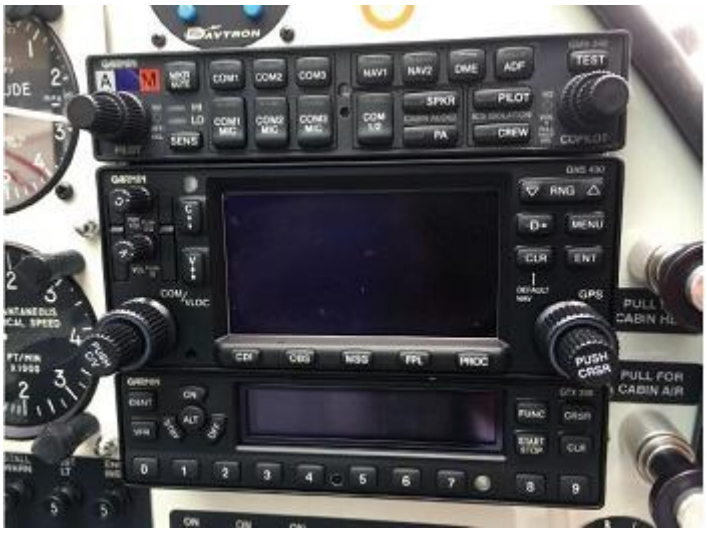
Navigation: The CAA's New Thinking

If you have been a secret follower of the magenta line on your moving map you will be pleased to hear that this is now the recommended way to navigate. And if it packs up en route you are urged to call Radar or Distress and Diversion and not mess about with some arcane Lost Procedure.

There is something of a sea change going on in the world of GA navigation, something which in my opinion is about twenty years later than it need have been but is all the more welcome. Of course, those who resist change, and there are far too many of them amongst us, will continue to cling to the old and trusted ways, and never mind all this new stuff about 'evidence based'. I listened to one of them give a talk recently advocating some pretty fancy work with charts, a ruler with slots cut in it at 10 nm intervals and an impressive array of cabalistic notes to scatter about your paper chart to keep you on track. He scorned the use of a transponder, declared that NATS controllers are on a hair trigger to book any transgressors of their hallowed airspace (do they have 'targets' I wondered) and appeared to favour 600 ft AGL as the best height for route flying. He admitted that GPS might have some uses although it is clearly poised, in his view, for total obliteration at any moment by ill wishers throughout the land equipped with jamming devices. This made a slight change from his predecessors who liked confidently to predict the collapse of GPS navigation at any minute because of the existence of multifarious black holes in the system. You might have imagined that by contrast no VOR/DME or ADF system had ever failed in the history of aviation nor had any Dead Reckoning navigator ever got lost.



This radio and GPS stack is installed in an Aviat Husky - the sort of kit to be found in up-to-date SEPs with panel GPS.

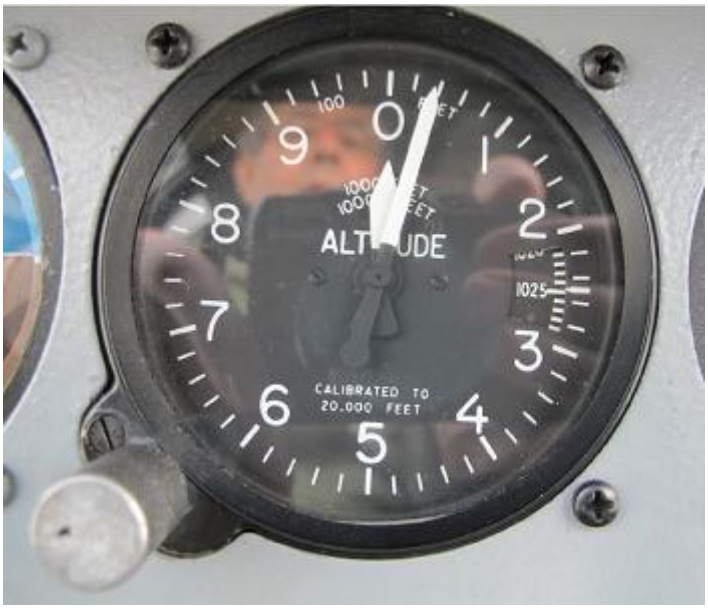
His talk took me back to my days of 'pilot navigation' training in the RAF. We were taught to a great extent to use the hallowed One in Sixty rule. The fundament of this Knowledge is that one degree of arc subtends one nautical mile at 60 nm distance. Armed with this precious truth navigation becomes childishly simple. So simple that you can do it all in your head.

Thus at 17 nm from your next waypoint you discern that your actual position is 2.5 nm right of your track. What correction should you apply to your heading? Simplicity itself! If you were 60 nm distant and 2.5 nm out your track correction should be 2.5 degrees. If you need to correct with only 17 nm to run, well that is under one third of 60 so you need to apply over three times the correction - say 8 deg. Alter your heading 8 deg to the right and all will come good. So went the theory.

In practice this method tended to fail if only because we were seldom very sure of our actual position in the first place, so that confidently deciding that we were 2.5 nm right of track was fanciful. In reality we were more likely to navigate by easily recognised landmarks such as railways and coasts, trying to keep these in sight rather than religiously following a straight line from A to B. That worked well enough and was within our limited capabilities. Many of us found mental arithmetic while flying at the same time somewhat beyond our lowly pay grade.

These days, however, life has become enormously more complicated for the humble pilot/navigator because of the arrival of vast tracts of Controlled Airspace (CAS). To complicate matters further, CAS varies vertically as well as horizontally so that a track that seems to take you around a CTA can easily land you in trouble because you have forgotten that the extent of the CAS at, say, 3000 ft is greater than it is at 2900 ft. Or maybe your altimeter, set to the QNH of your departure airfield is a few hectopascals short of the QNH in force for the CAS, putting you over 3000 ft on their QNH. Either way, you are now an infringer and, according to my lecturer, you will now have some controller dancing for joy. Actually, with the complications of a sudden increase in required separation, joy will definitely not be that controller's reaction.

Without a doubt, the more time that you spend in planning a route the less likely you are to get into trouble when you fly it but I reject the notion that sticking to the old religion of chart, stop watch, lines on the chart and continual inspection of ground features is the best way to address navigation amongst the jungle of CAS to be found in the SE of England. If you had someone else to fly the plane, look out, and do the FREDA checks that would be fine but combining all those duties in one operator, especially one who does these things only occasionally and for fun, is asking for trouble. And trouble we get aplenty. The last time that I inquired we were crashing CAS at the rate of once every 12 hours and things have probably got worse since then. Quite simply, navigation by the old methods is beyond most of us when it comes to threading our way between complicated CAS and things have to change. Add to any flight, however well prepared, a distraction – you drop one of those coloured pencils, you receive a traffic warning, the weather is closing in or whatever, and most of us quickly become unable to navigate with the precision required to stay out of trouble.



In today's CAS-intensive airspace, you are going to rely quite a bit on your altimeter ...

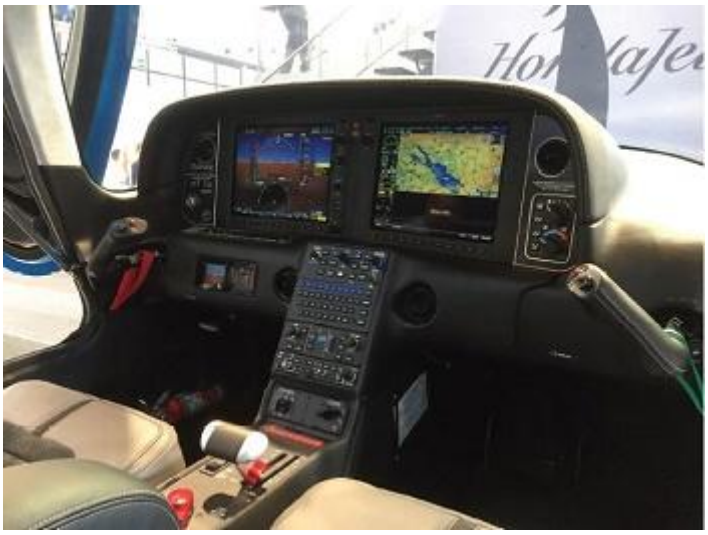
In the world of competition gliding the penalties imposed for crashing CAS have always been so severe as to put any serious competitor out of contention, so staying out has always been an essential. If that is difficult to a power pilot flying a prepared route, imagine how much more difficult it is for someone circling in a thermal, avoiding other gliders close at hand in the same thermal, striving for a better rate of climb than the others and planning the tactically best moment to leave the thermal and press on. Well, necessity is the mother of invention and long before Mr Garmin had started offering pilots magic boxes which in the early days were based on lat/ long positions and were demandingly difficult to master, the competition gliding community had devised their own moving map systems mostly presented on the iPAQ (remember them?).

So the competition glider pilots had solved their navigation problems some twenty years ago but the power pilots were subject to a constant barrage of warnings from the hidebound rear guard about the multiple perils that GPS posed. It wasn't reliable, it would lead to laziness and dangerous dependency and then, one dark day, it would fail just when most needed and the pilot, who would by then have forgotten all the old navigation skills and thrown away pencil, stop watch and chart, would crash and burn. So, for some decades, we soldiered on. Private pilots were solemnly taught the old and hallowed ways of navigation and GPS was never even mentioned. It was your schooldays all over again. You were taught biology in the classroom and learned about sex behind the bike sheds.

Given that the culture of UK GA training stems mostly from the RAF Central Flying School of a decade or more ago and that military people tend to be conservative by nature, this bizarre state of navigational affairs might have continued for a decade or so longer were it not for NATS. This is a fundamentally commercial body, subject to commercial pressures. If you ever wonder why commercial aviation has a so much better safety record than private flying you have to appreciate that crashes are financially disastrous for airlines. The public have to believe that commercial flying is very safe before they will buy tickets in large numbers so the commercial pressure to make flying very safe is paramount. Private flyers, like motor cyclists, divers and horse riders, are willing to accept a degree of risk for the joy of participation, so their

safety standard falls somewhat short of commercial flying. To NATS the significant difficulties imposed by infringing aircraft delaying or diverting commercial flights plus the ever present possibility of an incident or accident leading to far worse losses have motivated them to take action. While the CAA appears to regard safety in a somewhat abstract fashion, round at NATS keeping infringers out of CAS goes beyond non specific desires and constitutes a serious threat to profitability. There is, quite simply, a compelling business case for keeping infringers out and the commercial pressure to get this sorted goes way beyond the CAA's apparent corporate hope that GA safety statistics will show a slight but continuing improvement year by year.

So for some time now NATS and others have been on a mission to solve the infringement problem. They have not been helped by GA continuing to teach and examine for the age old navigation techniques, regardless of their ineffectiveness when it comes to infringement of complicated CAS. NATS and others have pushed for the detailed analysis of each infringement so that evidence can be assembled as to where we are going wrong. A revealed truth of this analysis is, surprise, surprise, that pilots who carry **and use** modern moving map systems comprise a very small proportion of the infringers.



All of a sudden the cat is out of the bag. Although it flies in the face of all the old weary, grey haired predictions it turns out that the people using this new stuff, the people who, as seen by the old guard, are basically cheating, are the good guys. And those stuck in the mud of the chart and stop watch have become the backsliders.

So it's not just a few weird boffin glider pilots and other assorted crazies who are preaching the gospel of navigation by moving map - it is now mainstream. it's Official. Why? Because NATS need to get those infringers out and the evidence that they have campaigned for is irresistible. How do I know this? You tell me that your instructor still clings to the old ways and says that teaching moving map navigation is almost impossible because of the lack of standardisation between systems?

Sorry, but it's now gospel. I quote from the *Skyway Code (CAP 1535)* at page 131:

LOST
With the widespread use of GPS systems, cases of being completely lost are thankfully rarer

than they once were.

However, such systems are not universally carried, and even if they are (which is recommended), they can be misinterpreted or fail.

If in contact with an ATSU that has radar, ask them to clarify your position.

If not in contact with an ATSU call Distress and Diversion 121.5 and ask for assistance.

Prior to establishing contact with either an ATSU or D&D, squawk 0030 – this will alert other ATSUs that there is a lost aircraft.

Orbit near any prominent landmarks that could be described to ATC. Do not continue to fly aimlessly.

The 'expert' lecturer on navigation had obviously seen this and felt duty bound to pay lip service to it. He recommended that you perform all those old tricks with chart, copious post-it notes and so on and that you also run a GPS system but consult it only occasionally just to confirm that it agrees with your own ‘proper’ navigation.

He never said what you should do if they did not agree but I know very well what my first instinct would tell me. Having briefly mentioned speaking to Radar if lost he then set about a prolonged disquisition on Lost Procedure straight out of some 1950s manual. It did not include speaking to anyone else on the radio.

Unless you are sure that all your future flying will be done well away from CAS, my advice to

you, backed up by CAP 1535, is, if your already have some moving map system - use it seriously. If you have not got one- get one - and then be sure to use it all the time.

Sooner or later the system will fail you, as will any other equipment. It might overheat and turn off, it might need re- booting and you have not time or spare capacity to do it just now, or the battery may have run out. Maybe that phantom GPS jammer will at last have his wicked way with you. If the system stops, don't play with it. Unless you are absolutely confident of your present position and your ability to continue unaided with ease, fly orbits, squawk 0030 and get on to Radar or D & D. What you have is a navigation emergency and you are positively encouraged to request help NOW. Not after further messing about while you may be in or near CAS but straightaway. The controller will be glad to hear from you and keen to help. You will have handled your emergency well.

I'm thinking that it's going to take an awfully long time for instructors and examiners to accept this new way of navigating. For some years to come they will cling to the old religion but the writing is already on the wall - well on p 131 of the Skyway Code actually.

Nigel Everett

[*These are my personal thoughts and not necessarily those of GASCo. Ed.]*

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