



Screen test

Glass cockpits are a wonderful boon to general aviation, but are you prepared for a total failure? Pauline Vahey recounts her experience

The greatest advances in general aviation since I began flying have come in the field of avionics. Light aircraft today have equipment and capabilities that a generation ago were the province of the passenger airliner fitted with an inertial navigation system the size of a small car and costing several million dollars. My Cessna 182T has a glass cockpit and an autopilot which is so useful that we tend to joke that at 1,000 feet on climb-out we engage the autopilot, get out the film and make the coffee. You get into the habit of letting the systems take the strain, and it makes aviation and navigation less stressful... but you must never come to rely on it because one day it will let you down, and when it does you'll have to be ready.

In my case I was a thousand miles from home when the Garmin G1000 in my Cessna suffered a double GPS failure. The secondary display froze on a topographical representation of some picturesque Albanian mountains, while the Primary Flight Display went black with a big red cross through it and presented the caption 'No GPS position'. Gone was the artificial horizon, gone was the direction indicator, the autopilot, the

familiar engine instruments.... it didn't give me a warm feeling. But I remembered the words of my instructor Eva Paul as she climbed out of the aircraft after a familiarisation flight. "It's a Cessna 182, Pauline," she said. "Whatever goes wrong, remember that – you can fly a 182, so just get on with it."

Sometimes at the end of a long flight, when the time comes to knock off the autopilot and hand-fly the aircraft to the ground I feel momentarily uneasy, as if I might have forgotten how to fly, as if something had somehow gone wrong and I was having to make an unplanned intervention. Other pilots tell me they experience the same feeling. The more equipment you have, and the better it is, the more time you spend letting the kit do the work, the more disconcerting it seems to hand-fly the aircraft like a Piper Cub. It's like committing to flying on instruments... you have to switch mindsets, use the other side of your brain, and there's a psychological obstacle – why should that be? I started out on gliders, I've hand-flown a thousand hours, you'd think it would come naturally. But it doesn't always do so.

I was a glider pilot for ten years and got

my PPL by the old route – when you had your Silver C you did an eleven-hour conversion onto power. That was 20 years ago. I thought of becoming a professional pilot but failed my Class One medical on eyesight, which was a blow. I had wanted to follow in the footsteps of my father, who was a Wellington pilot in the Second World War and who was, as it happened, very familiar with the territory in which I had my glass cockpit failure, having dropped supplies to the Yugoslav partisans in 1943. I remember flying over the marshalling yards in Verona and commenting to my passenger that my dad had bombed them, I'd seen the pictures – then checking the mike to make sure it wasn't accidentally open...

Our Cessna 182T is owned by a group of four pilots at Denham and we've had it for five years. It's our second 182; the first had conventional instruments, and I've flown it all over Europe and to north Africa. When it came time to change planes we looked for something more sophisticated. The choice boiled down to the Cirrus, the Diamond Twinstar and the C182T. We tried them all and eventually chose the Cessna, which offered long range – longer than any of us can match – good speed (133kt cruise), comfort, proven reliability, the ability to use shorter strips, and lower capital, maintenance and operating costs. It hasn't let us down, apart from...

We bought G-IJAG from Wycombe Air Centre (as was) when it was six months



old and had very few hours on the clock. After our last 182, which had a rarely-used wing-leveler and little else, it was a revelation. At the time there seemed to be no standard way of converting onto a glass cockpit aircraft, but getting comfortable with the screens wasn't a problem; we all settled into it very quickly. I hadn't previously flown with Garmin kit and I found the interface less intuitive than I had hoped; one really has to read the books, play with the sim on your PC and get to know the nooks and crannies.

The G1000 glass cockpit has a ten-inch Primary Flight Display (PFD) in front of the left seat and a Secondary or Multi Function Display (MFD) on the right of the panel. The PFD shows an attitude director indicator (ADI) with speed bar to the left of

it and altitude bar to the right, and a vertical velocity indicator ribbon replacing the VSI. The HSI is immediately below. They're grouped together quite tightly so your instrument scan is almost a matter of taking in everything simultaneously, rather than scanning in basic-T fashion. There's no balance ball – instead, there's a bar at the top of the ADI readout that moves left or right in the same sense as a ball would. At bottom left you can choose to have a duplicate of the secondary panel inset, and at bottom right you can choose to display GPS data. There's a cursor knob right of the primary display, and you use it to enter your route into the flight management system. The GPS information box in the primary display has 'nearest airport' functions, and with the cursor you can get

the information you need and switch to their frequency. The system incorporates dual nav/com radios and dual GPS receivers.

The MFD display gives map, terrain, and weather information, displays the engine instruments and incorporates pretty much everything you can select yourself. If you lose the primary display the secondary becomes the primary, and if you lose or switch off the secondary, the engine instruments automatically pop up on the primary. There's a KAP 140 autopilot that slaves either to the GPS or the VOR, both of which, of course, require the glass cockpit to be in good working order. If it's not, you have three steam-age standby instruments at the bottom of the panel in the middle – ASI, artificial horizon and altitude indicator.

As an aside, I personally don't think the glass cockpit is as easy to fly on

Far left: standby instruments on the 182 are adequate but not ideally placed
Top left: our first Alpine pass was blocked by weather, but we had Plan B ready
Left: Between Alpine peaks en route from Kempten in Germany to Portoroz

instruments as a conventional panel. It's all about the picture of where the needles on the instruments should be that you keep as an ideal in your mind, and you don't get that with ribbon presentations.

The autopilot was a real blessing, and I soon found myself switching it on early in the trip and flying on the bug.

We are part of a loose group who meet in The Falcon in Denham village on the first Monday of each month and decide around Christmas where we're going to go for a fly-out the following summer. Usually we go out with four or five aircraft, and for 2011 we decided our destination was to be Tirana in Albania. We tend to do our own thing, flying separately and meeting up in prearranged places. This year there were six aircraft, so we split into red wing and blue wing, three aircraft each, otherwise things can get unwieldy. Long trips in good company are a lot of fun and improve your airmanship and your skills; I always find that at the end, I'm taking ten minutes to do a flight plan that might have taken me half an hour at the start.

Fellow group member Robin Wick and I set out from Denham and stopped overnight at Kempten in southern Germany. Next day we took off to fly through the Alps, but the weather ahead didn't look at all inviting so we fell back on our Plan B, which was to take a lower pass further east. As it happened we also had a Plan C prepared, which would have taken us around the mountains, but in the event we got through and found ourselves in the sunshine over the north Italian plains, cruising towards Venice and congratulating ourselves on the fact that

we are ready for pretty much any eventuality.

I've always been a stickler for lines on charts, and for stressing the old mantra – aviate, navigate, communicate. Years ago, I was in the back of a 172 with the owner in the left seat and an instructor in the right, and we were on finals for Denham with full flap when we had a complete electrical failure. These two started clucking and faffing about, and I said, hang on, we're on short finals for heaven's sake, let's just land the thing... which we did, obviously without incident. You've got to get your priorities right.

We met our friends from Denham in Portoroz, Slovenia, and some were making plans to go somewhere other than Albania, partly because the weather was not forecast to be good and partly because these fly-outs are always a little ad hoc, and people peel off when they think of something interesting elsewhere. Some were put off by the difficulty of getting



Above: Portoroz on the Slovenian coast, where we began to experience severe turbulence

Left: Alpha Golf on the tarmac at our destination, Tirana in Albania

Bottom left: our 182 with the only other Denham aircraft to reach Tirana, the TB9

permission to fly into Tirana, but Robin is extraordinarily persistent and just wore the Albanians down with an endless stream of phone calls and emails. Three of us decided to go on, and flew south along the prescribed VFR route on the Adriatic coast. The wind was off the mountains and the turbulence was as bad as any I've known. As we were thrown about, the normally-mauve indications on screen started to flash yellow and a caption came up saying 'Unsure of GPS position'. Robin was flying so I pulled out the manual, and we decided that one of the GPSs had tripped out – because the system could no longer cross-check its data, it was warning of possible inaccuracy. Not a problem; the GPS is only a back-up for lines on charts, and we carry an extraordinary amount of paperwork in the aircraft – we call it the 'British Library' – including a full set of European Jepps, updated monthly.

When we got to Split in Croatia one more of our group dropped out, leaving only ourselves and a TB9 from Denham. I flew to Tirana, and after two nights in Albania we flew back to Zadar in Croatia. It was on take-off from Zadar that something went wrong.

I was taxiing out to the threshold when suddenly my PFD screen went blank and a big red cross appeared, with a caption saying 'No GPS position'. We still had the MFD, and we discussed the situation only briefly... we had the standby instruments, the likelihood of being able to find a Garmin engineer in Zadar was not great,



and as usual we had everything we needed in paper format. There's nothing wrong with the aircraft, merely the display. Throttle forward, and off I went.

The terrain was hilly, rising to mountainous, and we knew there was bad weather ahead. Soon after we got airborne, the lack of a DI came home to me. Trying to fly accurately on the compass takes practice I hadn't recently had, so I asked Robin to tell me whether it was thirty degrees right or forty degrees left or whatever – you can time a turn and roll out pretty accurately without looking at the DI. It was soon obvious that the MFD, which usually carries the engine instruments as well as the moving map, had frozen. Leaning off, normally done

Above: about to turn finals at Zadar in Croatia – on take-off from here, it all went wrong
Below: the multifunction display froze on a topographical representation of Albania
Right: new technology or old? A Zeppelin in the circuit at Friedrichshafen

with reference to the CHT on each cylinder, was done by ear.

We had planned to fly east around the Alps, filing for Wiener Neustadt in Austria and thence to Friedrichshafen. I flew with reference to the three standby instruments, which are not ideally placed, being low on the panel and off to my right, but were perfectly adequate. En route to from Wiener Neustadt to Friedrichshafen, the PDF suddenly came back up again. I

asked Robin to switch off the still-frozen MFD. It was a distraction anyway, but if it is switched off the engine instruments automatically switch to the PFD. So now I had everything except the flight plan, GPS guidance and the ability to slave the autopilot to the GPS. With the PFD working, I was able to slave it to the VOR, so we crawled across Europe, finger on map, looking out of the window and cross-checking with the beacons.

Unfortunately, we were heading for some pretty impressive-looking weather. The Croatian controller warned us of storms ahead, and the first Austrian controller repeated the warning. We had just passed a useable-looking airfield and thought we might go back and work things out on the ground. Normally I would have pushed the NRST button and brought up on the MFD everything you'd ever wanted to know about the airfield, but now it was a matter of figuring out what it was from the chart, then referring to the British



Library and working it out from there. It turned out to be Wels in Austria, and when we landed we found that the entire Denham contingent had dived for the same bolt-hole. So we made a night of it, and continued in the morning when the weather had passed, via Friedrichshafen to Troyes and Denham.

It transpired that both GPS aerials had broken and had to be replaced, and I can only think that they were damaged in the appalling turbulence off Croatia. But it was a valuable flight in impressing on me that practising for equipment failure is not just a theoretical exercise, and the more sophisticated your kit, the more you have to expect it to fail, and the more you have to practice. Always have your track on a chart, always have a Plan B and a Plan C. The lesson is – be prepared, practice for it not as an academic exercise but as a rehearsal of what you will do when, not if, it lets you down. And don't let such failures worry you unduly; you've got the yoke, the rudder and the throttle, and even in today's technology-rich flying environment, you need nothing more. ■

