



You live and learn

...or rather, you learn and live. Pat Malone reports on a uniquely valuable educational experience

I killed myself twice in ten minutes, but it could have been worse. First I hit a house, which was lucky because it stopped me slamming into some power lines in fog. Then I suffered something no-one has ever survived, a tail rotor failure followed by a vertical stabiliser stall in the cruise. The violence of the breakaway was

quite stunning, with the helicopter describing a corkscrew parabola across the sky as it broke up in mid-air – which was disconcerting, I can tell you.

On each occasion Rob Lewis hit the reset button and suddenly we were once again pootling along at forty knots and fifteen hundred feet with Shropshire spread

below us in all its rustic verisimilitude. For we were of course in a simulator, a full-motion replica of a Bell 412 with an 'outside world' as realistic as software can devise – realistic enough to give you a very real stab of fear when it all goes horribly wrong, again. You *know* you're in a sim, and you know you're not going to die, but



Left: Malone in the simulator, undergoing his most valuable hour of instruction
Above: simulator instructor Rob Lewis about to enjoy stressing out another victim

day job is teaching the *crème de la crème* of military pilots at RAF Shawbury. Rob Lewis has 5,000 hours of Search and Rescue experience in a Wessex and was the only Category A single-pilot SAR captain in the RAF, and I must be a hopeless klutz compared to his usual intake. His purpose was not to make a monkey of me but to take me where no helicopter pilot has ever gone and lived to tell the tale, just so I know where the edge of the world is, and to reinforce the message by stepping over it and into the fatal void. He can do the same for you, and I cannot recommend it highly enough.

RAF Shawbury is home to the Defence Helicopter Flying School, which trains helicopter pilots for all three services using the Squirrel and the Griffin, the RAF's name for the Bell 412. All the instructors are military or ex-military, and the sim is operated by the contractor FB Heliservices Ltd, a subsidiary of Cobham. Built by FlightSafety International a dozen years ago, it's far more sophisticated than anything a private pilot could ever hope to encounter, but it can be made available to civil pilots because the military have weekends off. As long as the routine maintenance is done and the sim is available for its real customers first thing on Monday morning, nobody objects if it's

used to teach civilians a thing or two. It's not cheap – maintenance engineers have to be kept on standby and the power required is phenomenal, equal to the consumption of the whole of the rest of RAF Shawbury. But you'll never get better value for money.

The simulator is a two-storey high thing that looks like a Martian lander, with wires, conduits and hydraulic pipes running up stinky legs which lurch, hiss, rise and fall as the poor sap inside goes through the wringer. Access is across a gantry, and once the door closes behind you the only motion clues you will get are the false sensations conjured up by the computers and reinforced by the flow of visual presentations on the screens in front of you.

Rob Lewis had created a full written briefing document in a folder personalised to me, which is not something you get at every flying school but which epitomises the meticulous and structured approach the services take to training – very different from our sometimes ad hoc, if not slapdash, procedures in civil flight instruction. We'd gone through a briefing over coffee on what we'd do; engine-offs, tail rotor failures, inadvertent entry into IMC. It was made clear that this would be tailored to my strengths and weaknesses, there was no detailed programme to follow, everything was flexible. The real value comes from loading the pilot up until his 'task saturation' curve turns into a vertical plunge to perdition, so he knows the exact whereabouts of his personal point of no

still the horror of the situation sets your heart thumping and your palms sweating. It's an experience you're never going to forget – which is the whole purpose of flying instruction, really.

I have had an hour at the stick of this simulator under the tutelage of one of the finest instructors in the land, a man whose

return. "At some point I might ask you to do a simple sum, say 17 plus 20," Rob said. "If you have to think about it, then you're close to your limit and you should use your remaining brainpower to land the helicopter. You're up at 90 percent, you're one straw away from breaking the camel's back. If you wait until you're at 99 percent, it's too late."

Stick 'n' rudder

A 412 panel is quite daunting to a single-engine piston chap, with a whole wall of clocks and stuff whizzing away. Ignore almost all of it, was the advice. You've got a stick, a lever, two pedals and a basic-T panel and that's all you need. Rob started her up and we got a bit of realistic padding, rattling and whining, just like the real thing – you have to smile. The sim can be configured as a Squirrel in an instant, and the torque altered from American-way-round to French-way-round at the flick of a switch, which is fun to do in flight when they're not expecting it apparently, that really foxes 'em.

The military work with stick trim, something with which the SEP pilot will not be familiar. In order to move the cyclic or pedals you must first push a button on the cyclic with your thumb to release the autopilot and allow the movement. If it doesn't come naturally this can be a motor function too far in times of stress, so Rob switched it off and we flew 'floppy stick' throughout.

Our 'flight' began from the apron at Shawbury and I almost backed it into the hangar on take-off, largely because there are few close-in peripheral ground clues. The limitations of the software mean you can't have a defined ground-air break – it's a sort of mushy area about five feet thick –



Top right: 'looking like a Martian lander', the two-storey high Shawbury simulator
Right: sim panel is daunting, but all you need is the basic controls and instruments

so you're not quite certain if you're flying or moving over the ground until you've picked up a knot or two. There's no visible rotor disc either. I didn't twig at the start that all the information I needed was on the radalt, another lovely piece of kit with which I'm not familiar, but once I included it in my scan I made a better fist of things. I pogoed and yawed my way out to somewhere flat, feeling queasy as the graphics twisted and tilted; Rob turned on the air conditioning outlets on the panel and overhead, which improved matters. Within a minute I could hold a fairly stable hover; forget the strangeness of it, relax, look out, fly the aircraft. Rob suggested a circuit – 70 percent torque and 70 kt for the climb, 45 percent for the cruise and 38 percent for a three-degree glideslope on the ILS. The queasiness disappeared as soon as we started to move. The terrain



around Shawbury has been mapped onto the software in great detail, with every tree, hill and house represented. It's not like looking at the real thing – it's a bit wooden and fuzzy, like looking at a TV screen that's too close to your eyes, but with the movement, the noise and the vibration it gives a very realistic impression of helicopter flight. In the circuit Rob cycled through some of the conditions he could throw at me – a blanket of low-lying fog, dusk, night, fog at night. The sim can reproduce every weather condition known to NATO from a North Cape whiteout to a Saharan brownout. I hacked out an untidy circuit, flew down the glideslope vaguely on the PAPIs and came to a rocky hover.

There's not much time for orientation, so

we climbed straight ahead to 1500 feet and would you believe it, we suffered a double engine failure. Usual procedure – lever down and stick back to 70 kts, pick your spot... at 200 feet start a gentle flare, which you tighten up as the ground approaches, then nose down and raise the lever firmly, hoping to get to the limit of collective travel at the point of touchdown. So far, so straightforward. At the push of a button we were back at 1500 feet and 40 knots – no time wasted climbing – and this time we had a drive train failure, complete with remarkably realistic clatters and vibrations. Again an autorotation, to a slightly less messy touchdown. Back into the hover, and the tail rotor failed. The helicopter lurched sideways, much more

violently than with a throttle chop in a 44, and the landscape began to spin. I rolled off both throttles, one of them perhaps not far enough – it's more than a wristful from stop to stop – and we turned through a full 360 before the ground rose up to thump us. I was working pretty hard, and already I was beginning to glow a little...

We clicked back into the cruise as Rob briefly recapped on the reality of tail rotor failure, as we'd discussed in the briefing. The vertical stabiliser will keep you fairly straight as long as you've got speed on, but don't be tempted to reduce the speed to find out exactly how much control you've got because loss of control will be almost instantaneous, irreversible and so stressful that the helicopter will probably break up.

Left: computer control room – tall cabinets for movement, darker cabinets for graphics
Bottom left: hydraulic pumps generate serious heat – doors and windows must be left open



Okay, let's do it. Post-engine failure, with left skid down and the ball out to the side the situation seemed eminently manageable, but Rob asked me to gently raise the nose to bleed off speed. It's quite difficult in a realistic simulator to carry on doing something you know will have a catastrophic outcome, but eventually we got there – the crab angle increased until down around 60 knots there was a sudden and violent breakaway as the vertical stabiliser stalled, the tail whiplashed to port and we began to cartwheel through three dimensions, the spinning fields of Shropshire rose up to smash us... and Rob hit the pause button. It was a supremely disconcerting moment and I was left breathless, hanging in my five-point harness looking straight down into a small copse on Hine Heath, trying to regain my composure.

"So that's how it would happen," I said.

"Yes, that's how it would happen," said Rob, flicking the display back to a benign 40 kt cruise.

Biggest killer

And then, some hard IMC, Britain's biggest killer of private pilots. We were heading west in unlimited visibility, not far above the treetops, until Rob introduced some mist – maybe eight kilometres of vis, which was fine... then the fog thickened a bit, which wasn't quite so fine, and I could see the mist resolving into cloud just above my eye-line. Ground features became indistinct in a way that would make you start to sweat.

"What's 15 and 17? asked Rob conversationally.

Not now, I thought – I'm busy. I was trying to reduce speed without descending into the trees or climbing into the cloud when suddenly – whiteout! I think I climbed into the overcast... I steeled myself and began a 180 degree turn on



the clocks, but the artificial horizon began doing odd things. I lowered the nose to try to get back under the clag, which isn't very bright when you're at 100 feet, then this house loomed out of the soup and with a bump and a sudden deceleration, the jig was up. It all took less time that it does to read about it.

So, we live to analyse it. Obviously I should have landed long before I went IMC. I pressed on because of where I was and what I was doing. I didn't have a plan for when I lost visual references... my training says you do a 180 on the clocks, so when my brain sought instructions, that's what I did. But the idea that I might just sneak under it took hold, and anyway, I never totally committed to instrument flying, I always had an eye outside, hoping for visual clues. I let the artificial horizon start waggling its wings, and I never had enough time to stabilise things...

Here's where military and civil training diverge – the RAF chaps who come in here have instrument ratings and can go up into it, sort themselves out and get radar guidance to safety. To the civilian pilot in



the small unstabilised helicopter, this door is closed. The trick, the only trick, is to get it on the ground before the moment of truth – long before. The problem for me was that everything was okay right up to the very point where it wasn't okay, and then it was too late. Unease turned to catastrophe in the blink of an eye. You have to quit while you're alive – not only should you not go there, you shouldn't go anywhere near there. That's a judgement call.

Finally we went out to the Welsh hills, taking advantage of the sim's ability to fly at 600 knots to get into Snowdonia – when we slowed down it felt as though we'd stopped. The hills rose beneath us, the vis reduced markedly and the ridge lines faded into the murk. As Rob pointed out, the lack of trees and buildings severely degraded my ability to judge distance. You need these visual clues, and if what you presume to be a proud pine tree turns out

to be a stunted bonsai affair – as happened to Rob on an SAR mission once – you can turn a drama into a crisis.

This time I was ready for it, and as IMC closed around me I had determined that I'd do what I could never do in an R44 – fly on instruments, climb and ask for a surveillance radar approach. I'm profoundly opposed to the current requirement for five hours instrument training in the PPL(H) syllabus because it gives people the idea that they might just get away with it, when in fact it will definitely kill them. I have a slight advantage in that as a fixed-wing pilot with an IMC rating I practice instrument flying regularly, and unlike a Robinson, a big relatively stable helicopter like the Bell 412 responds in a similar way to a fixed-wing aircraft. I was able to weave and undulate my way back to RAF Shawbury for an SRA and broke cloud on the glideslope. Had I been in an R22, I would have crashed.

What helped me enormously was a series of occasional one-word prompts from Rob: "speed", "height", or "attitude". This goes to the heart of one of his most intriguing observations, which is that we civilian pilots do not make enough use of other people in the helicopter. In an emergency, a military pilot will say to his co-pilot, "I will achieve safe flight – you check for dangerous indications." That increases his brain's capacity to deal with the problem of flying the aircraft. If you have another pilot with you, put him or her to work – look after the navigation and the radio, watch the Ts and Ps, second-guess you on the instruments, tell you where the wind is. Even if he or she is a non-pilot some useful functions can probably be undertaken, such as simple map-reading.

Below: Rob with his favourite helicopter, the Wessex, on which he has 5,000 hours

Anything that reduces your workload at a time of stress increases safety.

Service pilots go into the simulator mob-handed, two in the front and two in the back. This is because you can learn a great deal from studying the mistakes of others. It's instructive to watch the deterioration of a pilot's abilities as stress is piled upon him, especially if you then go through the same experience and find your own mental processes slowing down and your flying skills evaporating.

The hour passed in a flash, but I felt washed out. We debriefed over coffee, and I came away with my personalised folder containing not only instructions for emergencies but AAIB reports of accidents related to the common emergencies we face. As Rob says, there are no new accidents, just variations on old themes, and studying those that have gone before might just save your skin.

I firmly believe that this was the most priceless hour of flying instruction I have ever had, guided by the type of instructor we civilians never encounter and doing things nobody will experience twice in the real world. I have been to the ragged edge, looked over and fallen in, and lived to tell the tale. Where my awareness of my limitations was once amorphous and elastic, it's now based on knowledge and solid understanding. I know what to fear less, and what to fear more.

I will certainly do this again. It's more expensive than an hour of dual in an R44, but far better value. If you can get together a group of three or four pilots and book a Saturday at Shawbury with Rob Lewis. It'll cost about £500 a head for four, and its value transcends money. I have to say, just quietly, that it's also a heap of fun, and something you will never forget.

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