

Case Study - My hovercraft is full of eels

By Bengt Collin, EUROCONTROL

The controller

How many English football team names in the Premiership, Championship, League 1 or League 2 contain the name of a part of the body? They were sitting in the local bar sinking a pint or two of Boddingtons. It was still early evening, but the challenge was there to be solved. Not that it really mattered; this was not a contest, more of a fun experience. They shared the same kind of humour; being from Sweden and the UK, this was obvious. That afternoon they had both enjoyed Monty Python's "The Hungarian Phrase Book" on YouTube: "My hovercraft is full of eels." "Brilliant," they thought, but this was another challenge. So far they had managed LIVERpool, ManCHESTER United and ManCHESTER City, BournMOUTH and PortsMOUTH, not forgetting the famous ARSEnal. Is LEiGhton Orient OK? "Why not?" Joe replied, "What about (H)IPswich?" They finished their pints. Time to get home soon – work at the centre tomorrow.

The GA pilot

This was another fantastic day, although the endless sunshine had come to an abrupt



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end this very morning. He planned to fly north to visit his parents; they were living some six hours' driving distance away, too far to drive for a day or two, but a quite feasible distance for flying. He was an experienced IFR pilot, not that he was flying big commercial jets, rather small twin piston-powered aircraft. He also used to fly on a regular basis outside normal working hours; today he had booked a single-engine Piper.

The local grass field was located close to his parents' house. The President of the Flying Club (this was how he titled himself) was a good friend of many years' standing; he had just phoned him. Conveniently, since his friend was also the local MET expert, he had learned that the forecast for his planned arrival looked good. "I can see the old church tower clearly, and Chris, you know, the guy who sells vacuum cleaners, he told me that the weather should stay dry. Give me a call when you arrive and I will pick you up." His friend rang off.

The fighter pilot

The military airport was some seventy kilometres north of the big city; driving to work, the weather had been sunny as usual, but now the sky was almost overcast. Following the morning briefing, everybody not flying the first shift went downstairs for a cup of coffee; he and his colleague were not flying until ten o'clock and had plenty of time to prepare the exercise which was standard for him but not so easy for his relatively inexperienced colleague. This colleague was some ten years younger than he was, and had red hair and a terrible accent (he had been born in the south of the country). More im-

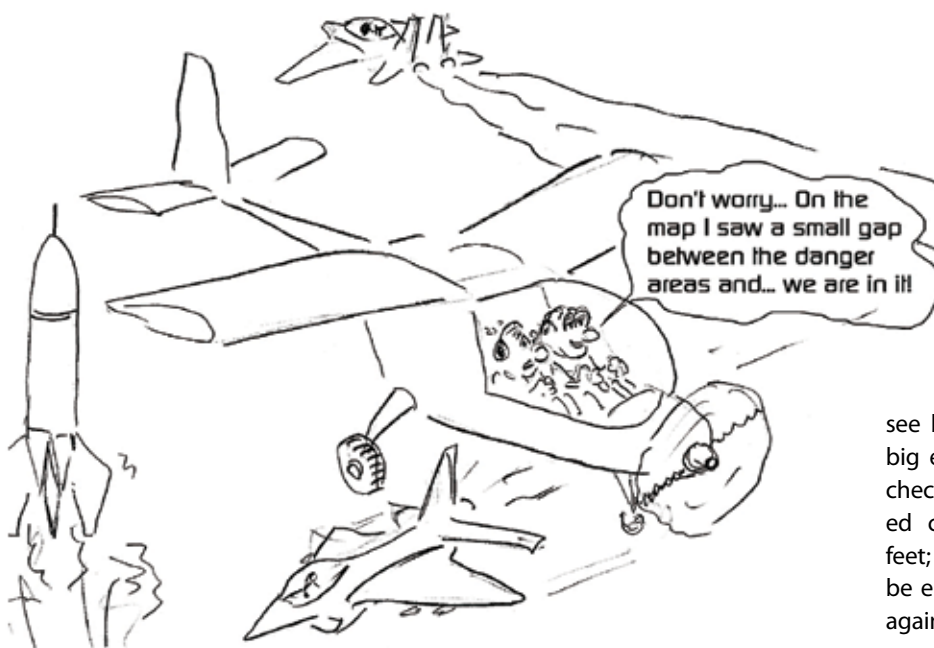
portantly, his colleague was dating the sexiest young lady in town. He was jealous. But his accent; he wondered how the couple communicated. Well, he had one or two ideas; but seriously, he was thinking of sending him to an elocution teacher. Why not offer the lady company while his colleague was being trained in pronunciation? A nice but unrealistic thought. He smiled to himself. It started raining. No risk of cancellation, though; he had seen worse.

The GA pilot

His local flying club, located at an former air force base west of the big city, was housed in an old building from the 50s. The yellow building had several rooms, one of them with maps and other useful information for flight planning. He tried to get on to the Internet and file a flight plan. The computer needed replacing. It was slow, irritating and generally user-unfriendly. Anyway, he did not need to file a flight plan after all; his priority was to depart before the weather got worse. The cloud base was still acceptable, both outside and at the arrival airfield (he trusted the local forecast), but he was aware of that this could change.

The controller

He was handling departures and arrivals for the military air force base. To his left was the position for the final approach director, to his right the controller position for helping and coordinating military traffic crossing the civil TMA towards the south-east. The traffic intensity was relatively low and neither of the other two sectors was actually open. Not that they did not have enough personnel: the other control-



lers strangely preferred playing cards and drinking coffee; he liked working on his own. Three pairs of fighters had departed towards the north-east thirty to thirty-five minutes ago. They should be back in about ten minutes. He also had an activated flight plan on a military navigation training flight from the east, planning to fly VFR below controlled airspace.

The GA pilot

He got airborne and headed north below the TMA. He navigated using his car GPS; many pilots at his club used the same method. He remembered the discussion at the last club meeting: a salesman from a GPS company had presented new products. Interesting, but his car GPS was quite enough, he had decided.

He also remembered that ATC had recently asked to visit and inform club members about airspace infringements after a couple of VFR flights had crossed the control zones nearby without clearance, but his plan was already decided and he did not mind. He knew the airspace relatively well. After all, he planned to stay at low altitude avoiding the control zones, so there would be no problem. The visibility was OK; he could see increasing cloud ahead. Should it get worse he could always turn around.

He did not really like to disappoint his parents, knowing that they always looked forward to his visits.

The fighter pilot

Finally they got the exercise right. They had to make a few extra turns, but it was worth it; now they could head back to their home base. "You can lead us," he both instructed and asked his trainee. He got some unreadable answer and repeated what he had just said. He almost gave up, got irritated, but then calmed down, instead taking another turn to locate his colleague. "Follow me visually instead," he said. At the same time, they received instructions to contact approach control. "My fuel is on minimum," the trainee informed him. This time he understood his language. "It is actually below minimum," he updated. He noticed the tone of the trainee's voice changing. Low fuel was not unusual, but this time something told him that it was a bit more serious. He would ask for priority; in any case, they could rely on getting the shortest routing from approach, who were always excellent.

The GA pilot

Time to decide whether he should continue or turn back. There was a lot of cloud ahead, but above him he could

see blue sky, not a lot, but probably a big enough hole to climb through and check the weather to the north. He started climbing through twelve hundred feet; a few more hundred feet should be enough, and then he could descend again and continue north.

The controller

The first pair of fighters called on the frequency. They immediately declared fuel below minima. He was not surprised. They were number one anyway, straight-in approach, no frills, easy. He remembered years back when another fighter which was too heavy asked for an extension of the approach pattern. One minute later he declared he was short of fuel. When something happens, it happens quickly! Suddenly an unexpected aircraft called. It was the VFR from the east meeting low cloud and climbing. He saw the label far away in the civil part of the TMA; he started to coordinate and turned the aircraft away from other traffic. He looked back at the fighters; straight ahead of them he noticed a primary echo on the radar screen. It was exactly on final for the landing runway, still some eight miles ahead of the fighters. The echo was definitely an aircraft. It was now turning left, but although it should be below controlled airspace, something told him it was not. It was a strange feeling; his experience?

The fighter pilot

They were maintaining seventeen hundred feet, locked onto the ILS. His colleague followed him visually two miles behind. The fuel should be enough for him, he thought, thankful for no extra turns during approach. Normally they followed on radar. It was an excellent

Case Study - My hovercraft is full of eels (cont'd)

tool for locating other aircraft; even the altitude indication was correct. Now, although this was no longer officially allowed for some reason he did not understand, the trainee needed to switch it on, otherwise he would lose contact in cloud ahead. "Unknown traffic twelve o'clock six miles," the controller informed them, "twelve o'clock four miles." He looked ahead but could see nothing. He was just above a layer of cloud. The visibility was good, but the sky was empty, completely empty.

The controller

He focused on the VFR flight to the east. More coordination needed, back to focus on the finals traffic. The unknown echo had disappeared. Suddenly he saw it again. It was straight ahead of the first fighter. "Twelve o'clock half a mile," he called.

The GA pilot

He had tried to climb but unexpectedly met clouds; he had descended and now tried a second time to climb above them. Sixteen hundred feet and he was almost above the clouds, just two hundred feet more. He looked north, more clouds. He could definitely not see any church tower; better turn back.

The fighter pilot

"Twelve o'clock half a mile." Nothing. Then, like a bolt from the blue, a small aircraft passed to his left, climbing through the same altitude less than fifty metres away. It happened so quickly that there was no time to react. "Contact straight ahead. It's a Piper. Now it is descending again." His trainee sounded focused. **S**

Case Study Comment 1

by Radu Cioponea

Why did I feel this was coming the moment I read about the GA pilot's "preparation" for the flight? Of course, we all know that GA pilots are unprofessional, superficial, reckless and disrespectful of rules. Besides, they often think they're far better than they are, and like to show off. Of course this guy was going to cause problems not only to himself, but potentially to others too.

Next, why did I know this was coming the moment I read about the fighter pilot's predicament with his younger team-mate? But then again, we all know military pilots tend to be show-offs, think they're far better than they are, think they're entitled to all the pretty girls, are disrespectful of other traffic, fly those fast and ridiculously expensive aircraft, and pretend they must always have priority. So they can even disregard their own safety because someone else will make sure they get priority no matter what.

They're defending our airspace against intruders, after all.

So, why was it clear this was coming when I got to read how the controller was working and how the positions were organised? Of course, this particular controller liked his work. So much so that he, like almost all other ATCOs, thinks he's better than God, doesn't need a team next to him, takes unnecessary risks, thinks he's far better than he is and likes to show off how well



he handles the traffic, sometimes even at the limits of the regulations. But of course, they move the traffic safely and we all owe our lives to them.

OK, so the conflict was clear. The players were clear. The conditions were more than clear. Or was it all that clear? Let's pause for a moment here and take another look.

All those involved are humans, whether pilots or controllers. Yes, they are. Don't listen to any gossip to the contrary. Right, now that we've established that all of them are humans, we must accept that they're all very complex entities. They're likely to be very good at certain tasks. They're likely to think well, be imaginative, adapt well to new or unforeseen situations, and be able to recognise known situations; but they also have all sorts of limitations, as we all do. They can make mistakes. They can be stressed. They can forget or overlook things. Worse still, they can even have feelings! Don't we

all have the same limitations, as humans?

This is precisely why this situation developed. Because we had humans who are good at what they do, but not perfect. So there's this nice gentleman who's eager to please his parents, and he presses on regardless of his own concerns about the less than ideal weather. There's a potentially heroic pair of military pilots, who would not hesitate to fly into the fire if that were their mission, who have to cope with differences

Let's make sure we form a team, a proper team. In which communication is properly established, in which we know what others are supposed to do and they do it.

of character between themselves and are also bogged down by a communication problem. That's trivial, one could say. Who doesn't have communication problems? And finally, there's the brave ATCO who loves his job and takes great pleasure in doing even more than he should normally do. So what if the adjacent positions are closed because the controllers are drinking coffee and playing cards? He can still do a bloody good job of shifting aircraft.

All of the above are absolutely ordinary issues that we meet almost every day: the rush to get somewhere, paying little or no attention to the dangers

lurking along the way; our colleague whom we don't particularly love; or our other colleagues who didn't show up for that last meeting at which we had to prepare all alone. That's all fine. Because, normally, no one will notice. Because these things usually happen in isolation. But this time, the stars were in alignment. The weather deteriorated faster than the GA pilot had hoped, but his wish to reach his destination was stronger. The exercise was tough but had to be finished, no matter what. Military pilots don't have the luxury of failure. Neither do ATCOs. So regardless of the missing colleagues and the missing help, the job had to be done.

But all these things happened in the "right" sequence and within the "right" time-frame. The outcome was a bolt from the blue, passing to the left, less than fifty metres away. This time, chance didn't want to screw things up, and watched over our pilots. But what about next time? And the time after that? Are we willing to continue gambling on the presence of luck within those fifty metres? No, I didn't think so.

Then let's make sure that chance is not flying our aeroplanes or controlling our traffic. Let's make sure we plan adequately for our VFR flights, which are supposed to be visual and should therefore not be flown in clouds, and in particular not willy-nilly, chasing some elusive blue sky when the adrenaline is pumping. When, apparently, it's hard to see anything beyond the end of one's nose. Also, let's make sure we form a team, a proper team. In which communication is properly established, in which we know what others are supposed to do and they do it. Let's make sure that the only stars in alignment are the ones in the sky. **S**



Case Study Comment 2

by Dragan Milanovski



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is ATC training expert at the EUROCONTROL Institute of Air Navigation Services in Luxembourg.

Most of his operational experience comes from Skopje ACC where he worked for a number of years on different operational posts.

Now, his day-to-day work involves ATC training design as well as Initial Training delivery for Maastricht UAC.

This case study relates to an airspace infringement caused by an experienced GA pilot in a familiar environment but under complex meteorological conditions. His plan was to remain below controlled airspace, but he failed to do so. He had to climb to remain clear of clouds, and forgot to ask for a clearance, or was not completely aware of his exact position, or simply did not have the time to call.

Maybe he meant to say that he wouldn't sell anything. At least the pilot was aware that the weather could get worse.

Having the local knowledge and being familiar with the airspace did not help in this case. On the contrary, the flight could have been prepared better and various options could have been considered before departure.

Although there was no need to submit a flight plan, the pilot had made an effort to do so. Bearing in mind the developing MET conditions, this was a good idea (flight information service, possible diversion, change of planned level, alerting service, etc.). This is where his experience should have shown, and he

should have looked for another way of submitting the flight plan.

On the other hand, using a car GPS was not a good idea. Having a clear indication of where petrol stations and other places of interest are does not help when airborne. What helps is airspace structure, airspace boundaries, airways, location of ground navigation aids, reporting points and many other features commonly available on any GPS unit intended for use on board an aircraft. The "scary" part is that this was common practice; many pilots in his club were using the same navigation method. Analysing this event will probably make them aware of the associated risks.

Was it just the weather that caught him by surprise? One could argue that he made a series of "strange" decisions and that being an experienced pilot he should have done better.

To start with, he put himself unconsciously under pressure to fly. He did not want to disappoint his parents, who were always happy to see him. He kept pushing and delaying the decision until it was too late.

He did not bother to obtain a proper forecast from the MET office. He seems to have been afraid of what the forecast might be. Instead, he called a friend with local knowledge and experience, who in turn believed the forecast of the guy who sold vacuum cleaners: "it should stay dry."



The controller did well in this situation. Although he was relatively busy with coordination regarding the VFR flight from the east, he suspected that the primary target was not below controlled airspace, and passed traffic information to the fighter pilots. Maybe he would have had more time for this particular case if the other sectors had been open (especially the one that normally does the coordination), but I nevertheless do not think that he could have done anything better. Still, there is a sentence in there that bothers me: “the controller

liked working on his own”. Maybe he needs to reconsider his preferences.

The ATC unit was also trying to increase awareness about airspace infringements. Visiting the club and talking directly to pilots is probably a good way to start.

The trainee pilot had no problems identifying the Piper, which was not the case with the other fighter pilot. Was this because he was slightly behind, or because he had his radar on? It is definitely worth investigating.

MY RECOMMENDATION this time goes to the GA pilot. Being experienced and having the local knowledge of airspace and terrain allows you to use your skills more efficiently, but it cannot replace the basics learned in training. This incident could probably have been avoided if the flight had been properly prepared and if an appropriate navigation method had been used (even map reading would have been better than using a car GPS). Try to recognise situations where you are under pressure and act accordingly; avoid pushing it to the limits. **S**



Case Study Comment 3

by Martin Robinson, UK AOPA

Situational awareness, or more specifically the lack of it, is the only constant in airspace infringements, if, that is, we mean by situational awareness a state of knowing where the aircraft is, where it has been and where it is going in terms of the four dimensions of flight.



This process can never become fully automatic and always requires some conscious effort of thought. The pilot is vulnerable when there is high cockpit workload but perhaps also when complacent or distracted. Pilots can and do also sometimes misinterpret correct information, reaching the wrong conclusion by rejecting the right conclusion. This could be incorrect map reading - identifying the wrong town on a map, or not correcting for DI precession against the compass and believing the DI to be correct when it is 20 degrees off. It could also be setting the DI on an extended runway centre-line of '012' instead of '120'.

Fortunately, over the years, acronyms have been developed to help pilots such as FREDAC¹, or FREDACP, where the 'P' is 'position'. If this check is done every 10 minutes during a flight, it should help to combat poor situational awareness.

Finally, I am reminded of the following piece of wisdom apparently attributed to Albert Einstein: “Computers are incredibly fast, accurate and stupid. Humans are incredibly slow, inaccurate and brilliant. Together, they are powerful beyond imagination.”

Maybe he was thinking of GPS and pilots. **S**

SUGGESTED READING

- Human Performance and Limitations in Aviation by R. D. Campbell and M. Bagshaw - 3rd (online) edition 2008
- GPS Problem Areas article in SKYbrary

¹ - Fuel, radio, engine, DI, airspace, carburettor heat

Case Study Comment 4

by Captain Ed Pooley

We are reminded that although mid air collision is relatively rare, it can be a direct consequence of airspace infringement.



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He now works as an independent air safety adviser for a range of clients and is currently acting as Validation Manager for SKYbrary.

Of course, we also know that for every actual collision, there will be many 'near misses'. Sometimes, the subsequent investigation of near misses does not examine their context as well as it might, and is confined to the discovery of the root cause – in this case the airspace incursion by the GA pilot. It is perhaps understandable that in the 'real world', the rigour of an incident investigation is usually directly dependent on its actual rather than its potential outcome. But of course, except for the final details added by 'fate', the reasons why a near miss might occur need not of course, as in this case, be any different from those which might lead to a mid-air collision. So let us take this opportunity to examine the 'players' in this scenario and see what we can learn.

The controller clearly had at least a suspicion that the primary return which had appeared on his screen was a light aircraft in the vicinity of the base of his radar cover – temporary pre-occupation with establishing

separation for the 'VFR from the east' probably meant that the usual clue of an intermittent return from traffic near the base of the radar was missed but perhaps the likelihood was assumed by an experienced controller, who thus suspected that a climb towards the altitude of the fighters was a definite possibility. Since he had observed this traffic manoeuvring on the ILS LLZ track in 'good' time - well probably just over 3 minutes ahead of a possible conflict - he did have the option to attempt to vector the fighters around the traffic. However, this would not have been an easy response, given that a successful landing off this first approach was essential because of the low fuel situation. We do not have all the details, but it might have made it impossible for the fighters to establish on the ILS GS at 1700 ft and an attempt at any lower GS capture height might not have been sensible.

We were told that the 'Director' position was not manned but that this was because of low traffic density rather than a lack of controllers on duty. So maybe there was just enough time when the return was first seen to call the 'Director' into position and, in anticipation of that, to retain the option of vectoring the fighters temporarily off track if the unknown height return remained at their 12 o'clock and there was still a way to ensure that a landing was possible off their first approach. However, I accept that this may not in fact have been a realistic plan in these particular circumstances, and just

giving traffic information on the basis that the risk of an actual collision was much lower than that of the fighters losing control and crashing due to fuel exhaustion caused by breaking off the priority approach seems to be a not unreasonable choice.

Let's make sure we form a team, a proper team. In which communication is properly established, in which we know what others are supposed to do and they do it.

I therefore recommend that the ANSP involved considers whether a minimum 'return-to-position' time should be established when positions are shut down (or merged) owing to a lack of traffic as opposed to a lack of duty controllers. Such clarity could be useful when unexpected traffic situations develop and the controller with a problem needs to know whether re-manning of positions might provide a useful part of the ATC tactical response.

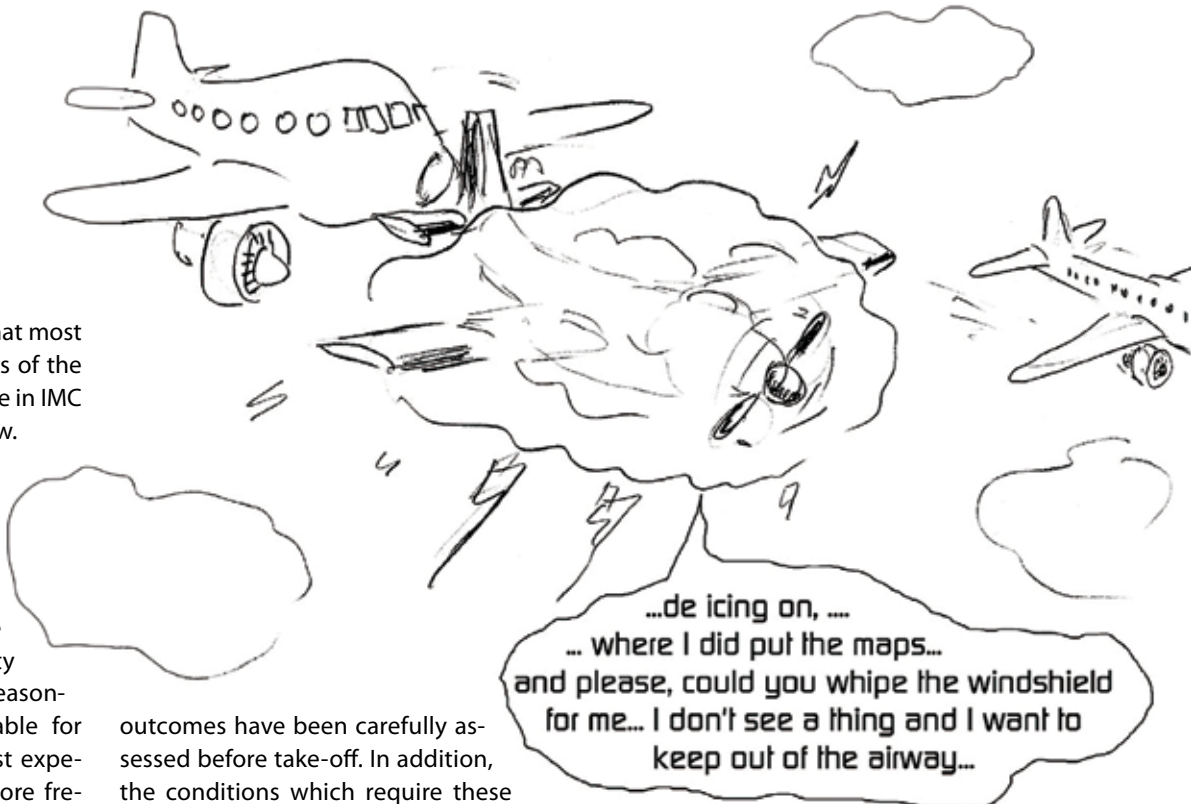
The fighter pilots took a typical and understandable view of the 'traffic information' they were given. With no height on it and low fuel status declared by the trainee, continuing

their priority approach was what most would have done. The chances of the traffic being at a similar altitude in IMC were effectively assessed as low.

However, military pilots should not be expected to routinely carry out practice exercises which easily lead to low fuel status and the subsequent need for a priority approach. This is of course a reasonable solution to have available for occasional use, but in my past experience it tends to be used more frequently than 'exceptionally'. I therefore recommend that this military base aligns its fuel loading policy for training sorties more effectively with the requirements of the exercise, if necessary limiting the maximum exercise duration so that the quantity of reserve fuel which can be carried will reduce the prevalence of 'priority approaches'. A distinction must be drawn in fuel loading and in flight management policies between operational missions and the more common training details.

The GA pilot is, of course, the 'offender' here - 100% the 'root cause'. His incursion invited my earlier remarks about 'defensive risk management' by the victims of his poor airmanship, but we must now take a look at his attitudes and their context.

VFR flying in potentially marginal weather is not to be undertaken lightly. Prior to any planned VFR flight, the pilot must make a very cautious assessment of whether completion of the flight under VFR can be guaranteed. Any flight where continued VMC may be questionable must be undertaken only after alternative flight



outcomes have been carefully assessed before take-off. In addition, the conditions which require these alternatives to be adopted in preference to a continued attempt to reach the originally intended destination must also be considered before take-off.

A decision to adopt an alternative such as a turn-back or an en route diversion will need to be informed by prior assessment (variously making use of a current aeronautical VFR Chart of at least 1:500,000 scale, current NOTAMS and current 'official' MET data) of:

- terrain clearance issues
- controlled and restricted airspace and other routine or exceptional aviation activity;
- potential weather complications, including lack of reliable pre-flight weather information and the options for obtaining updated weather information during flight.

This GA pilot failed to follow this scheme before he took off and was then faced with a situation which he had not fully considered before take-off in terms of either its occurrence or his response. This was a GA pilot suited to flying his single-engine

...de icing on, ...
... where I did put the maps...
and please, could you whipe the windshield
for me... I don't see a thing and I want to
keep out of the airway...

Piper only on a guaranteed VFR day ... and with an up-to-date chart on board, as well as the car GPS we were told about. The opportunities for pre-flight planning at his flying club were clearly not ideal, but this is frequently the case at small airfields, and simply demands from individual pilots a recognition of the limitations which it imposes on them. The less which is known, the greater the required margin for the unexpected.

A SAFETY RECOMMENDATION

A recommendation for the flying club which rented the aeroplane is that it is in its own interests to find a way of involving itself in pre-flight planning for flights away from base being made by its members in club planes. Since this goes for all flying clubs, I would also recommend that the periodic regulatory inspections made of all flying clubs should be required to look at the way this involvement is achieved and be satisfied that it is sufficient. **S**