised that my glide would take me to the airfield, I also decided that a perfect landing on the centre line with no forward vision was not for me. For a vast amount of the descent I had been visual with a large piece of grass that ran parallel to the runway, I kept telling myself, I'm not a commercial pilot, I'm not being judged on the landing and from all of my training and my GA experience a bad and heavy landing on grass is always somewhat more appealing than the same on tarmac. I didn't tell the controller of my intention to aim for the grass, I think I may have been afraid of him saying no! (I'm sure he wouldn't) but that last 30 seconds was somewhat testing. Any landing that you walk away from is a good landing (as one of my first instructors kept saying!)

Some 30 minutes after taking off from East Riding, and having flown for the very first time as an IR not IR(r) pilot and having landed successfully on the grass, I positioned the aircraft onto the centreline of Runway 20, blue lights flashing around me, with a fireman looking at me as if I was mad having landed on the longer grass rather than the beautiful runway we now all sat upon. I could only congratulate my passenger for his belief in me. There we sat, our emergency over! As I was taught, an emergency landing should have a real expectation of preservation of life, limited injury being caused and, if possible, an intact aircraft. I chose the grass as a safety and comfort blanket. On this particular day that blanket worked.

Would I change any decisions I made? Well I'm here to answer that, so the answer is clearly a 'No'. Would I do the same again? Absolutely. Since the incident, I have run the scenario time and time again in my head and sat in the aircraft. I am in no doubt the grass would have won over an attempted blind perfect landing on the centre line of Humberside Airport every time. Human Factors played a huge part in this incident, training and currency being the most important factor, along with trust in the excellent controller.

The engineers report confirmed that the oil leak came from the end of the crankshaft ID; there had been approximately 2lts of oil dumped onto the screen and subsequently the rest of the aircraft. On leaving the aircraft it was quite surreal to see the amount of oil that had made its way from the front screen to the rudder and every part (including the wings in between). A close up of the screen from the outside shows the battle that had just been won, it's a little like trying to drive a car with bathroom obscured glass fitted!

The CFI from my homebase contacted me the day after the incident and we met up that day to talk through the event, we discussed my decisions and the reasoning for them, not to criticise but to

learn and expand knowledge. Human Factors played a huge part in my planning (Humberside was my fuel and emergency divert for the route that I had worked through the evening before my flight). I didn't realise how helpful it would be getting into a small 2-seater Cessna the day after with the CFI. There are many things I have personally learnt about myself from this experience, and I am not naïve enough to think that this incident is my last run with trouble. I have some strong views on instrument training, not IR(r) but basic PPL extension instrument training, but that's for another day. For me, I've signed back up to revalidate my IR(r) and I shall ensure I keep very current with emergency procedures, all so I'm ready for the next time things go a little wrong once again!

There are no comments yet.