

Instrument Pilot

The PPL/IR Europe Magazine

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"Arriving precisely at East Midlands"

(P-RNAV trial)

By Vasa Babic



Cockpit of the Cessna 421 used for P-RNAV trial

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Oxygen in general aviation

1 Precision area navigation (P-RNAV) is
2 gathering pace in Europe – a number
3 of countries will introduce their first
4 standard instrument arrival and departure
5 routes (SIDs and STARs) requiring P-
6 RNAV compliance in 2008. Although
7 there will be 'conventional' alternatives
8 available for the foreseeable future, our
9 view at *PPL/IR Europe* has been that
10 we should be involved alongside other
11 stakeholders and airspace users in this
12 important development. Jim Thorpe, our
13 chairman, has been working with the UK
14 CAA on P-RNAV compliance for GA, and
15 I have been working with the FAA's New
16 York International Field Office.
17

18 I received a P-RNAV letter of
19 authorisation for my N-register Cessna 421
in November 2007, and the next step was to
fly some procedures for real. East Midlands
Airport (EGNX) has a trial of P-RNAV
arrival procedures running. Figure 1 shows

an extract from the chart for two procedures
for runway 27 ILS final approach and is
reproduced with the kind permission of the
CAA.

☞ NEMAX 2B starting at LONLO to the
west of EGNX

☞ NEMAX 1A starting at VELAG to the
south of EGNX

Jon Cox, the ATS Manager, was very
positive about having a piston GA aircraft
participate. I have to thank Jon, and the
ATC staff at East Midlands who kindly
accommodated my various requests and let
me fly both procedures in full, amidst the
normal flow of commercial traffic.

This article is a condensed version of the
report I submitted as part of the trial. It
is available in full in the members' forum
at www.pplir.org. For more details on P-
RNAV, the Eurocontrol web site has an
excellent set of resources at <http://www.ecacnav.com/PRNAV>.



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For reports on meetings, conferences and other activities attended in the last 12 months by directors and members of the executive on behalf of PPL/IR Europe members, see www.pplir.org – Lobbying



The new editor has landed...

On one December day, stuck indoors with weather not very friendly for flying, I was idly reading our Chairman's appeal "**IP Editor required**"... "A role that's interesting but which does not make too much of a demand on your time or require any special skills." He made it sound so easy ... "Hey, I'm managing to do it this month so there is irrefutable proof no special skills are needed."

Even for me who has done nothing quite like it before? Maybe I should have been a little more suspicious at the great speed with which our Chairman responded so positively when I volunteered.

I have very quickly acquired the greatest respect for my predecessor, David Bruford, for doing it so well and for so long. My thanks also to him for being so helpful over the handover – although come to think of it, he too probably didn't want to frighten me off! I duly rewarded him by asking why he had never used his extensive professional background to write an article for IP on general aviation insurance. He took the hint and **Getting the best value for money from light aircraft insurance** is published in this issue. I hope you find it as helpful as I did.

So who am I? PPL (A) achieved 4 years ago plus an IMC in the meantime, though I really really want to complete my instrument rating to increase my options for European touring. The theoretical knowledge exams have all been done - relatively straightforward with sufficient time and a good ground school (GTS at Bournemouth). I am part way through the flying training but have found it really hard both to fly accurately enough and to cope with the cockpit workload (age 60 imminent may

not be helping, wish I had started younger). And I fly a glass cockpit PA32, a Piper 6X, that I brought back from Florida last summer with a bit of help from an excellent ferry pilot (Stuart Mills).

With the arrival of a new editor comes a fresh opportunity to comment on IP. This is your magazine and I need you to tell me what you like and dislike, and what you want and don't want.

There must be some budding authors out there with something to say. At present most of the articles in IP tend to be written by a small number of people. There's room for your articles too! Perhaps you've had an interesting flight (technically or otherwise); experienced and solved a particular problem; found a useful, different way of doing things; or undergone training somewhere and have learned something worthwhile. Please consider sharing your successes. Or perhaps you have become incredibly frustrated, and could - in desperation - write a letter asking other members for assistance for me to publish to IP!

And if I don't have enough material for an issue I may have to start writing articles myself - trust me, you won't want that to happen!

Be gentle with me for a while please but don't let that stop you telling me what you think about IP, preferably by email.

David Earle,
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theditor@pplir.org



P-RNAV trial
continued from page 1

Avionics and autopilot

The 1978 Cessna 421 used for the flight is a pressurised piston twin, equipped with a hybrid of original and retrofit avionics - fairly typical for this class/age of aircraft. The primary flight instruments are conventional, electromechanical ADI and HSI. The autopilot is the original Cessna "800 IFCS" system which provides HDG and NAV tracking modes, altitude capture/hold, and ILS coupling.

The main avionics units are two Garmin GNS480s. These are WAAS approved GPS/Nav/Coms, similar to the Garmin 430W and 530W series. There is also a roll-steering converter fitted, which allows the GNS480s to 'drive' the autopilot heading mode with lateral navigation (LNAV) guidance from the active flight



plan. However, both trial P-RNAV procedures were entirely manually flown. The aircraft has 2 multifunction displays with 'JeppView' chart and terrain/traffic/weather output.

Pre-flight planning

I had been given a report of a previous trial by a Learjet crew. This was very useful in highlighting key points of the procedure one needed to plan and brief carefully e.g.

- the QNH change when passing a designated waypoint on each procedure
- the lack of a level-off before the intercept of the ILS glidepath

The conventional IFR Jeppesen charts were consistent with those published for the trial. I thought the P-RNAV presentation was very clear. I don't think it would have caused any difficulties to a pilot seeing this new type of chart for the first time. The "callouts" which depict altitude and speed limits stand out well and are very usable in-flight.

Loading and checking the procedure in the GPS before start-up

The P-RNAV procedure names in the GPS database were the same as on the paper charts so there was no ambiguity in selecting the right procedure.

I did find one apparent coding discrepancy. In the paper charts, NEMAX is the initial fix for the ILS27 approach, and is followed by the final approach waypoint, FAP ILS27, at 5.2nm from the threshold. In the GPS database, the FAP is not part of the procedure; instead NEMAX is followed by a waypoint named "CI27", 7.1nm from the threshold. This is the final approach course fix, often introduced in area navigation (RNAV) databases (the "C" designates a final approach course fix, the "I" that it is associated with an ILS approach, and the "27" corresponds to the runway designator). This is illustrated in Figure 1, where the large arrows highlight the waypoints in question.

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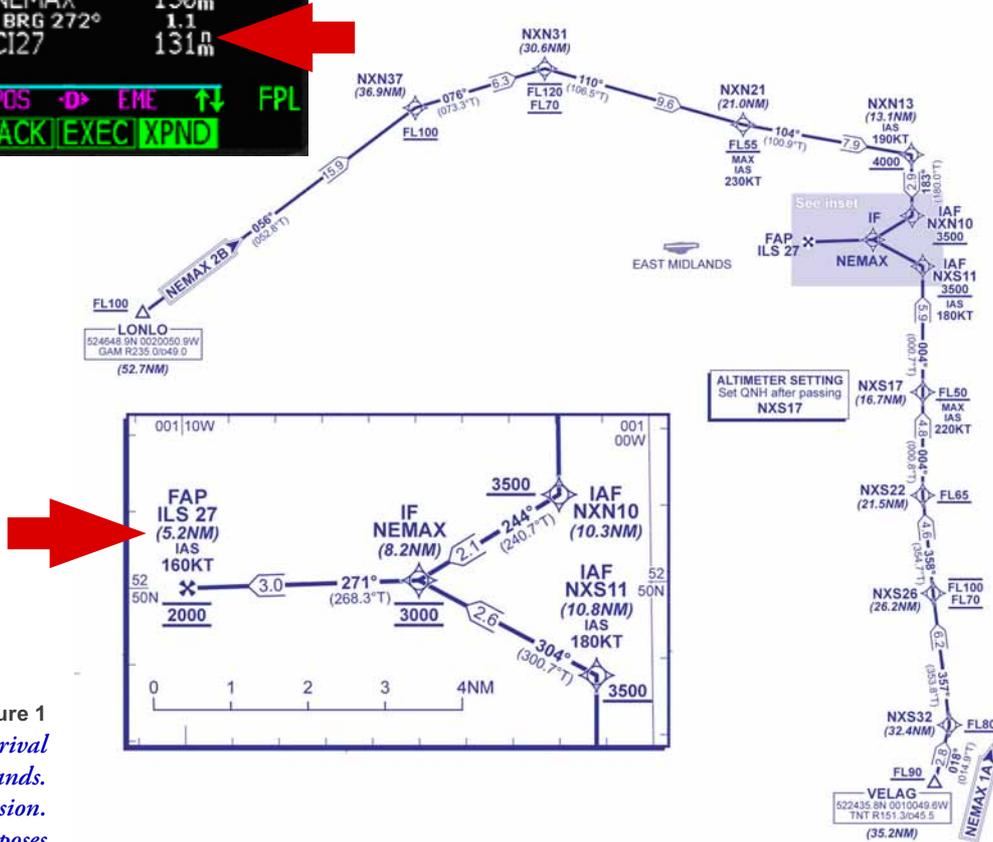


Figure 1

Part of the trial P-RNAV arrival procedure to runway 27 at East Midlands.
© CAA, reproduced with permission.
Not to be used for navigation purposes

◀ This is a good illustration of why one has to check RNAV databases against paper charts – the time to find puzzling discrepancies is not whilst flying the procedure!

Flying the NEMAX 1A

I flew the procedure manually, starting at FL90 at VELAG. I think it is easiest to describe the experience in terms of three distinct pilot tasks, lateral navigation (LNAV), vertical navigation (VNAV) and speed.

LNAV

Much of the equipment and training emphasis associated with P-RNAV is about LNAV and assuring that the required accuracy (RNP-1 i.e. within 1nm for at least 95% of the flight time compared with 5nm for basic area navigation) can be safely met. I found LNAV the most straightforward part of the procedure. Following a sequence of RNAV waypoints, with precise turn initiation and turn path guidance from the GPS, is significantly simpler than following a conventional procedure. The GNS480 depicts a magenta line computed path for fly-by waypoints on the map display that makes track guidance very clear. However, just the GPS text annunciation was sufficient. I found that if one followed a 10 second “countdown” to turn initiation, and then promptly rolled into a rate 1 turn when the “Turn Now to Track XYZ” message was displayed on the GPS, the procedure could be flown very accurately.

The GPS also displays a CDI and drives the HSI CDI when selected as the nav source. In practice, I found I did not really use the 2 CDIs. The combination of the magenta line map, the digital cross-track error display in nm and the actual ground track display were the 3 most useful references for establishing and maintaining a suitable heading. During straight-line legs and small track adjustments, I could keep the cross-track error within 0.05nm. The maximum cross-track error I believe was less than 0.1nm, during the turn to NEMAX.

Ahead of each turn I manually reset the HSI CDI to the new track at each waypoint, as soon as the “10 second countdown” began, and then reset the heading bug when established on the next leg track. Although the GPS map provided better primary guidance, I did find this process a useful way to mark the start and end of each turn, and to provide a back-up to the GPS map (for example, if, due to distraction, one deviated from track with the map zoomed in and ‘lost’ the magenta line, or needed to select a

different GPS page display in order to load the approach procedure)

Perhaps the “nicest” part of the LNAV guidance was the final transition to the approach. By following a continuous sequence of RNAV waypoints from 35nm out, you end up perfectly aligned on the localiser with a wind-corrected heading established. This felt “smoother” and easier than manually intercepting from a radar vectored or procedural turn.

VNAV

In this aircraft, there is no VNAV guidance available from the GPS, and thus altitude limits had to be read from the paper chart and rate of descent managed manually from raw data. This felt more demanding than following LNAV commands from the GPS. I targeted being at the minimum flight level/altitude at each waypoint. The procedure has a gradient of 300ft/nm, except for the shallower first two segments from VELAG to NSX26 (9nm and 2000ft descent). This is helpful, because it allows you to establish the descent initially and then follow a rule of thumb of “descent rate (fpm) = 5x Ground Speed (knots)” for the rest of the procedure.

I found it reasonably straightforward to meet the altitude targets, although the descent profile was not quite continuous. Before each waypoint I found myself applying pitch changes to make sure I would be low enough to meet my target altitude, and often briefly levelling off just before a waypoint. It might have been easier, and certainly smoother, to target being 200ft above the minimum limit in order not to have to level-off if the target altitude was reached slightly before the waypoint.

Speed

Vno for this aircraft is 200kts and the limit for gear extension and approach flaps is 176kts.

I targeted 190kts until the 180kts speed limit at NSX11. In the clean configuration, this requires a 50% power setting to achieve a 950fpm descent i.e. 300ft/nm. This is the performance I would usually aim for on a conventional arrival at a large airport or when requested to ‘keep the speed up’ by ATC.

I found I could maintain my target speed to within 5kts, except for momentary deviations of up to 10kts, which were hard to avoid when adjusting the descent profile as described above.

In general, speed control was easier than in a radar vectored arrival because of the continuous nature of the descent. With radar vectors, the difficulty for a piston aircraft

is that ATC can request a higher speed and you can offer, for example, 180kts or 190kts, without knowing what the descent profile will be. If assigned a long level segment, it can require large and abrupt power changes to maintain the higher speed, and it may not be possible to do so in some cases.

Flying the NEMAX 2B

I found flying the NEMAX 2B slightly easier, because the procedure ‘style’ was now more familiar, and the interval between waypoints was generally longer, reducing the workload intensity. The speed target at the start of the ‘base turn’ is higher (190kts), but the greater track change in the turn to NEMAX helped deceleration to the approach speed. I think the largest cross-track error at any point in both procedures was during this turn, when it peaked at 0.18nm. This was a reminder that the initiation of a turn should be rapid and positive, exactly at the GPS countdown point. Hesitation can result in a deviation outside of the turn. The procedure is designed for Rate 1 or a maximum bank angle of 25°. At 180-190kts, the maximum 25° is required, and this is steeper than the typical Rate 1 bank in a piston aircraft.

Procedure design & database coding

The procedures worked well for a general aviation piston aircraft. They are, in essence, long arrivals with small track adjustments, followed by an RNAV guided turn onto the final approach track. A properly installed general aviation IFR GPS unit can provide all the procedure guidance needed.

The speed targets of 180kts and 190kts at the start of the ‘base turn’ and 160kts at the FAP are too high for most piston aircraft. 160kts on arrival and 130kts at the FAP are more typical speeds that could be flown by light twins and high performance singles. The continuous descent does allow a piston aircraft to ‘keep the speed up’ more easily than a stepped radar vectored arrival.

Each individual waypoint increases pilot workload, and short legs are more demanding in this respect. From a pilot’s perspective, it would be preferable if the procedure design could use fewer, longer legs.

Single pilot workload

The best way to describe the workload involved in flying these procedures is to compare it to conventional arrivals under similar circumstances i.e. to a relatively busy airport, with significant commercial jet traffic. The conventional procedure would typically involve the initial elements of a published STAR, followed by radar vectors ▶

Getting the best value for money from light aircraft insurance

By David Bruford

Owners of light aircraft are incredibly loyal when it comes to remaining with their broker. The average policy renewal period is seven years which remarkably is the same as for household insurance despite the constant bombardment from moronic cartoon dogs.

Where to start?

If you are looking for cover, or to change, you'll either ask a flying chum or trawl the Internet. Either way you'll probably end up with the same group of underwriters as there are only a few to choose from but those underwriters get their business from numerous sub-brokers, and it's a useful extra string to your bow to have your policy routed through such an organisation. It doesn't cost any extra as the sub-broker's commission is paid by the underwriter and in the event of a problem you'll have an expert to negotiate with the underwriter or loss adjuster on your behalf.

If you use the Internet, restrict the search to European based insurers. US based underwriters don't write annual business in Europe and vice-versa although both will offer cover for Atlantic ferry flights but these normally terminate at your final destination airfield.

A quick Google for 'aircraft insurance' will come up with five options which coincidentally is about the limit of the choices you will have when it comes to premium. Ignore the sponsored links - moneysupermarket.com, antag.co.uk and findaircraft.com; their position at the top of the list is simply a reflection of how much they pay Google and the fact that they don't offer aircraft insurance; or in the case of findaircraft.com that they are based in the USA. Don't bother with www.aeroinsurance.com either as they "...offer insurance via insurance brokers only." but if you do want to hear what they have to proffer, the website's largest user is HSBC insurance brokers whose contact information is on their website.

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to the ILS, with several ATC step-down descents prior to the FAP. A piston aircraft would often be asked to 'keep the speed up' or to advise ATC of best speed and then instructed to maintain that.

Workload elements favouring the conventional procedure:

- Fewer waypoints
- Fewer altitude and speed restrictions on charts
- Radar vectors are simple to follow, without pilot interpretation of charts or nav aids

Workload elements favouring the P-RNAV procedure:

- RNAV guidance easier and simpler than radio aid raw data but more complex than radar vectors
- Arrival LNAV and VNAV is highly "predictable" and situational awareness is more easily maintained compared to radar vectored arrival
- RNAV guided alignment onto final approach track easier than traditional ILS intercept
- Fewer RTF communications needed

In this trial, I would judge that the workload on the P-RNAV procedures was somewhat higher than in a conventional arrival. In particular, during a sequence of relatively short legs on the NEMAX 1A, I did find my instrument scan needed rapidly to cover the GPS, the paper chart and the primary flight instruments – checking in particular that I had not muddled up the target altitude amongst the succession of waypoints. I was a little tense and conscious of wanting to avoid errors given the nature of the flight. The NEMAX 2B felt less workload intensive.

On balance, and with more practice and familiarity, I do not believe the procedure workload under manual flight would be particularly different from conventional arrivals. These can be quite variable – some radar vectored arrivals are relatively easy, when circumstances and ATC technique are favourable; some are more

difficult e.g. when descents and intercepts are late and abrupt.

In practice, I would fly these procedures using the autopilot in roll-steering mode, where no manual intervention is needed for LNAV until the ILS mode selection prior to the FAP. The constant descent would be maintained manually through the autopilot pitch command wheel. Under autoflight, I think the P-RNAV workload would be lower than in a conventional arrival with fewer heading bug and altitude select changes and fewer radio aid selections. The main task becomes monitoring the arrival.

Speed limits

P-RNAV compliance is available to all suitably equipped aircraft. In the future, therefore, there will be piston aircraft that are P-RNAV compliant, but not able to meet the speed targets in some procedures. It would be useful if speed *limits* rather than *targets* were used, as they are for all but one waypoint in each of the NEMAX 1A and 2B procedures. Clearly, an aircraft assigned a procedure it cannot comply with will declare this to ATC, and can be radar vectored. I imagine that, when separation permits, ATC may direct such an aircraft to simply follow the P-RNAV procedure at best speed. It would be useful for both RTF phraseology and perhaps some arrival speed remark convention for the flight plan to be developed for these circumstances, as P-RNAV procedures become more widespread.

P-RNAV and GA – the bottom line?

My view is that P-RNAV presents no more difficulty for a single-pilot GA operator than conventional IFR – just some important differences. PPL/ IR Europe will be publishing more on the GA training, operating and avionics requirements for P-RNAV in future issues.



Be prepared

So, how do you sound like you know what you're talking about when asking for a quote and want to be offered the most competitive rate? Let's break down the questions as they will be asked of you, by phone or form, and what they mean to the premium.

Everyone will want your name and probably your address and contact details. Don't get all defensive. Would you want to deal with anyone that wants to stay anonymous?

The pilots' details will be required so collate this in advance. You'll need the names, occupations, ages, ratings, total hours and hours on type (type being the type of aircraft that you are seeking to insure). It would also be very useful to know the total hours and hours on type from each pilot for the past 12 months; underwriters like to feel that the pilots that they are insuring are current.

Aircraft details; all straightforward – you'll need to know the make & model, year registration, maximum take off weight (some insurers refer to it as maximum take off mass) and value.

Aircraft value? Is that what you paid for it? No. It's very important to base this on the current worth because aircraft values are agreed at the inception of the policy date. The annual premium is based upon the hull value plus a consideration for liability insurance, so the higher the hull value is, the more you pay but of course, the higher the payout in the event of a total loss. This value remains the same at each renewal unless you elect to change it so you must increase it after you have an avionics refit, new engine, re-upholstery or a re-spray (don't wait until renewal – an accident or loss won't time themselves to that date). If the sale value increases, tell the insurers, otherwise the agreed value could work against you.

You'll also have to disclose the seating capacity including the crew. The liability premium is based upon the maximum number of people on board but don't, for instance, state that it's a four-seater if you will ever carry five. You might save a few pounds but it will cost you a personal fortune if there is a personal injury claim and the underwriters can legitimately decline to pay.

What sort of cover?

You'll need to advise the use of the aircraft. Private, personal business and pleasure is the base level of cover and you should expect to pay more if you hire it out or let it be used for training purposes. Within those



*Accidental damage cover includes life's little miscalculations.
PPL/IR Europe library photo*

uses there will be higher loadings again for ab initio or aerobatic use. It will be helpful if you can estimate the annual hours the aircraft will be used for and be able to break that down into any categories other than private, personal business and pleasure uses. You will probably impose a minimum qualification on pilots using the aircraft in the form of total hours, hours on type, currency and ratings. Be prepared to advise the insurers of the details.

The underwriters will also want to know where the aircraft is hangared and its base airfield. Some underwriters will decline to quote for airfields where they have experienced what they feel to be a disproportionate number of claims but most fields fall into the base premium. It's not like motor insurance where the closer you are to a big conurbation the higher the premium. They might ask where the aircraft is maintained and by whom, most won't but have that information to hand in case they do. Some airfields have individual insurance/indemnity clauses in their access agreements. Providing they are reasonable, underwriters will normally include that wording within the policy but to do this they must obviously have sight of the document so have this available to send them.

They will also need to know if you will be operating just in the UK (or your own country) or UK and Europe. If at any time you want to fly outside of the EU area you will have to negotiate an additional, and chargeable, extension of cover. You also need to advise them if you want to include cover for the UK's Crown RAF and MoD airfields. Getting this extension only gives you the required insurance cover, it doesn't negate you from jumping through the hoops

required to get special permission to land at these airfields. That could be the subject of an article in itself.

Next, the public liability limit and included in that is the CSL – the combined single limit for any one incident. There are mandatory minimums for third party insurance within EU airspace aircraft based on the maximum take off weight/mass (MTOW/M) in kilograms. These are

< 1,200kg	€1,500,000
< 2,000kg	€3,000,000
< 5,700kg	€9,000,000
< 14,000kg	€25,000,000

In the UK these are roughly converted into Sterling with limits of one, two, three and five million but you can opt to take a higher level if you wish. Bear in mind that crashing a four-seater and maiming all on board (it's cheaper if everyone dies) may result in claims exceeding the minimum limit and the excess claims don't go away just because you are not insured for them. The claimants will clear out your policy limit then go for your personal assets, then the wife and kids. Ask for a quote on the next level up and see if the extra premium payable matches your piece of mind threshold. If your aircraft is on finance, check to see if they require a specific minimum limit of cover. Often they do and their criteria have no relationship to the MTOW/M.

You'll get the usual: "Have you claimed on an aircraft policy within the past five years?" If yes have the dates to hand together with details of the circumstances and costs paid out to the repairers and any third party claims. They will also ask if any insurer has declined to accept a proposal from you, refused to renew or cancelled your policy. If you can say yes to any of these and you are

currently insured, keep paying the renewal and be grateful that you have cover because it is very unlikely that any other insurer will want you. You must also disclose any material fact or information that would affect the underwriter's decision in quoting a premium. Insurance contracts are based on 'utmost good faith', so if there is anything you think would fall into this category, disclose it, failure to do so could void all cover and enable the underwriters to refuse all claims.

Most aviation policies offer a no-claims discount at renewal but this, almost uniquely for an insurance product is not transferable to a new insurer. However, many insurers will offer a 'new policy discount' in order to get your business.

Exploring the options

So, now that you know what to ask for when you phone, let's pop back to our Google for 'aircraft insurance'. The first UK broker Google comes up with is the Joint Aviation Services web site, sporting a "Member of the General Insurance Standards Council" logo. The GISC ceased several years ago and brokers are now regulated by the Financial Services Authority so we'll pass there. GT Aviation, offers a downloadable MSWord or PDF proposal form for you to complete and Towergate Hall & Clarke (who under the Hall & Clarke mantle seems to have been in aviation insurance since the Wright Flyer and are, by reputation, one of the best brokers to deal with) offer an enquiry form where they will contact you to take details or you can just simplify the whole contact system and pick up the phone and talk to someone who will take the details and give you a quote. No aircraft insurers' use vile sheep-herding-like call centres. Whatever system you choose, armed with the 'inside



Cover is not restricted to licensed airfields - nor even those littered with boulders.

Photo courtesy of Chris Bosher

knowledge' you gained from the information above you can make contact with any broker or underwriter and give them the right information so that they can give you a like-for-like quote. Don't hesitate to ask them about any features of their cover that the opposition may not offer. Some policies don't impose an excess for total losses, some will include any pilot authorised by the policyholder at the same premium that others will require named pilots and still charge for additions. Some have limits for search and rescue, others don't, some include airside cover for your car, personal effects, and others include MoD airfield cover without additional charge.

And if it comes to a crunch...?

Unfortunately it's impossible to ascertain how any of these insurers will act when the whole point of your insurance is called upon to show its mettle – dealing with a claim. The only way that you can find this out is to ask fellow pilots or maintenance and repair organisations that you are friendly with. They might give you some good and

bad stories that will enable you to ignore some insurers and give you some first-rate leads to try. You might also decide that you want a local broker; one that in the event of a problem you can go and see or they will visit you. This is certainly attractive for training organisations or small fleets. Odds are you will only find these by personal recommendation so ask around and get comparative quotes.

Whatever you do, as with all forms of insurance - don't choose the cheapest, it's very unlikely to offer the best cover. Choose the one that provides all the cover you want, with a company you felt confident in talking to at a price that is reasonable. If you do decide to go ahead with a policy and your aircraft is under some form of finance agreement the details of this should be entered into the policy document by endorsement to note their interest (the finance company may well require this and supply you with a wording that can be used by the insurer).

Finally, if your aircraft is laid up for more than a month as they all are at some stage in their cash absorbing lives, advise your insurers that you only require 'ground cover' until the aircraft becomes airworthy again. This will provide you with cover that excludes flight risks and costs you as little as 1 – 1.5% of the hull value for the period, credited against your next renewal. Just remember to advise your insurers before the aircraft flies again.

David Bruford is the Non-Executive Chairman of Bruford & Vallance Insurance Services Limited who are brokers for light aircraft insurance. www.bruford.co.uk - For quotations contact Jason Mayled, 01823 277188, Jason@bruford.co.uk Any insured aircraft that is flown solely by named instrument rated pilots can qualify for an additional 5% discount.



Aircraft hull insurance covers accidental damage, theft and fire.

Photo courtesy of Chris Bosher

Self-flown GA IFR transport in Europe: a User's Guide

Part 3 of 4

By Vasa Babic



Vasa Babic continues with part three of a four-part series on self-flown GA IFR transport in Europe

The experience of ground services

☔ Ground handling

You generally have the choice of being handled by the airport operator or choosing a commercial handler, although at some larger airports the latter is the only option. Commercial handling costs between 50 and 200 euros for a piston aircraft, the airport operator is usually much cheaper. Every airport is different, so it is hard to generalise. Commercial handlers usually offer a consistently good service, and treat a small airplane pilot as courteously as their bizjet customers. Airport operator handling is somewhat variable. I personally use a commercial handler every time. Their job is to do whatever it takes to help you meet your schedule, and to make the transit comfortable. Planning is also much easier if you have an easily accessible, single point of contact. I find the cost and effort of GA too high to let the experience be spoiled by airport delays and hassles for the sake of a handling fee.

I carry a spare set of copies of just about every aircraft and pilot document an airport official might want, and have needed to hand these over a couple of times.

☔ Fuelling

Avgas costs seem to vary from 1 euro to

2.5 euros per litre across Europe. Avgas supply, however, is the biggest single planning headache and cause of delay I have encountered. It is worth checking and rechecking availability if you are going to an airport that doesn't see much piston traffic. Paying for fuel will occasionally require either cash or the supplier's brand of fuel card. Credit cards are usually accepted, but the payment can take longer to process. I carry Shell, Exxon and BP cards, because it is fairly easy to get all 3. Some suppliers will take another company's card, so it is worth asking. A Total card is useful in France, but you must have a French bank account.

However, the key lesson about fuelling is to always do so straight after you land. I have re-learned this lesson many times...

☔ De-Icing on the ground

Aircraft seem to stubbornly retain surface ice even in bright sunshine and temperatures above freezing. From personal experience I can say that if your expectations of de-icing equipment are a handheld tank and sprayer, a large vehicle with a crane-mounted high-pressure hose is not a pleasant surprise, given the fluid costs several euros per litre. It will come to 500-1000 euros for a small aircraft. The handheld tank variety is not available at many airports, so there is a strong incentive to carry your own.

Pre-flight Planning

Some of the planning issues for this kind of flying have been discussed in the sections above, so I will only summarise the resources and process I use to try and make the task reasonably quick and easy. Most of these notes will be fairly obvious, but I'll detail them in case the reader finds some new and useful items. My 'system' takes two to four hours for a new destination, and 30 to 60 minutes to update the plan for a trip I've flown previously.

☔ Websites resources

- www.acukwik.com for airport data and contact details (fuel, handling).
- www.avbrief.com for weather and notams; also has an excellent PDA/Blackberry/WAP interface.
- www.cfm.eurocontrol.int/chmi_public/ciahome.jsp?serv1=ifpuvs the IFPS flight plan validator.
- www.homebriefing.com for filing flight plans.
- www.interfax.net easy gateway service for faxing MS Office documents as email attachments.
- www.pplir.org the PPL/IR Europe forum, has hundreds of members with specialised, local knowledge.

☞ *Software resources*

- Jeppesen JeppView: for printing approach plates and reference to Jepp text pages.
- Jeppesen FliteStar and Internet WX subscription: for flight planning.
- Jeppesen Services Update Manager: for updating GPS nav data and MX20 charts.
- ICAO FPL form and UK GA General Declaration (“Gen Dec”) form: MS Word document pro formas with all my standard details filled in.

☞ *Hardware resources*

- Home PC with a large Dell colour laser printer: for flight planning and printing trip kits.
- Sony Vaio TX series laptop with Wifi: for updating avionics data cards and flight planning whilst travelling.
- Vodafone 3G USB data device: for laptop internet access when travelling.
- Blackberry 8800: for weather data and mobile email (eg. handling, flight plan slots)

☞ *Other resources*

- Various Jeppesen binders, Jeppesen paper for printing approach plates.
- German DFS (Deutsche Flugsicherung, German Air Traffic Control) 24-hour pay-per-call flight briefing and planning service +49 69 78072 550: as a back-up.

The only expensive, aviation dedicated items on this list are JeppView, which is essential, and the laser printer. I print hundreds of approach plate and flight plan pages every year and find an office-quality printer very useful – it’s very fast and will print colour plates double-sided on perforated Jepp binder paper.

☞ *Planning stage 1: feasibility*

As soon as I have a destination in mind, I try and work out whether flying myself is possible. I browse Jepp FliteStar to identify the likely destination and alternate airports, and run a quick flight plan to check the fuel burn and trip time. I then use the AC-U-KWIK website to get contact details of a commercial Ground handler. I call them and ask about avgas, opening hours, slots and any other restrictions. If all this is OK, I will email a handling request to get confirmation. I create a subfolder for the destination on my PC and save the handling contacts and a PDF of the AC-U-KWIK information page. This folder builds up to be the trip kit I print before travelling.

On some routes, I find it useful to research

a second alternate. If your destination is the primary airport in a region, it may take two alternates to give you all the combinations of opening hours, IFR facilities and avgas supply you need. On longer range trips, it is also useful to identify an enroute fuel alternate.

☞ *Planning stage 2: route*

Getting IFPS-acceptable routes takes a little practice. First, I create a route using the FliteStar ‘wizard’ and amend it to start at a terminating waypoint for the departure procedure and end at the initial waypoint of a STAR – this avoids a whole round of IFPS errors. I then paste the route into the IFPS validator; about a third of the time it will come back with no errors, another third of routes will be OK after a tweak or two, and for the rest, I need to spend some time re-planning them, based on the error message feedback and the Route Availability Document (RAD) on the CFMU site. I find routes along an axis between the southeast of England and northern Italy the most problematic, because the airways system is subject to a mass of availability restrictions, which FliteStar does not include in its database.

Once the route is accepted in the IFPS validator, I create a flight plan using my MS Word pro forma and save it in the trip folder. I also check the FliteStar route, enter the likely fuel, baggage and passenger load and save the route pack.

☞ *Planning stage 3: night before*

I get the airport notams for the departure, destination and alternate and print them for the trip kit. I also check and print the Sig WX and Spot Wind charts, and the 24-hour TAFs.

I then update the FliteStar route pack with a download of the enroute winds. I’ve tweaked the aircraft performance model data so that I know it’s accurate. I now have a detailed flight plan, JAR-OPS fuel plan and W&B schedule, which I save and print.

All the print-outs go into my trip kit: a small Jepp binder, with clear plastic page inserts. I maintain one large Airway Manual with all the plates for airports and alternates I use regularly. If the destination isn’t one of these, I print the required plates. I also select the paper enroute charts needed. The trip kit is now complete, and it’s all I take with me. I like not carrying a flight bag full of heavy manuals, and, if something changes, I have JeppView and FliteStar on my laptop as a back-up.

Finally, I file the flight plan with Homebriefing.com and use the email-fax

gateway to send a Gen Dec. Homebriefing lets you store flight plan pro formas, so the aircraft and safety equipment fields don’t need to be re-entered. I always save passenger Gen Dec details, so I don’t need to chase people for their passport numbers etc. the next time they travel.

☞ *Planning stage 4: day of flight*

It’s relaxing to wake up before the flight with no more planning to do or faxes to send; I only need to check the latest TAFs and airways slot messages, and then go to the aircraft. The IFPS route can be directly entered into the Garmin GNS480 units I use. A lack of FMS-style airways route handling is a nasty flaw in the Garmin 430 and 530 series. The 480s are coupled to an air data and fuel flow computer, so in-flight, I only use the paper flight plan to note clearances and actual fuel burn and time enroute at key waypoints.

☞ *Planning stage 5: return leg*

The trip kit I take with me will have all the materials for the return journey except current weather. I will usually use a hotel Wifi connection to download this and file the flight plan. The FliteStar return leg print-out will be a zero-wind version, so I update this with forecast winds on the laptop and write in flight time and fuel burn changes by hand. The handlers will also give you a briefing folder with weather and notams for your route.

☞ *Regular destinations*

When I have flown to a destination previously, things are a lot easier. A few days beforehand, I send the handling request, check airport notams and make sure the former route is still IFPS valid. No more planning is needed until Stage 3, the night before.

☞ *Summary*

This kind of ‘real world’ flight planning is never really taught in training or described in books or magazine articles. It takes some personal “R&D” time to develop methods that will work for you. However, although the IFR system looks very complex, it is also highly codified; once you “crack the code”, it does become simpler.

PPL/IR Europe was founded because pilots like us are very much “on our own”; without the Ops departments and commercial service providers that support professional crews. The website, forum and journal are a very effective means of sharing knowledge and asking other members for help on all these flight planning topics. ▶

Safety conclusions

To what extent does this profile of self-flown IFR transport introduce new safety issues and how can they be managed?

Human factors and decision-making

Any transport flying, by definition, imposes some pressure to complete a flight. In planning a schedule, I think there are two ways to avoid overstretching your aeronautical decision-making with difficult conflicts.

First, the capability to execute flights safely must comfortably exceed the requirements of a travel schedule. I'll discuss some of the technical issues about capability below, but the working day must also leave you fit to fly home. I find that two to four hour flights between different cities are OK for a set of individual meetings, but not a series of long working days.

Second, the consequences of cancelling a flight must always be reasonably acceptable. On business, if a trip can be abandoned at short notice and easily rescheduled, that's fine. If it's a critical deal or meeting, then you must have a plan B. For personal travel, you have to be comfortable that the cost of private flying will occasionally include last-minute airline tickets, hotels and airplane recovery.

In practice, I find I naturally build these factors into the feasibility planning stage described above. Flying oneself is too much hassle if it's not going to be enjoyable and stress-free.

Standard operating procedures and single-pilot resource management

I think this profile of flying has several advantages for the private instrument-rated pilot. First, you maintain relatively good IFR currency. Second, you build good experience outside of comfortable, familiar routes. Third, you operate in a highly controlled environment, scaled to airline safety needs. For example, I think it's easier to fly an ILS to minima at an airport with a 12,000 ft runway and full approach lighting than to a small regional airport.

However, each of these advantages brings a corresponding challenge, which

I found needed adapting and firming-up my personal standard operating procedures (SOPs).

Complacency: My worst flying over this period didn't happen a thousand miles from home during a complex procedure at an unfamiliar airport – it was always associated with getting complacent in undemanding conditions nearer to home. The effort to maintain SOP discipline needs to be greatest when you are most relaxed.

Sterile cockpit: I like having passengers who are interested in aviation, and some are fascinated by being in a light aircraft mixing with large jets. However, I have found that I need to be very blunt in briefing passengers that I can't speak to them at any time from brakes-off to cruise level and from top-of-descent to brakes-on.

Autopilot use: My procedure is to use the autopilot to fly the aircraft above 1,000 ft. I know some PPL/IRs are concerned about maintaining manual flying skills and about autopilot failure. However, a high density traffic environment is not the place to practice single pilot hand-flying and it is not a place to fly (at least in a medium piston twin) without a reliable autopilot. The autopilot is the most basic safeguard against a momentary lapse which could result in an altitude bust or a loss of separation. For example, during multiple step climbs or descents, I think it is much more reliable to set the Alt Selector immediately after a clearance and monitor the autopilot capturing the assigned altitude than it is to hand-fly a level change. During IR training, the virtue of accurate hand-flying is so drummed into us, and rightly so, that I find I have to overcome the feeling I am being lazy or slack when I turn the autopilot on.

Operations manual

My original POH checklists do not include some key IFR operating procedures, and the autopilot and avionics checks are fragmented across various supplements at the back of the manual. I have written my own 20 page AOC-style ops manual for the aircraft, and I use a laminated, two-sided A4 extract as my checklist. I don't find after-market checklist products useful.

Continued in the next issue...



Feedback

Firstly, let me congratulate you on an excellent publication which, of all the flying type magazines I receive, is probably the best! Having said that, I often do not get time to read Instrument Pilot when it arrives and, as a result, I sometimes put them to one side for future reference.

As a result, I have recently read the May/June 2007 and the article titled 'The Golden Age' which, I must admit, really struck a cord! Having said that, I should wish to add my own observations in respect to 'golden ages', which occurred during the 1990's when I was part of a syndicate of an aircraft based at Luton. Yes, in those days it was called Luton rather than London Luton!

What really sticks in my mind, was the attitude in respect to security, whereby we had a key for the padlock for the gates to get in through the perimeter fence. This was wonderful as we were able to drive our car up to the wing of the aircraft (a Piper Lance) in order to get the bags out of the back of the car and into the back of the aircraft. Cars were then parked relatively close by with a short walk to get back through the perimeter fence. The gate was then padlocked and secure.

In addition, I also remember an arrangement with the company which handled the 'duty-free' at Luton, whereby we were able to secure further discount of some 30%! Indeed, I remember the syndicate was most upset when this was reduced to 22.5% off duty-free prices! I am also embarrassed to admit that one could pre-order the duty-free and have the said items left on the seats of the aircraft! Golden days indeed!

However, like most 'golden days', they came to an end with the 'invention' of Easyjet! Suddenly, there were lots of big aircraft around and after a fairly short space of time it was quite clear that Luton did not want small aircraft getting in the way of its commercial carriers.

In this respect, whilst myself and another syndicate member had instrument ratings whereby we were given slots for departures, the other members were often left waiting with engines running for half an hour or more. In the end the syndicate (which has since been disbanded) moved to Cranfield. No more 24-hour facilities; no more customs on site; no more duty-free! All in all, a rather totalitarian equivalent to the golden days at Luton!

Otherwise, well done again for an excellent read.

Regards,
Austin Truman,
Member no. 55



Reflections on the first 14 years of PPL/IR Europe

By Roger Dunn who is retiring from the Executive at the AGM

It all started in a hangar at Biggin Hill, where Peter Herold and I housed our Mooneys. One day Peter turned up with a new IR, but announced that he did not feel that the huge amount of study he had completed really equipped him for practical flying under IFR in a light aircraft. He would like to talk to more seasoned IRs, but they were hard to find. Eventually the idea of a network evolved and an inaugural meeting was set for 29th March 1994. Each of us invited other PPL/IRs whom we knew. About ten of us flew to Staverton, including Nigel Everett. It was a successful meeting of kindred spirits and Nigel wrote a short piece in *Pilot* about the occasion. In no time we had more than 100 people asking to join, including many outside the UK. The *PPL/IR Network* was borne and Peter was swamped. We had found an untapped niche market. The following year we re-launched ourselves as *PPL/IR Europe*.

Not enough chairs at the CAA?

We quickly realised that in addition to exchanging information, there was a serious need for some lobbying to protect the interests of the instrument rated private pilot. AOPA was doing some sterling work across the board for GA, but PPL/IRs were few and did not justify much of the precious AOPA resource. Having had some ten years experience on the Council of the Confederation of British Industry (CBI), the task of initiating some lobbying fell to me. I quickly realised that we needed representation on the General Aviation Consultative Committee (GACC) and the National Air Traffic Management Advisory Committee (NATMAC). All my efforts to join these committees were firmly rebuffed by the CAA hierarchy of the time. The objections were that GA was well represented, the committees were already too big without us and there were not enough chairs in the meeting room!

Small successes

Eventually our efforts were rewarded by membership of two lesser committees, the Standing Advisory Committee on Personnel Licensing (SACPL) and the BRNAV Implementing Committee. Both these committees were mainly populated by airline oriented people plus a solitary GA

representative from AOPA. The SACPL was in the late stages of the twelve year gestation period of the Joint Aviation Authorities' requirements on flight crew licensing (JAR FCL). I felt it was likely that there would be a patronising attitude to the upstarts from *PPL/IR Europe*, so I decided that I must do my homework thoroughly before my first meeting. I studied JAR FCL 1 (Aeroplanes) from beginning to end. I noticed that it did not include the night flying privileges for IR pilots that we had enjoyed in the UK. I made a dramatic presentation of this point early in the meeting. I had recently flown from Glasgow with an employee as passenger. My take-off had been delayed and I was obliged to land at Biggin after dark. I pointed out that if JAR FCL 1 had been in force, I would have been obliged to land at Birmingham and off load my passenger, before continuing my flight to Biggin.

At this point a certain captain, who had been reclining in his seat, sat bolt upright. He said that if Mr Dunn were right the new rules would create chaos in BA's schedules. They could have Concorde crossing the Atlantic and be obliged to divert to Shannon because the pilot had not recently flown at night and could not therefore carry passengers at night. The chairman dispatched two senior CAA officials to a table at the back of the room to study the documents. Half an hour later they reappeared and announced that I appeared to be correct. Not a single regulator in the twenty five participating states had spotted this fundamental omission. Frantic efforts were made to amend the Air Navigation Order, which had already been laid before Parliament. I did not feel patronised by the committee after that, and I was able to engage in a constructive dialogue, which I believe reduced the impact of some of the horrors of JAR FCL.

Regulation – what regulation?

My next meeting was to be the BRNAV committee. My tactics had worked well on the SACPL, could I pull off a similar coup at the BRNAV committee? Fortunately, I was able to draw on my experience at the CBI Council. I had been present when the then Deputy Prime Minister, Michael Heseltine, arrived and asked us how he could help the smaller firms. With one voice we

replied "get rid of the red tape". The better regulation initiative was born. I followed its development with great interest, but I was surprised to find no trace of it at the CAA.

At my first meeting, the Chairman ran through the agenda and asked for questions. I responded by asking whether compliance cost assessments (CCAs) had been prepared for all these proposals? These were the forerunners of what are today known as regulatory impact assessments (RIAs). If so, were copies available to members of the committee? The CAA hierarchy on the top table looked blank and started whispering to each other. I was asked to explain. I pointed out that it was now Government policy that CCAs and risk assessments should be prepared for all new regulatory proposals. The Cabinet Office had kindly provided me with an impressive publication with a fiery red coat of arms on the front. I held it up to the meeting and read from the Prime Minister's forward. The CAA hierarchy looked baffled and decided that they would have to refer the whole matter to their legal department.

Our next stop was the Cabinet Office. Michael Dunkerley, a fellow executive committee member at the time, and I met the head of the Better Regulation Unit and asked him to explain the point of his department if the largest producer of regulations, the CAA, completely ignored him. Our strategy appeared to work. In due course Martin Robinson of AOPA and I were summoned to meet the CAA top regulator. We were given a lecture on why RIAs were entirely inappropriate for aviation. We disagreed. We pointed out that the purpose of the RIA was to ensure that the impact of a proposed regulation on all parties was considered, not just those with the loudest voice.

We continued our pressure on the Cabinet Office and the Better Regulation Council. Some months later the CAA announced that in future it would prepare RIAs for all new regulatory proposals. We had succeeded.

The General Aviation Safety Council (GASCo)

Despite our initial successes the doors to the key committees, GACC and NATMAC remained firmly closed. The breakthrough

came in 2000 through GASCo. In the absence of any other willing candidate I agreed to become its chairman. In this position it was clearly sensible that I should sit on the GACC. However, GASCo already had a representative on the GACC and nobody wished to remove him for the newcomer. I proposed that I should sit on the GACC as the *PPL/IR Europe* representative and raise both GASCo and *PPL/IR Europe* matters. This was accepted and we have retained our seat ever since, although I no longer chair GASCo.

GASCo also provided the key to NATMAC. Initially I represented GASCo and *PPL/IR Europe*, but eventually it was agreed that *PPL/IR Europe* should be separately represented. Paul Draper is now our representative on NATMAC.

I believe that *PPL/IR Europe* has made significant contributions to both these bodies and important regulatory changes have emerged as a result of our efforts.

GA lobbying too fragmented

During my years of lobbying for *PPL/IR Europe* it has become apparent to me that GA suffers greatly from having such a fragmented organisation with lots of conflicting interests. We have lacked an effective umbrella organisation, which would seek a consensus view and apply pressure in the right quarters and counterbalance the lobbying of the airlines and the pilots' unions.

The CBI provides a role model of what can be achieved. It also embraces a wide range of conflicting interests. It succeeds because it has a clear policy of not taking any action which conflicts with the interests of any member organisation. I believe that *PPL/IR Europe* can claim credit for the initiative which led to the creation of the GA Alliance. It started over dinner in Brussels, when Paul Draper and I coined the name and persuaded Roger Hopkinson, then a member of the PFA executive committee, to call a meeting of interested parties. The GA Alliance has been a great success. It has given us access to both government and the CAA at a level that has not been available during the fifty years I have been a PPL. I suspect that the GA Alliance was a significant factor in the setting up of the GA Strategic Review in 2005. It seems to me that this review, in which we played an active part, has led to a far more positive attitude towards GA at all levels within the CAA.

Our influence in Europe

We are now at a watershed for lobbying. Almost all new regulations affecting instrument rated pilots will be created in Brussels and Cologne. The role of the CAA and other national authorities in Europe will be limited to applying the European regulations. It is essential that we develop our contacts in EASA, the Commission and at the European Parliament, if we are to succeed in our aims. We

PPL/IR EUROPE AGM, LIVERPOOL 19th APRIL 2008

The 2008 AGM of *PPL/IR Europe* will be held on 19th April in Hanger 2, Ravenair Business Aviation Centre, Viscount Drive, Liverpool Airport, Liverpool L24 5GA. Directions and maps are available at www.ravenair.co.uk and www.liverpoolhandling.co.uk

PROGRAMME

- 10:30 Arrivals, registration, coffee/tea
- 11:00 **The IR Test Standard: meeting it as an IR student and maintaining it as an IR holder**
Pat Lander, CAA
Pat will draw on his experience, and that of his examiner colleagues, to "dissect" the IR test into its 6 sections and, in each, review the best practices for meeting the test standard for safe IFR flight and the mistakes to avoid. Q&A to follow.
- 12:15 Lunch
- 13:15 **RNAV for GA**
Vasa Babic, PPL/IR Europe executive member
A review of RNAV as it affects European GA pilots with a focus on the training requirements and regulatory status of P-RNAV terminal procedures and GPS approaches.
- 14:30 **Update on CAA requirements and approvals for GPS approaches in the UK**
Jim Thorpe, PPL/IR Europe Chairman
- 14:45 Afternoon coffee/tea
- 15:00 **AGM**
The agenda for the 2008 AGM and proxy voting forms is being sent to members electronically.
- 16:00 End of meeting and departures

Cost: £20/€30 payable to the meetings organiser on arrival at Liverpool, to cover meeting room hire, teas/coffees and lunch. Participants are responsible for airport landing and parking fees: We have negotiated a reduced flat rate landing fee of £15 for all SEP, £25 for MEP, and a 50% reduction in parking and compulsory handling charges, for all members who have registered and submitted their flight details, as below.

Registration: Please return the registration details below by 15th April to receive reduced landing fees, handling fees, and discount on fuel. Late registrations are welcome but you need to reserve compulsory handling separately with Ravenair via their website www.liverpoolhandling.co.uk and discounts cannot be guaranteed.

REGISTRATION

I hope to attend the meeting on 19th April 2008.

Name:
 Accompanying person(s)
 I will arrive by Air / other mode of transport
 A/C type
 A/C reg
 ETA from
 ETD to
 POB
 Pilot/Passengers' names
 Dietary requirements - Regular / Vegetarian / Other

The registration form is also on the website at www.pplir.org/index.php?option=com_content&task=view&id=336.

Please send completed registration to Steve Dunnett: meetings@pplir.org or by post to Prof S.B. Dunnett, Brain Repair Group, School of Biosciences, Cardiff University, Museum Avenue, Cardiff CF10 3US.



◀ must recruit more active members, particularly in Germany and Belgium, who are able and willing to assist in this process. There is no doubt in my mind that the European officials that I have met will welcome a constructive contribution from us, provided it is properly thought out and well presented. We cannot expect them to resist pressure from the pilots' unions and the airlines, if we fail to stake our claims. 

A big thank you to Roger Dunn!

It is hard to believe that Roger is giving up being a member of the PPL/IR Europe Executive (and also a Director) at the forthcoming AGM, especially as he has been so involved from the start. His article paints a simple picture of what he has achieved for us over many years. But the more accurate picture is that he has been a stalwart member of the Executive who has given us his invaluable advice and sterling input in many subject areas. In particular, convincing the many Government and State agencies with whom we interface that we need to be listened to and have a relevant message for them. His persistence in ensuring the message is properly researched, given and received has to be experienced to be believed! Roger, we give you our sincere thanks for your contribution, you will be sorely missed on the Executive and the many committees you have served on for us but I am glad you are remaining a member.

Paul Draper 

The Chairman's Corner

The discussion on the future of the IMC has created considerable comment in the wider GA world and has even raised ripples within our own august circles. In an effort to facilitate a more informed debate we recently circulated members and some 50 responded.

- ☞ 1 was training for the IMC
- ☞ 3 were IMC holders with no intentions of an IR
- ☞ 8 with IMC who want IR not started as yet
- ☞ 9 with IMC had actually started IR or have lapsed IR or other ratings
- ☞ 29 were IR holders who previously held an IMC or had views.

- Most were happy with their IMC training. Comments would seem to indicate considerable variations. Some schools only do home base approaches, some flew in IMC, some not. Most seemed to obtain the rating in minimum or close to minimum hours although many said that the training was aimed towards attaining a standard.
- Almost everyone felt that with an 'FAA style' European IR it would be acceptable for the IMC to lapse. A number of respondents were very positive indeed about this route. Some support was conditional on the detail of any grandfather rights for the IMC.
- The majority of IR holders held FAA qualifications.
- There were divergent views on the adequacy of the IMC. The strongest proponents were those who had gone on to get an IR. The most cautious were those who for the moment did not have an IR. Only a small number of respondents felt that the IMC was suitable for 'hard IMC' without some additional training.
- Several people objected to the 'get out of trouble concept' and felt that without practice and currency the IMC was as much a threat as a benefit.
- One non-UK member understandably expressed total puzzlement as to the concept.
- Of the IMC holders who currently don't have an IR about three quarters qualified their usage of the rating in some way ranging from higher minima to poor VFR only.
- About four people appeared to use the rating regularly for intentional IMC flights plus a couple more who had various additional ratings other than the IR or lapsed ratings. No respondent gave specific detail of their use.
- One person pointed out the benefit of the IMC to commercial students who need the 100 solo hours before their CPL/IR. This aspect had not occurred to me but the benefit was immediately obvious. Presumably the rest of the world manages this in some way.
- A small number of respondents felt very strongly that the IMC was a flawed concept and potentially dangerous.

- A large majority regarded the possible 10 hours basic instrument course as useless or even potentially dangerous. Perhaps this was a badly worded question as respondents seemed to look on it as an IMC replacement rather than a separate option with a different, perhaps wider, appeal to those with a PPL.

- The vast majority are aircraft owners or part owners.
- All bar one were appreciative of *PPL/IR Europe*.

I reread several times the most directly affected 21 responses from those who, for whatever reason do not presently hold an IR. I add the following impressions.

- With no disrespect intended there were some who appeared to have quite limited experience of the system and were quite unrealistic about what was possible.
- A significant number evidenced real efforts to obtain extra skills or keep current ranging from asking schools to give additional training covering real IFR flights to voluntarily having flights with an instructor every few months.
- People felt very strongly about certain perceived risks such as icing, not having a radar service or matching minima with personal currency. I thought it interesting that no one mentioned spatial awareness, loss of control or adopting minima which give some chance of a forced landing after engine failure. Risk assessment it seems is personal as much as rational.
- No one seemed to have thought at all about how the IMC impacted on the ATC system in the UK or how that might work in Europe.
- It was slightly ironic that the most vocal supporters of the IMC were those who had felt it necessary to get, or seriously intended to get, an IR.

It would seem reasonable to assume that an IMC holder who joins *PPL/IR Europe* is likely to be more serious and thoughtful than the average. Quite how this might translate into the attitudes and actions of the wider IMC pilot community is hard to judge. As far as *PPL/IR Europe* is concerned it seems that our aim of welcoming 'anyone with a serious interest in instrument flying' encompasses our membership quite appropriately. There seem to be very few members who insist that the IMC is the only answer and are against any change. If there were to be a truly accessible European IR with acceptable transition routes for IMC and, for that matter, FAA IR holders this would be very widely welcomed.

I hope that this work will help us unite behind a strong rational lobby in Europe in favour of a truly accessible European IR with full privileges. If this can be made modular in some meaningful way then that is also welcome. We must ensure that there are acceptable ways for IMC holders and FAA IR holders to gain credit towards any new rating. If this is achieved I really believe that we will pass on to future IR holders a far better system than that which we inherited. 



EUROSTUFF



By John Pickett

European Parliament

The EU Parliament adopts the long debated “EASA extension of scope”. This adoption extends the EASA terms of reference to include personnel licensing, aircraft operations and “third country” aircraft.

With regard to personnel licensing, EASA working groups have done a considerable amount of work on prospective licences and ratings. Consequently we can expect numerous Notices of Proposed Amendment (NPA) to be issued in the coming months. It appears that EASA was ready long before the European Parliament fired the starting gun. It is imperative that we all review the NPAs and make our comments in the prescribed manner. Registering via the EASA website is very easy. When the JAA was carrying out a similar process there were many complaints when the NPAs became directives. It should be understood that this time EASA has powers to make laws and we will not be able to cry “foul” after the event if we fail to comment. It will be too late when the NPA closing date is passed.

The adoption means that the legal base for the Light Aircraft Pilot Licence (LAPL) with lighter medical requirements and a medical certificate issued by the family doctor is now in place.

Already the anomalies are appearing. We are told that the definition of “complex aircraft” is now fixed. A multi-engine, turbo-prop aeroplane is now a complex aircraft as is a single engine turbo jet.

But a single engine turbo-prop will not be a complex aircraft if the Maximum Take Off Mass is less than 5,700kg, it is certificated with no more than 18 seats and requires only one pilot. The effect of this new definition is that, for example, the operators of a small single engine turbo-jet powered aeroplane will have to put in place an operations manual, quality control system, flight and duty time limitation system etc. Hardly lighter regulation of general aviation.

Battery powered flight

For the first time in the world a conventional single seat aeroplane, “Electra”, flew for 48 minutes, according to the Association pour la Promotion des Aéronefs a Motorisation Electrique (APAME). The motor was powered by an entirely new generation of light lithium-polymer batteries.



During the flight the aeroplane travelled 50 km. This is a major achievement in the search for environmentally friendly aeroplanes and travel. Hitherto several aircraft powered by batteries have flown. However, Electra is the first aeroplane with batteries that will qualify for an airworthiness certificate and the first aeroplane to fly for 48 minutes without any additional sources of power, solar or otherwise.

Lithium-polymer batteries have been used in radio controlled model aircraft and UAVs for several years. In 2006 they started to be used in electric bicycles. Further development has resulted in batteries with lighter weights, and increased maximum discharge currents. Since the casing of the battery is not metal it can be specifically shaped to fit in an aircraft fuselage.

Galileo gets political go ahead

The saga of Galileo, Europe’s satellite navigation, positioning and timing systems continues. The target date is put back to 2013. The European Parliament has confirmed the need for additional public funding of 2,400 million euros bringing the current estimate to 3.4 billion euros. A recent press release has advised that the next stage in the Galileo programme will see the European Commission in a new role as programme manager. The release also states, “Although early in the year 2007 there was considerable doubts with regard to Galileo, there is now broad public and political support for the programme. As evidenced by the press reactions around the world, the European Union is seen to be able to decide on truly strategic, high technology projects”. But at what cost?

Following the publication of the report by the British House of Commons Transport Committee into Galileo, the UK Government published its response. Included is the following:

☞ Costs

The estimated and outturn costs of Galileo have increased at every stage of its history. It is therefore imperative the Commission carry out further work to verify the cost estimates for the remaining phases of the Galileo programme as requested by the UK government and others. Comprehensive, rigorous and realistic information is in short supply across many crucial aspects of the Galileo programme, leaving no sound basis on which to make very important and costly decisions.

It would appear that requests for information and analyses have fallen upon deaf years in Brussels.

☞ Benefits

The UK government response goes on to say that they have no reason to doubt that the Galileo project, if completed, could produce a wide array of benefits, both direct and indirect. But the UK government is deeply concerned that the consequences of the five-year delay to the Galileo programme have not been taken into consideration in the Commission’s calculations of revenues.

☞ Funding

There appears to be a considerable difference in the estimates of the costs. The UK government estimate that building and running Galileo over 25 years will cost almost 7.5 billion euros. (7,500,000,000 euros)

The response goes on to say “There is an alarming absence of rigorous and unprejudiced appraisal of the costs and the benefits of different options for Galileo. Cost benefit analyses undertaken years ago, based on assumptions which no longer hold true, cannot be relied upon to justify or rule out any particular course of action in 2007 or 2008”.

Berlin heads towards closure

Whilst the future of Berlin Tempelhof Airport hangs in the balance the scales are loaded towards closure. Considerable support for keeping the airport open is given by nearly 200,000 voters. However, if the Senate are forced to hold a one-day referendum on April 27th a quorum of 25% of the city's 2.425 million voters must be achieved.

Flight instructor shortage

With the introduction by EASA of new licences and ratings there is going to be an increased demand for flight instructors. Both in UK and Europe there is already a considerable shortage of career flight instructors. In the UK the number of instructor ratings issued by CAA continues to decrease.

Australia is another country whose aviation industry is being restricted by the lack of qualified staff. The Government of Australia have established a "Future Pilot Task Force" group in an attempt to tackle the country's growing pilot shortage. The target of the group is to try and increase the number of instructors by at least 15% in an effort to avoid further pilot shortages. EASA can change regulations and laws, and introduce new pilot's licences and ratings but it must ensure that there are sufficient numbers of qualified staff to implement the training required. It is interesting to note that there are indications that EASA could be reverting to a previous system, used by the British and the French, where PPL holders were able to give flight instruction for specific licences and ratings.

Mode S

The UK CAA has announced that following the completion of the consultation process, the changes agreed would come into force on the 31st March 2009. The consultation period closes on the 31st May this year.

The Authority has said that general aviation aircraft that cannot re-equip with Mode S transponders by the deadline will not be grounded. But there is a warning "Aircraft that are not equipped with transponders may find it difficult to get ATC clearance to enter certain airspace".

Meanwhile, Eurocontrol, the European Organization for the Safety of Air Navigation, has started allocating a new type of Mode S Interrogator Code to cope with the expansion of Secondary Surveillance Radar Mode S (SSR Mode S) systems in Europe. The new interrogator code is called a surveillance identifier (SI) code. There are 63 SI codes, and the first of these have been allocated to Mode S radar installations in France and the Netherlands, resulting in extended Mode S surveillance coverage.

Reprieve for the UK IMC rating

There has been a considerable amount of mis-information circulated in the aviation press but the UK Instrument Meteorological Conditions Rating is not going to vanish from the aviation scene just yet.

Endemic in the structure of personnel licensing systems is the principle of "grandfather rights". An example, the writer has two PPLs, one issued by the UK CAA and the other by the Hong Kong Civil Aviation Department. Both licences are valid for life. Neither are JAR licences but they comply with the Standards and Recommended Practices (SARPS) of Annex 1 Personnel Licensing to the Chicago Convention. Both licences are valid until death. Nobody can take the privileges of the licence away. As AOPA stated

"EASA cannot simply overwrite national laws".

Mr Lembit Opik MP has entered the fray over the IMC Rating. He is going to try and get Europe to adopt the FAA IR. Lembit has said, quite rightly, about the IMC/FAA IR that "unless people like us do something about it, it will never happen."



Lembit Opik MP

Finnish deficiencies

EASA has recently given the Finnish Civil Aviation Authority 26 notices of deficiencies. These deficiencies were discovered in inspections carried out late last year. Two of the warnings were for serious incidents.

Race for world's most accurate clock

An atomic clock that uses an aluminium atom to apply the logic of computers to the peculiarities of the quantum world now rivals the world's most accurate clock. The aluminium clock uses similar principles to the currently most accurate clock which is based on a single atom of mercury. Both clocks are based on natural vibrations in ions (electrically charged atoms) and neither gain nor lose one second in over 1 billion years, compared to about 80 million years for the current U.S. time standard based on neutral cesium atoms.

The mercury clock continues its reign as the world's most accurate for now, by a margin of 20 percent over the aluminium clock, but designers say both experimental clocks could be improved further. For more details, see www.nist.gov/public_affairs/releases/logic_clock/logic_clock.html.



Atomic clock using aluminium and beryllium. Photo NIST (National Institute for Standards and Technology)

Pilot licensing numbers continue to fall

According to the UK CAA the moving average of the number of Private Pilot's Licences and associated ratings issued continues to fall. PPL (A) licences, PPL IMC Ratings, PPL IRs, PPL Night Ratings and National PPL (A) licences all are in decline. The PPL (H) is the only licence that shows an increase in numbers.

Flying in Greece

AOPA Hellas publishes a detailed set of requirements for PPL holders wishing to fly into Greece or hire Greek registered aircraft.

Interestingly the document contains a warning that some national licences from EU countries may not be acceptable in the future!

See www.aopa.gr/en/infosdetails.asp?NEWS_ID=1

General aviation aircraft deliveries

The year 2007 was very good for the delivery of new general aviation aircraft. There were 4,272 aircraft sold in 2007 according to GAMA. Business jet sales were up by 28.4% as were turbo-propeller aeroplanes. But the sales of piston engine aeroplanes fell by a small amount.



Pilots' Talk

Compiled By David Bruford

Dates for your diary

19th April 2008 – AGM

PPL/IR Europe's Annual General Meeting will be held at Ravenair Business Aviation Centre, Viscount Drive, Liverpool John Lennon Airport, Liverpool on the 19th April. The day will offer the usual opportunities to listen to a couple of interesting speakers and make or renew friendships with other members over an excellent buffet lunch. All members are very welcome. Full details and programme at www.pplir.org/index.php?option=com_content&task=view&id=336 and on page 12.

31st May 2008 – Project Propeller at Old Warden airfield, Bedfordshire

Promoted with "Where today's pilots meet WWII RAF air crew". The basic premise of the project Propeller scheme is to match up WWII RAF air crew with current pilots and to gather together for a day at a significant location. The project arranges for air crew and pilots to meet up at a convenient local airfield, fly to the venue for the reunion, and then fly back home once the event comes to a close. More information at www.projectpropeller.co.uk/pp/home/.

13th - 15th June 2008 - Aero Expo High Wycombe



The premier UK aero fair, **PPL/IR Europe** will this year be organising the seminar series as well as having a manned stand and social meeting point throughout the expo. For further details see the www.pplir.org > Events > Forthcoming events > Aero Expo

27th to Sunday 29th June 2008 - Jersey International Air Rally

Changes to this annual event mean that attendees have the choice of the full week end package (full rally package) or the rally entry fee and the Saturday night prize giving dinner (basic rally package).

For further information contact either the Jersey Aero Club on info@jerseyaeoclub.com Telephone +44 1534 743990, the rally manager, evelinehawkin@hotmail.co.uk or see www.jerseyaeroclub.com/rally.php.

28th June – 2nd July 2008 International Air Rally of Malta



The annual International Air Rally of Malta will be held for its 39th year in June/July 2008 and offers the opportunity for some friendly flying rivalry, good laughs and some excellent trophies in the friendly and beautiful island of Malta. More details on <http://www.geocities.com/maltarally/main.htm> or email to George Kissaun at kissaung@mail.glabal.net.mt

JAA FNPT simulator - discount for PPL/IR Europe members at Exeter (EGTE)

Simulator Flight Training Limited offers a 10% discount off of the standard training and IR renewal test fees subject to production of a current membership card when settling the invoice. Enquiries or bookings via Airways Flight Training's office at Exeter Airport on 01392 364216.

Changes to mountain ratings



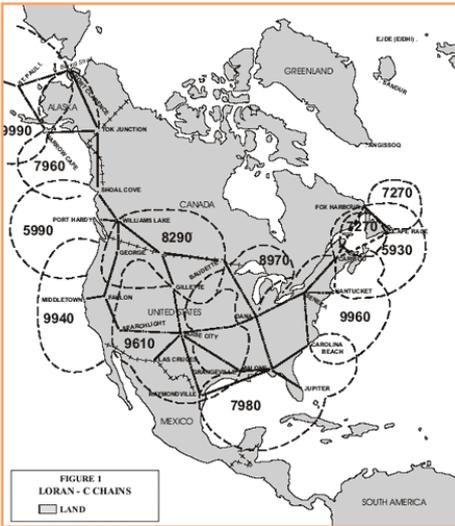
The French DGAC has recently promulgated a rule to the effect that any foreign pilot wishing to use an altisurface or altiport must hold a valid French issued authorisation.

See: www.sia.aviation-civile.gouv.fr/dossier%5Caicfrance%5CAIC_A_2007_23_EN.pdf. Previously, the holder of a Swiss, Austrian, German or Italian mountain rating was entitled to land without specific authorisation. This is fairly academic for the Brits, but it probably makes the French rating the qualification of choice for aspiring mountain pilots.

U.S. finally embraces eLORAN as GPS backup

LORAN – the long range aid to navigation – an American development of the British GEE radio navigation system used during World War II, will continue, and be modernized, according to the recently released U.S. Fiscal Year 2009 budget. Furthermore, system responsibility will be placed with the National Protection and Programs Directorate of the Department of Homeland Security, which has chosen it as the backup for national infrastructure elements that currently depend on GPS.

Today, high-accuracy GPS timing is essential to such critical elements as communications, utilities, banking and transportation, and a severe GPS outage today could be crippling nationwide. But the low-powered GPS signals can be jammed easily by hackers or adversaries, whereas the updated eLORAN (for enhanced LORAN)



offers near-GPS timing accuracy, high-powered jam-resistant signals and totally different failure modes. Industry sources state that eLORAN receivers would track every ground-based LORAN station within reception range, which could provide 25 or more position and timing sources “all in view” simultaneously across the U.S. But standalone eLORAN aviation units appear unlikely—manufacturers currently envision small eLORAN chips buried as backups inside future GPS units.

Manchester celebrates freedom from price controls



Manchester Airport will be able to set its own charges after UK Transport Secretary Ruth Kelly announced on 14 January 2008 that the airport will be de-designated. Government-imposed price controls had been introduced in 1986 under legislation that sought to protect passengers from airports that had the potential to abuse their market position.

UK Safety Board concerned about avionics corrosion

The UK Air Accidents Investigation Branch (AAIB) recently issued a sweeping recommendation (www.aaib.dft.gov.uk/publications/formal_reports/1_2008_vp_bjm.cfm) that EASA, FAA, Transport Canada and other aviation agencies amend requirements for the design and installation of electronic components in aircraft to take into account fluid and moisture

contamination as a source of common cause failures.



This recommendation stems from a November 2005 incident involving a 2004 Bombardier Challenger 604 (registration VP-BJM) that experienced autopilot pitch and stabilizer trim failure due to corrosion of the horizontal stabilizer trim control unit (HSTCU) circuit board. There were no injuries, but the crew declared an emergency and made a no-flap emergency landing at London Heathrow Airport. According to the AAIB, moisture created by humid air condensing on the cooling motherboard during repeated prolonged flight at altitude over time corroded the solder, leading to the HSTCU’s eventual failure. While the incident occurred on a Challenger, the AAIB is concerned that avionics motherboards on other aircraft could be affected in a similar manner. Bombardier has since issued a fix and installed specially coated HSTCU motherboards in the affected 366 in-service Challenger 604s at no cost to operators.

European flights reach all-time high thanks to LCCs

Low-cost carrier (LCC) traffic helped the number of flights in Europe to reach a record level in 2007, Eurocontrol has announced. The organisation also predicted that activity will continue to rise in 2008. Eurocontrol calculated that 10 million flight movements were made in Europe last year - an increase of 5.3 per cent over 2006. Average daily traffic in Europe in 2007 amounted to 27,676 flights, compared with 26,286 the previous year.

New online search and rescue mission launched



A group of committed volunteers who met online while participating in the Amazon/Google search for Steve Fossett has launched a new Web site, InternetSAR.org, to facilitate such searches in the future. “We learned a lot during the three months or so of searching for Steve, and we didn’t

want that collective wisdom to get lost,” site founder Ken Barbalace told AVweb on Wednesday. About two dozen people have pitched in to help create the site, Barbalace said. “Our backgrounds range from pilots, professional image analysts, a skydiver, a Web site developer, and a few programmers, to people that just have a good eye for detail and have extra time to devote to the search.” Tutorials and protocols are being developed to provide all searchers with feedback from senior image analysts, Barbalace said, so they can constantly improve their reports. Experienced searchers with proven abilities can weed out false positives and “white noise” to help make the process more useful to search-and-rescue teams. Volunteers, who must have Google Earth loaded on their computer and a broadband connection, are invited to register at the site and participate in the image analysis. Barbalace said he is working to organize the effort as a non-profit group. “Our goal is to develop an efficient and cost-effective Internet imagery analysis search process, so that SAR organizations all over the world can take advantage of this innovative way of using technology to assist rescue workers,” the site reads.

Roadable aircraft to fly this year



The MIT graduates that embarked on the heretofore impossible dream of creating a practical roadable aircraft (they dislike the term “flying car”) have found the funding they need to keep going on the project. Terrafugia, as they call it, will fly before the end of the year and they hope to be delivering the \$148,000 vehicle in 2009. What’s more, they were displaying the engineering mock-up and folding wing demo at US Sport Aviation Expo in Sebring because the Terrafugia will be a light sport aircraft, powered by a single Rotax 912 engine. “We’re very happy with the development so far,” said Dick Gersh, the company’s VP of business development.

In vehicle mode, a snowmobile-type transmission will uncouple the propeller shaft and supply power to the front wheels. A top speed of around 85 mph is expected on the road.

London City has a magnetic personality



A UK Air Accidents Investigation Branch report indicates that magnetic interference at London City Airport (LCY) was responsible for “significant navigation problems” a Hawker 800XP experienced after takeoff. The incident occurred on October 31st 2006, and prevented the crew from complying with the standard instrument departure while on a flight to Brussels. Fortunately, the crew was able to recover heading information 10 minutes after departure and land safely back at LCY. While stopped at holding point M at LCY, the pilots observed AHRs and HDG red flags on both primary flight displays, which the pilots described as a “known fault” at LCY due to “metal in the taxiway pilings.” When the airplane was lined up on Runway 28, the flags disappeared. However, after departure the pilots were unable to control the aircraft’s heading using the autopilot because neither of the heading selector bugs would move in response to rotation of the heading selector. The red flags reappeared, and the twinjet was subsequently radar vectored back to LCY. Investigators found that other aircraft using the airport have experienced the same phenomenon, which has been traced to magnetic interference due to the large number of steel structures underneath the airport dating back to the land’s previous use as a boat dock.

Ground radar’s replacement? Magnetic fields track aircraft



New technology now being studied in Europe can track aircraft by detecting tiny changes in the Earth’s magnetic field, according to a recent report in ICTWeb (see cordis.europa.eu/ictresults/index.cfm/

section/news/tpl/article/BrowsingType/Features/ID/89466). Structures that cause “shadows” for today’s radar systems, a problem for ground surveillance at large, sprawling airports, do not impair the magnetic field detectors. Recent tests of the system in Greece and Germany showed that it could detect 100 percent of the passing aircraft, and pinpointed their location to within 7.5 meters [25 feet], a level of accuracy comparable to most existing air traffic management systems, says researcher Haibin Gao. The system uses an array of small, cheap sensor units, which could be as small as a coin in the future. They can be installed at the entry and exit points of each runway, and would be affordable even for small airports.

The researchers now are looking for investors to certify the technology and bring it to the market.

Health study: Aircraft noise and blood pressure



“Night time aircraft noise can affect your blood pressure instantly and increase the risk of hypertension,” according to Dr. Lars Jarup of the Department of Epidemiology and Public Health at Imperial College, London. “And so can sleeping next to someone who snores.” According to a study co-authored by Jarup and published in the European Heart Journal. Researchers remotely measured the blood pressure of 140 volunteers and analysed the noise level in each person’s bedroom. The sample included people living near London’s Heathrow, and airports in Athens, Milan and Stockholm. Noticeable increases in blood pressure were correlated with increases in noise levels reaching more than 35 decibels - which can be similar to the amount of noise generated by snoring or nearby automobile traffic. The level of noise, according to researchers, was the key factor. The type of noise was not. Similar increases in blood pressure have been reported in other environmental noise studies. The study found that systolic blood pressure increased by 0.66 mmHg per 5 decibels of noise and increases were apparent even when individuals remained asleep.

National ‘Visit Air Traffic Control’ Month – May 2008

During May 2008 over 20 UK Air Traffic Control Units will be taking part in the first national ‘Visit ATC’ event. The Ministry of Defence (MoD), NATS and independent air traffic units throughout the country are participating in the scheme which is aimed at increasing the knowledge of both pilots and controllers of each other’s skills and limitations. The event is part of the UK’s ongoing Airspace and Safety Initiative (ASI).

All the visits will require prior registration and are open only to holders of pilot licences (NPPL, PPL, BGA certificate etc). Those attending will be required to show their licence. If you have not pre-registered or cannot produce your pilot licence you will not be admitted on the day.

Places are limited and will be allocated on a first come first served basis. All the events are free of charge.

For a full list of units taking part, the times and dates when each unit is open for a visit, and contact details for pre-registration check the ASI website at: <http://www.airspacesafety.com>

FOR SALE GRUMMAN AA5B TIGER 1979 TT & TTE 1516



Sensenich prop. Excellent condition - complete re-spray in 2004. Currently VFR panel with Bendix King KY 97A com, King KR87 ADF, Garmin 330 mode S (IFR approved), marker receiver, 4 place intercom, 4 cylinder digital CHT and EGT gauge, Davtron, and second altimeter. Price, as is, £32,250. Also have the following yellow tag avionics, which when fitted would create a full airways tourer. Garmin GNC 300XL IFR approved GPS, King KNS 80 R-nav/com unit (FM immune version), and Garmin GI 106 CDI/glideslope indicator. Can supply separately or discuss a price for fully installed and certified.

Contact Steve Niechcial,
Tel 07976 011494

Oxygen saving regulators – how much do they save?

By Christof Edel and Peter Holy

With oxygen refills difficult to come by, most non-pressurized “high-fliers” buy a system that uses less oxygen than a basic constant flow cannula. After many “mine is better than yours” beer conversations and not content with relying on manufacturer claims, we wanted to see how much the systems actually save and conducted a test flight, with somewhat surprising results.

A recap – how oxygen systems work

All portable oxygen systems have the same basic components: the oxygen bottle, which holds oxygen at a pressure of 150-300 bar when full, and a pressure regulator that reduces this to somewhere around 1.5-2 bar, normally mounted directly on the bottle. Some hoses then go through a flow regulator or demand regulator to “translate” this pressure to the appropriate oxygen amount required, and this connects to a cannula or mask to deliver the oxygen into your nose. The one component that makes a difference to how much oxygen you use is the flow/demand regulator. A mask is required only above 18,000ft and as all the systems discussed here depend on the use of a cannula to offer the largest savings, we restrict this article to the use of cannulae.

How much is enough?

While the law of the state of registry determines when the use of supplemental oxygen is required, it does not normally say how much. Aircraft certified according to FAR/JAR 23 need to supply at least 88 litres per hour per head (l/h) at FL180, but

as portable equipment does not have to be certified the actual oxygen provided varies. For example, the standard constant flow system by Mountain High provides 120 l/h at FL180, while Aerox assumes 105 l/h (both according to their website).

A much better way to determine oxygen requirements is measuring the actual blood oxygenation and adjusting the flow to achieve a reasonable level. At sea level, blood oxygenation is 97-98%, decreasing to 90% at 6-8,000ft and below 70% at FL180. For our test, we chose 90% as a target level, and the system flow was set to achieve that level.

The baseline – a constant flow cannula

The most basic system is a simple cannula, connected to a ball flow-meter. This most primitive of all measuring devices is held upright, and the oxygen flow blows up a ball in a tube. The tube has an altitude scale and you adjust the flow to make the ball float next to the altitude you fly at – while holding the tube vertical. This requires two hands and can be quite fiddly, so when operating alone we would consider it good practice to set up the system for the intended cruise altitude as part of the pre takeoff checks.

On our test flight, we set the flow-meter to the 18,000ft setting, which used about 150 l/h. Lower settings did result in oxygenation levels below 90%. All relative savings in this article are calculated from this baseline, which is a lot higher than the FAR requirement for built-in systems of 90 l/h and the 100-120 l/h typically quoted by manufacturers.



Left: Oxygen-saving cannula and manual flow regulator. Right: Mountain High cannula for use with O2D2 system

Cheap and useful - the Aerox Oxsaver

The standard constant flow cannula delivers oxygen all the time, even when you breathe out. This obvious waste can be avoided by using special cannulae which incorporate a reservoir under the nose which stores oxygen during exhalation and is emptied at the start of the inhalation. These cannulae are available under several brands, but there appear to be two basic types – moustache and pendant – both manufactured by Chad Therapeutics. We used a moustache model provided by Aerox for our test. The flow is again regulated using a ball flow-meter, but with a different scale for the lower flows required.

Based on the operating principle one would expect a lower oxygen usage than for normal constant flow cannulae, and indeed we needed 95 l/h to maintain 90% oxygenation – a 36% saving; not bad for a \$30 device. As an interesting aside, we had to set the flow-meter considerably higher than the Oxsaver FL180 setting – at the standard setting the flow was reduced to 54 l/h, which is almost exactly what Aerox claims, but oxygenation was too low at 80-85%. We would recommend anyone flying with these devices to monitor actual blood oxygenation.

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Test Methodology

- ☞ Two male pilots 2 hours flying up and down Norfolk at FL180. Each system was used for 15-20 minutes and the actual usage time was recorded to 5-10 seconds precision.
- ☞ We used a generic fingertip pulse oximeter to monitor blood oxygenation at least every five minutes throughout the test.
- ☞ For the demand regulators, an indi-

vidual bottle per system was used and weighed before and after the flight.

- ☞ For the constant flow systems, we first set the flow-meters to FL180 but in each case we had to adjust the flow upwards to meet the 90% oxygenation target. Once we had established that flow, we marked the flow-meters and measured the actual consumption when back on the ground, replicating that flow and weighing bottles before and after.

- ☞ We both considered the workload typical for an IFR en-route environment with autopilot i.e. low, with the tests taking up some attention, but not at all stressful.

This is not a scientific test i.e. a sample of 2, weighing accuracy approximately 5%, no standardised breathing pattern/rate; however, it is the best we have come across so far and should give a reasonable indication of relative performance.

Oxygen Regulators

continued from page 19

Demand regulators

So far, the systems discussed deliver a constant flow, regardless of the breathing cycle. A second category of system senses actual demand for oxygen by detecting the user's breathing, and adjusting oxygen according to that demand. While superficially this does sound similar to the Oxysaver cannula operation, this is superior as it shuts off the oxygen flow completely, while at higher flows the Oxysaver reservoir will just spill over.

Mechanical marvel – PreciseFlow

PreciseFlow manufactures a mechanical device which uses a cannula with two tubes, of which one delivers the oxygen while the other is used to detect (via the change in pressure) the inhalation/exhalation cycle. The start of inhalation opens the oxygen flow and the start of exhalation closes it. Also, the aircraft altitude is set manually using a rotating ring and this controls the size of an internal orifice, which is much neater than fiddling with the ball flow-meters.



Tested at the standard FL180 setting, it achieved the best oxygenation of all systems (90-94%). Oxygen usage was 80 l/h, a 47% saving. When reviewing the test results later, we also discovered that the pressure regulator used has a slightly higher pressure than recommended by PreciseFlow. Compensating for that, a saving of ~55% would be realistic while still giving 90% saturation.

Oxygen autopilot – Mountain High O2D2

The PreciseFlow regulator shuts off when you breathe out and hence prevents oxygen from flowing when it would just spill over. But it still delivers oxygen during the last part of the breath-in cycle, which never reaches the lungs but gets stuck in the trachea on its way to the lungs.

Mountain High tries to avoid this by delivering a short pulse of oxygen just after you start breathing in. The duration of this pulse is electronically regulated and automatically increases with altitude, as the



system has a built-in pressure sensor. Instead of setting the system to an altitude, you just switch it on and set the altitude at which you want the flow to start – always on, 5,000 or 10,000ft. This has the added advantage that you don't waste oxygen during climb. On the other hand, it needs electrical power (3 AA batteries or an optional external power supply), and if that or a part in the "magic box" fails you are stuck with no oxygen, as the system fails "off".

The system consistently delivered 90% blood oxygenation, and the flow rate was very low at only 30 l/h – an 80% saving! This was even better than the manufacturer claims (43 l/h – 71%), probably explained by differences in breathing rates. It also offers stepped increases in the amount of oxygen delivered, e.g., for use of face masks, but we did not need this as it achieved our target of 90% - the basic setting was sufficient.

Wearing comfort

On a four hour flight, oxygen consumption is not the only consideration. All cannulae offer a similar comfort level, with the Oxysaver needing some time to get used to, but not unduly so, as long as you don't look into a mirror. The basic constant flow system has the drawback that, due to its excessive oxygen flow, it irritates the nose more when used for long; and the Mountain High pulse is quite sharp and noticeable, so overall the PreciseFlow is the least obtrusive system, despite its somewhat "fat" cannulae. But overall, none of the systems has any major drawbacks ruling it out for long flights.

User interface

Ball flow-meters are a bit fiddly and require full attention for about 30 seconds each time you have to adjust the flow rate. When operating alone, it is best to set them to the target rate on the ground and then check later they still are ok. PreciseFlow have a simple twist wheel to set the altitude you fly at and this is much more convenient. Mountain High is the only system that automatically adjusts the rate as you climb and descent, beating the others hands-down.

Safety considerations

First of all, loss of oxygen at FL180 is not catastrophic, as long as you notice it. Time of useful consciousness is 15-20 minutes. All systems tested can fail without warning and all but the Mountain High system do not give any positive indication of a failure e.g. a blocked or kinked oxygen line. For constant flow systems you could notice the ball in the flow-meter dropping and PreciseFlow and

Mountain High have an indicator showing when they deliver oxygen; but unless you place it within your scan you are unlikely to notice. Mountain High has an audible alert either when you run out of oxygen or when it does not recognize a breathing cycle within 45 seconds; but in a typical single cockpit you are unlikely to hear it! You can wire it to your audio panel, though, which would significantly enhance safety. This still leaves sudden battery failure as a risk, an added point of failure over the very simple constant flow systems. So in any case, we recommend using a pulse oximeter to measure actual oxygenation as part of your regular cruise checks, just to be safe.



Pulse oximeter showing 98% oxygenation and heart rate of 68, with carrying pouch

Summary and conclusion

When we set out to conduct this test, we expected a much more balanced result. We even double-checked the PreciseFlow measurements by repeating them on the ground – not strictly a valid test, as it will use less oxygen under these conditions, but we wanted to make sure we did not commit a gross error.

In the end, it is pretty clear. The Mountain High pulse demand regulator beats the competition hands down on oxygen saving (70-80%) and ease of use. Its only drawbacks are the somewhat sharp pulse and the need for electrical power; however, this saving comes at a price as it is also the most expensive system, at \$800 (2 place) or \$600 (single place) for the demand regulator alone.

PreciseFlow disappoints as at \$395 per demand regulator it is not cheap for only a 47-55% saving when you can get 36% by using the Oxysaver at a cost of \$30 per cannula. Standard cannulae are only a real consideration if you can't face wearing the Oxysaver because you look really naff...

What about FL120?

The results of this test only apply to flight at FL180. It is not valid to extrapolate these results to lower altitudes. Maybe if we find ourselves with some time and three flight hours to spare this spring, we will test at a lower level. Watch this space, but no promises.

