Instrument Pilot

The *PPL/IR Europe* Magazine | No. 68 | July-August 2008

CONTENTS

PPL/IR EUROPE

A bit over the top

Navigating the North Pole

by Timothy Nathan

While I cannot pretend to be an expert on any kind of navigation, let alone polar navigation, I can at least say that I have flown a light aircraft low level across the North Pole recently and can, at the very least, present a practical guide for those that might follow and tell an interesting story for those who wish to fly the trip vicariously.

The transit was from Svalbard to Eureka (in the far north of Canada) in my Piper Aztec. Eureka is not far (in global terms) from the current position of the magnetic North Pole, so I chose to fly via both the geographic and magnetic Poles. This means that I flew about 450nm with ostensibly a magnetic variation of 180° (though I must say that it never presented on the compass as such). Where I refer to the Pole in this article I mean the geographic Pole.

Grid navigation

Because I was flying to and from the Pole it meant that my track always followed lines of longitude i.e. I was flying at all times either due north or due south. Therefore I did not have to worry about the grid navigation technique that must be used if you wish to fly in a straight line which bypasses the pole. Grid navigation is not hard, it essentially means creating a new grid system where the lines of latitude and longitude are parallel not at the equator

P 19 ▶

PPL/IR Europe is open to any pilot interested in the operation of light aircraft under IFR in Europe. The annual subscription is GBP60 and more details are available from the Membership Secretary.

Instrument Pilot is the magazine of ***PPL/IR Europe*** — a company limited by guarantee registered in England at Hamlet House, 366-368 London Road, Westcliff-on-Sea, Essex SS0 7HZ, No. 4379059. The views expressed in this magazine are not necessarily those of ***PPL/IR Europe***. Readers should be aware that the magazine is written mainly by amateurs. While reasonable efforts are taken to check the accuracy of statements in the magazine, no confidence should be placed in them unless independently checked and confirmed by an appropriate authority. Contributors to the magazine possess no greater expertise than that of their readers. Therefore, no advice, guidance, recommendation or factual statement should be relied upon until checked against a more dependable source. Neither the officers nor the contributors nor ***PPL/IR Europe*** accept responsibility for facts or opinions stated in this magazine.

Editorial e-mail:
theeditor@pplir.org
Website:
http://www.pplir.org

Art direction & production
Paul Turner
paul@exec-flight.co.uk

Printing and distribution
Lithocraft Ltd
35a Dane Road, Coventry
West Midlands, CV2 4JR

Instrument Pilot
(Print) ISSN 1747-0382
(Online) ISSN 1747-0390

Directors of PPL/IR Europe

Members of the Executive

Membership Administrator

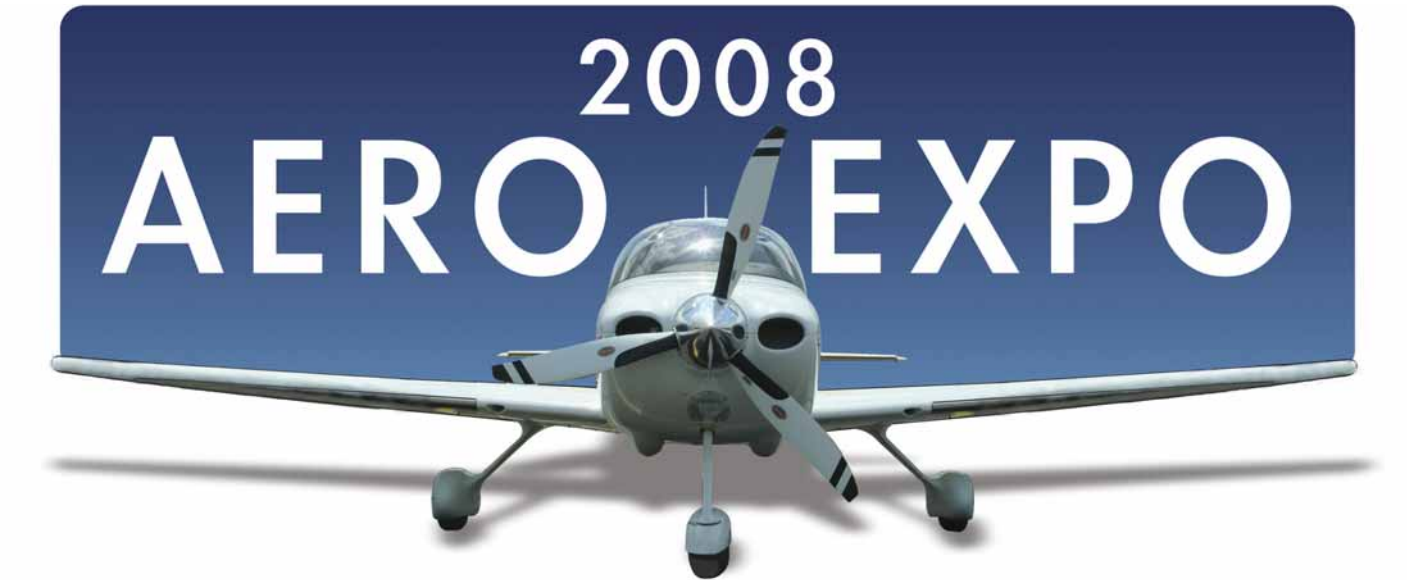
*Annual accounts for the company are available on the website. See www.pplir.org – **About Us***
*For reports on meetings, conferences and other activities attended in the last 12 months by directors and members of the executive on behalf of PPL/IR Europe members, see www.pplir.org – **Lobbying***

Aero Expo 2008 - a very big thank you!

A very big thank you to everyone who helped out at Aero Expo. As described in Douglas Baillie's report on page 3, we successfully organised and ran the seminar programme throughout the three days. And we manned our stand from beginning to end, with lots of interest in ***PPL/IR Europe***. We recruited over 30 new members and entertained lots of existing members who visited the show.

To promote ***PPL/IR Europe***, we produced a special publication ***European Instrument Pilot*** covering training, aircraft selection, operational matters and touring. Members can purchase copies through our website for £8 p&p included (see www.pplir.org/index.php?option=com_facileforms&ff_name=TheBookOrderForm&Itemid=98).

Jim Thorpe,
Chairman



Report from Aero Expo, 13-15 June 2008, Wycombe Air Park

by Douglas Baillie

The cold front had passed on its southerly journey the day before, so we had some nice clear air for those arriving in their private planes and helicopters. The few remaining cumulus and the cooler summer air provided a nice ambient temperature for wandering about the very extensive exhibits both inside the hangars and outside, without getting stifled by any unwelcome mid-June heat. For those concerned about such matters I expect that there were not too many density altitude problems about.

Outside, aircraft everywhere

The first thing that is noticeable is just how much space is taken up by the various exhibition stands spread about outside. These are made up mostly by the up-market hospitality transporters owned by the new aircraft manufacturers and their sales agents, some flying school information platforms and some used aircraft for sale. There was of course a proliferation of many kinds of aircraft just sitting there begging you to come over and take an intimate look at their plush interiors, glass cockpits and shiny new paint.

In particular, I was most impressed with the Pipers on display, the extensive new Cirrus range and variants, but mostly with Air Touring's promotion of the very recent, new Mooney Acclaim S, with its novel anti-ice system, very similar to the Cirrus, using a pressurized glycol pumping system for the prop and all leading edges. The Mooney has a stated cruise of 210kts and has a retractable undercarriage whereas the Cirrus is somewhat slower, is much less expensive, has fixed gear with spats and is not cleared for known ice. But strangely the Mooney has what appears to be the same anti-ice systems as the Cirrus (no doubt someone knows otherwise and will say so) and is cleared for flight into known ice. I don't know how often flights into these conditions are likely to be encountered, but having flown in Scotland for more than 40 years, it only needs to happen once to be worth the comfort of avoiding becoming a large block of uncontrollable descending ice! But that's another story for another day.

Of course it was impossible to avoid looking mouth wateringly at the new six seat, pressurized TBM 850 from EADS Socata and the other imposing range of single turboprops and if you have a few million dollars to apply to your fun flying, so much the better. Drool-on.

Inevitably, British Airways had its mobile flight simulator available and interestingly they offer it for hire for something different at corporate events. Good idea.

For those whose interests include rotary flying, Sloane Helicopters had one or two lovely examples on display along with some very clued up and helpful instructors on tap to offer lots of advice and guidance. Having recently completed my PPL (H), it was interesting to be able to chat with another enthusiast on reasonably level terms.

Cabair were much to the fore, with lots of their staff and instructors on hand promoting their various pilot courses and seminars. They also offered helicopter flights and had a wide range of used aircraft available for anyone thinking about a purchase.

Inside, a high density of exhibitors

Although the outside exhibition area was laid out in an interesting, logical and continuing way, the absolute content level was minimal when compared to the density of exhibitors (over 50), who were distributed among their allotted slots within the two main hangars.

These exhibitors really did provide everything that the novice right through to the seasoned expert might want to see, buy or just ask about.

If you wanted it, then it was probably there. Much evidence could be seen by the proliferation of leaflets, booklets and other marketing material that was bulging out of the inevitable array of promoter's polythene bags, filled to overflowing with all kinds of paraphernalia and give-aways.

It took me a full eight hours to really look around properly at what was going on and that didn't include the coffee breaks, discussions over lunch with other aviators who queued patiently at the inevitable (and somewhat expensive) burger vans. Snacks and lunch being taken on wooden benches and tables, nicely laid out in the sunshine.

Crowded stands

Everything was of interest to the visitors, even the CAA's safety desk that was always busy and crowded with pilots and others expressing their varying views on just about everything to do with current and proposed regulations, from lively exchanges on Mode S to turgid interpretation of the Air Navigation Order. This was all good humoured and always presented in a spirit of flight safety.

The new Air Traffic Services Outside Controlled Airspace CD, issued jointly with NATS is an absolute must for all GA users as it contains all you need to know about the

new regulations due to be introduced 12th March 2009. It is being distributed free to PPLs later this year but its content can be viewed online now at http://airspacesafety.com/content/home.asp.

The Met Offices' technical stand seemed to be a popular location, offering hands-on help with the latest in on-line weather forecasting along with some amazing new high-resolution graphical images, both of which have made huge advances in recent years with regard to weather trends, forecasting accuracy and, most welcome, added clarity.

The Garmin stand was a masterpiece of elegance, space and high technology nicely combined together to enable everyone who was interested enough to take advice and look carefully at their simulated flights and extensive range of the latest in GPS advances. Bristling with new ideas, their user friendly, logical and instinctive flow of information and functionality simply makes even recent advances of the last year or two look quite pedestrian by comparison.

The competition to Garmin wasn't far away either in the form of Bendix/King from Honeywell promoting their equally intuitive avionic packages, including upgrades and retrofit options for all light aircraft.

From far and wide

Possibly one of the furthest travelled was the Blue Chip Aviation flying school that carries out flight training from PPL to ATPL from Pretoria, South Africa. Guaranteed VMC and with a strong pound sterling to the rand, a possible lower cost option!

But no, the furthest travelled prize surely goes to Flyinn Tours and their guided holiday experiences for pilots, who came all the way from New Zealand. Sample the mountains, back country navigation, strip landings, station life and all the NZ wildlife. So, I have to say that this sounds just great if you really want to try something completely different to add to your logbook.

Chemicals, covers, flying kit & more

Of course I also realise that some visitors have special interests. If you have a passion for finding out more about the chemicals you need for your aircraft then this is the place to find unbridled passion for cutting edge concoctions and obscure mixtures. Want to know about aircraft polish, or what to use to clean your windscreen? Do you have a passionate need to learn about the performance and make up of anti-icing and de-icing fluid, hydraulic fluid and any of the complex oils your engine may need or deserves? Then you have come to the right place because these guys know their stuff and it can be most educational if you understand the language they use.

Cambrai covers had a nice display of how to protect your pride and joy from the elements, unwanted ingress or, if lucky enough to be in some kind of hangar, protection from pigeon guano.

If you want to take to the air locally and without the benefit of an engine, then all you wanted to know was to hand from the people at the Booker Gliding Club.

All of the pilot magazines and journal publishers were out in force, offering discounts for subscriptions if you hadn't subscribed yet, or didn't know that a particular new offering even existed.

Want to learn more about the latest in head-sets with acoustic balancing, automatic attenuation and noise cancellation? Or some light background music that automatically stops when your radio bursts into life or you make a transmission or an identification of a navigation-aid? Well here they all are, from Bose and others, right across the board, to such an extent that begins to make the standard David Clarks look and feel a bit dated.

If you have a need for some flying kit, in the form of overalls, shirts, rank bars, shaggy world war two jackets, silk gloves, big boots, kids stuff, personal tee shirts, aircraft models, maps, guides, flight plans, pens, protractors, or funny hats and as they say, much, much more, then you have arrived at your personal pilot's nirvana. The things that you see in the catalogues that you sometimes get 'free' with your magazine now take on real life and can be sampled first hand. And there are lots and lots of them.

Model aircraft or the real thing

If you have ever wanted to have more aircraft control, land shorter and do so safely then maybe you could drop in and speak to the experts in Micro Vortex Generator Kits that can be retro-fitted in a day to full span and tail, for meaningful performance improvements. These experts are Micro Aerodynamics Inc. Washington, USA.

If you are unable to afford the real thing, then how about a nice custom model of your favourite, dream aircraft? Geoff Noble has been catering for the aspiring for over 15 years and is bound to have just what you need to take pride of place on your desk.

Maybe you can stretch a bit and really get that real aircraft by asking Hitachi Capital or Lombard for some financial help by spreading the cost over a few years ahead instead of saving up endlessly until you are too old to fly anymore?

Help is on hand for anything you may ever really want to know about flying or general aviation. This included a very modest stand, run by some enthusiasts, aimed at serious private pilots who are keen to learn more about the operation of light aircraft under IFR whether for business travel or touring, called ***PPL/IR Europe***. I think that by Saturday evening they had signed up at least 20 new members and I hear that was maybe over 30 by close of play on Sunday!

Fancy building your own dream house and private hangar on a private, custom-built airpark in France? Well, guess what? You have arrived at the right place again, with two locations to choose from, both currently in development and a lot pre-sold. Great idea for a holiday home with your favourite steed parked safely in its own protective, secure shelter, only a few metres away from your front drive and ready to go.

Seminar programme

Lots of time could also be spent in attendance at the various seminars that ran more or less continuously throughout the three days. These seminars were organised, hosted and chaired throughout solely by volunteer ***PPL/IR Europe*** members, whose interest and enthusiasm was clearly infectious as evidenced by the popularity of all the sessions. I managed to attend three out of twelve, so I didn't really get a proper idea of the content of the entire spectrum of subjects. It would have been easy to just sit there taking in all of the useful information, but the rest of the exhibition was so extensive, that it was not possible to do everything.

The ones I did attend were excellent. Particularly from NATS whic has appointed a dedicated and experienced controller whose remit is to try and reduce infringements of controlled airspace. So not unsurprisingly we all learned a great deal about the new initiative around managing the increasing number of 'busts' in the London TMA, where there is certainly a new and vigorous regime coming into play that will result in a nil tolerance strategy. No doubt about it, this is a serious matter, with culprits now being tracked all the way to their destination. Remember that they (NATS) have both primary and secondary radar available so there are no hiding places any more.

On a more positive note, all they ask is that all aircraft squawk with mode Charlie selected all of the time so that they at least know where you are and what height you are flying at. Fair enough.

▶

◄

And if you are aware of making a mistake, then call up the facility or, if you don't know the frequency, use 121.5 which will get an immediate fix on you and pass it to the relevant controller. This will seriously reduce the likelihood of a collision, avoid needless avoidance actions being taken by ATC and, best of all, mitigate the consequences of your neglect or mistake because they want to encourage you to confess and sort it out early.

So there you have it: squawk Charlie and call up D&D if you are not sure or uncertain of where you are, without fear of retribution. Running away and trying to hide or pretend it wasn't you is the worst sin of all and will result in reports being made to the CAA who tell us that they will prosecute.

The Met lady presented an inspiring and informative session, albeit a bit complex at times, explaining in some useful detail how much weather information you can now access on-line, rather than just relying on hard copy available at the flying club, or by the now virtually redundant fax-back method. Only one person in the audience of 50 still used fax!

Probably best, and relevant for ***PPL/IR Europe*** members, was Alan South's presentation on his experiences flying around Europe on business. Alan explained in some vivid detail the advantages and disadvantages of such exposure to real time, focused flying. His advice is to plan, followed by more planning, and to know the weather. Having an intimate knowledge of your aircraft and its limits seemed, somewhat sensibly, to be the predominant issue.

Don't just take my word for it

All in all, the ambience of the entire Aero Expo was an interesting blend of professionalism, expertise freely given, friendliness, helpfulness and willingness to help anyone who cared to show interest.

It really is impossible to comment on all that was there in a meaningful way and you really would need the full three days to do justice to everything on show.

So don't just take my word for it. Get along next year, maybe help out at ***PPL/IR Europe*** for an hour or so and if you are passionate enough why not consider adding more to the seminars as a speaker. There is always something to share and more to learn about by getting involved.

FAA CPL

By Peter Geldard

Following the path of fellow PPL/IR Europe member, Peter Holy – who obtained his FAA CPL in England - and very much with his advice and encouragement, Peter Geldard, recently gained his FAA commercial pilot licence in the States. He explains 'how' and 'why' he took this step

Like many ***PPL/IR Europe*** members I obtained my FAA IR some years ago and have used it regularly since. Like some of you, my IR was attached to a FAA PPL that was issued on the basis of my CAA PPL i.e. 'piggy-backed'. Normally, such an arrangement causes no problems but for three reasons I felt the time had come to upgrade in obtaining a 'stand-alone' FAA licence. I mention two reasons below and the third at the end of the article.

Why bother?

Firstly, having both a CAA & FAA licence results in a certain amount of duplication i.e. two lots of expense with two biennial reviews and two medicals. Where the FAA medical is concerned, being 'post 60', the requirement for only one medical every two years (at half the price of a CAA annual one) makes the expense only one quarter of the cost.

Secondly, because the FAA PPL licence is accredited on the basis of my CAA licence if any change is made to the original CAA licence upon which it is based, the accreditation ceases and the process of obtaining a new validation has to be gone through again i.e. if your address or licence number changes, or, as has recently happened, the need for 'English Language Proficiency' to appear upon the licence. For those of us still possessing an old CAA licence (as against a JAA one) change is also going to happen at least twice in the coming years since EASA has already stated that it will only recognize JAA licences when it starts to 're-issue' their own. For those with 'piggy-back' licences, they will know that each 're-issue' of a FAA licence requires both the expense and hassle of getting the CAA to produce the 'confirmation' that the 'Fred Blogs who claims now to be English proficient is the same Fred Blogs who previously held licence number 1234' etc. plus the expense and inconvenience of travelling to the States and attending an FAA Flight Standards District Office (which has to be specified) in order to obtain a 'new piggy-back' which will only be valid until the next licence change comes along…

As a result of some 'hangar talk' it was suggest to me that if I was going to take this route, rather than get a 'stand-alone' PPL - which I had originally planned - why not go for an 'upgrade' and aim for the commercial? The syllabus covers all that one did for the PPL (plus some of the IR material), but in far greater depth; particularly new material on American weather with special reference to the modern computerised methods of obtaining information and analysis of a 'go/no go' situation. There is also specific emphasis on the extra material that a commercial pilot is likely to need e.g. the regulations over the use of oxygen; and the practicalities of pressurisation etc.

I therefore concurred that getting a

CPL would not only solve the two reasons mentioned above, but produce an added benefit which is mentioned below. So knowing I was already going to the States to lecture, I decided to combine 'work' with 'pleasure'.

The 'written' and the medical

Those who have taken FAA exams in the past will know the system. I took the written exam in the UK at Farnborough via FlightSafety (www.flightsafety.com plus click 'Farnborough'). They have Lasergrade computer testing for which they charge £150. There is a whole host of learning helps available, from simple books through to sophisticated (and expensive) computer programs: 'Horses for Courses'. Being a 'bookish' sort of person, I used ASA and ploughed through their material. Gleim (www.gleim.com) do the same. You will need to find a FAA CFI who will 'sign you off' – a requirement to take the written test.

It is beneficial to take the written seriously since, under the FAA regulations, when the time comes for your check ride 'the examiner is required to test your knowledge on the areas in which you were deficient in the test'. With already a possible two hour oral pending, there is no point in making things more difficult for yourself! The theory involved covers the whole of the syllabus of the PPL – but in far greater depth. Obtaining a third class medical - all that you need if you only want to use the commercial licence privately - is straightforward. For us 'oldies' over 60, the benefit of it being a simpler examination and valid for two years has added advantages.

The practical and flight test

One of the oddities of recent USA security hype is that if you already have a FAA PPL (which a 'piggy-back' is), you do not need to go through the Transportation Security Administration (TSA) hoops in order to obtain a commercial licence. The ***PPL/IR Europe*** website has a useful page on this at http://www.pplir.org/index.php?option=com_content&task=view&id=127. You will, though, normally still need to obtain an M1 Visa.

Being a rather slow learner in new flying skills - 'teaching old dogs, new tricks'? I needed about ten hours to pick up flying the new manoeuvres which are included in the commercial test: chandelles and lazy eights etc., plus time to refine older skills which are required manoeuvres for the commercial check ride, like 55° steep spiral turns and power-off landings, but all to the increased (tighter) requirements of the commercial test regulations. Likewise you would need extra time to familiarise yourself thoroughly with the complex 'plane that you are required to use, particularly if this is new to you.

The flight test consisted of about one and a half hours flying and two hours oral which tested the whole area covered in the written and/or oral guides produced by ASA. The oral contained some interesting questions like: 'How much does the C of G change when the gear is raised/lowered?' As I was taking the test in a Piper Arrow, I guessed it didn't make much difference – which was the right answer! 'What oil is used in the hydraulic system to lower/raise the gear?' Fortunately I knew that because I had re-read the handbook thoroughly the night before!

The result

In my case, a new 'stand-alone' FAA licence with the word commercial! In practical terms – especially in the UK – there is very little useful benefit, since no one wants to hire a low-hour, old man like me. The FAA is also very stringent against 'holding out' or in any way trying to be an 'operator' without an operator's licence. There is as well, I found, very little demand for crop dusting or bird scaring in the leafy lanes of Kent!

But what one does possess is a commercial licence. I know that Cathay Pacific pilots propping up the bar at Raffles in Singapore may pour scorn on it; but at the end of the day it is 'what it says on the tin': an ICAO compliant commercial licence. And within such a licence is enshrined the 'right to work'.

At the University of Kent (where I work as Senior Chaplain) my friends in the Department of European Law are adamant that such a 'right' is so highly protected and hedged about within a multiplicity of labour laws and human rights acts that 'all the huffing & puffing of EASA at full throttle' will not be able to penetrate them.

This will affect whatever EASA may or may not do with PPLs - and I am one of those who still believes that most 'hangar talk' on this subject is pure speculation and attracts the worst kind of groundless 'doomsday' predictions. But when the 'change' comes, and under EASA it will be 'when' not 'if', I believe they will be obliged either to continue fully to recognise a commercial licence for what it is – an ICAO commercial licence with inherent rights – or be prepared to offer very generous 'grandfather' rights in exchange.

For this reason, if for no other, fellow ***PPL/IR Europe*** members who have an FAA PPL may consider whether it would be also beneficial for them to 'upgrade' to a CPL – especially if their current FAA licence is a 'piggy-back' one.

Intra-European duty drawback on Avgas

*A suggestion from Howard Gold, posted on the **PPL/IR Europe** website forum*

In the UK we are entitled to duty drawback on foreign flights, either at source at certain airports, or by drawback application (and I presume anyone can claim, not just a UK based aircraft).

It would be particularly useful to ***PPL/IR Europe*** members if we could collate information on where else in EU we can either:

1) Obtain duty-free fuel at source for export (and if so, what are the requirements and procedures)
   and/or
2) Obtain duty-free fuel by drawback application to that country's customs (and information on how that is done).

I don't recall seeing this information collated other than just odd mentions on forums. In fact, had it not been for Lough's posting on the Croatia thread I would not have realised that Italy has a drawback system. I wonder can we (UK based) pilots use it?

If we could build up a directory of duty-free rules and protocols, airports providing this facility, on-line forms, re-claim addresses etc on a country by country basis it would be a very worthwhile resource?

If readers have any up to date information, please either let me know or post the information on the website forum, Ed theeditor@pplir.org

Thielert and Diamond in high-stakes poker game

By Peter Bondar

The Thielert story rumbles on, which is more than can be said for half of all Thielert powered aircraft that sit moribund, grounded by a combination of EASA safety directives, internecine warfare between the Thielert Administrator and Christian Dries, the pugilistic owner of Diamond Aircraft, and the lack of spares from what was clearly a struggling entity long before it went bust.

So what are the options and what is it going to take for owners to get to the Promised Land?

Mercedes engine

Well, strategically for Diamond the end game is the new Austro engine, the AE300, a 170bhp, four-cylinder, 16-valve unit based on the Mercedes 2.0 litre diesel unit used in the second generation A Class where it produces a 140bhp. In cars they are being re-chipped to 170bhp.

Christian Dries, as they say in 'management speak' has pissed on the administrator's bonfire by informing any would be investors that Thielert's largest customer Diamond will no longer need the services of Thielert by the end of the year.

The resultant poker game would be entertaining to watch if it was not for all the Thielert owners stuck in the middle.

So what is the game they are playing? As the administrator, the card deck is not loaded in his favour, but he can and is making life difficult for Diamond, since they are not a creditor but potentially a major short term revenue opportunity.

On the other hand Diamond wants to deprive the administrator of cash and force the liquidation of Thielert as fast as possible. They are clearly hoping for a well judged price to acquire the assets.

I feel Diamond could have finessed the presentation issue but the ugly facts are not far beneath the surface.

So what's happening or what could be happening?

My spies tell me that Austro Engines and their associated teams at subsidiaries of Mercedes and Bosch and the German designer and manufacturer of the new gearbox unit for the AE300 are working all hours and are currently using every test cell in Europe to try and get their new baby certified.

If I was Diamond, and since Mercedes is one of my new buddies, I would be busy flicking through the Mercedes parts catalogues and seeing just how many Thielert parts are actual purely rebadged Mercedes parts. I would be then going to someone to get some fine aviation grade paperwork attached to them.

Next I would go to EASA and get the relevant paperwork to overhaul and service those pesky gearboxes.

Promised Land

So the poker game is in play, the players are reluctant to show their true colours but are sure bluffing it, big time!

What does it mean for the existing and would be owners?

Well, I think that despite the doomsayers, the Promised Land is still there. Interestingly and forcibly this was all brought home to me when I went and sat in the back of a Duchess twin following someone else through their MEP revalidation prior to my attempt in the DA42.

Every manoeuvre was associated with a twisting of cowl flaps, the tweaking of mag switches, the caressing movement of the constant speed prop levers and the steady manipulation of the mixture levers with just the odd tickle of the boost pumps and, almost forgetting, the carb heat levers too!

So for every six events the poor student had to do, I had but one, game over in my mind and for anyone who has ever flown the DA42 for real. The only logical progression is a turbo jet after that!

That Diamond is serious there is no doubt. That Thielert is dead, we are only waiting for the body to cool down.

Diamond desperately but only transiently needs Thielert. Thielert's manufacturing facilities will allow Diamond to expand production much faster than they otherwise could, with three hungry factories and back orders-a-plenty plus the desire to swap out all the Thielert engines, capacity will be sorely needed.

Performance benefits

For Diamond the Austro 170bhp AE300, and its soon to arrive 270bhp bigger sister, will power Diamond's piston fleet for many years to come.

The engines are heavier but Diamond will certify existing airframes to higher weights. The DA40 diesel will hold its head against its 180bhp Lycoming powered sibling. The DA42 will be invigorated with 25% more power, certainly easily breaking 200 miles per hour but not 200 knots.

The new engines do not use clutches for damping power train pulses and the engineering team cut their teeth on Porsche engine aero conversions; together with all of Diamond's vast collection of empirical knowledge, the next generation engines will be a whole lot better.

Latest news is that Diamond has started most of the actions that have been hypothesised, rumours are Lycoming may come in with a top trumps bid, based on the fact that of all the current engine manufacturers they are probably furthest behind the curve when it comes to diesel technologies. Stay tuned, this story will run and run or until September when the insolvency period is expected to close and the new owners will be announced.

Peter Bondar is a passionate aviator with 600 hours of time on his DA40 and DA42s. He is a founder member of the Thielert Engine Owners Action Group. His comments are based on experience working in corporate construction and recovery as a 'flying doctor' and his comments should be regarded as conjecture rather than authoritative.

Pre-flight: before you start up your pride and joy, consider the law…

by Ajay Wiltshire and Ian Gee

One of the most irritating things about clients is when they ask for after-the-event legal advice because, at the time they decided to sell a controlling stake in their company, to a man they met in the pub, on the basis of an agreement he drafted, they all thought that lawyers were too expensive, took too long and it was such a simple agreement that they did not need one.

We would always emphasise the need to take some advice from a lawyer and an accountant at the outset of any financially meaningful transaction. This article does not cover taxation issues, for which you must rely on a tax adviser.

So, you might well think that you can refer to this article for advice; we could not possibly comment!

FAA N-registered aircraft

Only a US citizen or a US corporation can own an N-registered aircraft. So, your first option is to find a friendly American, who may be a friend, relative or even a spouse. This person becomes the registered legal owner of the aircraft and you can then complete some form of agreement to determine the actual ownership of the aircraft. Be warned. I have a friend who is a car collector and his wife takes great pleasure in telling people that he can never leave her as she's 'got him by the Bentleys': when somebody has you by the Piper, it's much, much worse!

The other option is to use an agency to provide the registration service for you. There are a number of well-established organisations which provide N-registration. In choosing a professional service provider, you *pays your money and you takes your choice*. You can get an aircraft registered for a few hundred pounds – it all depends on how comfortable you are with entrusting your aircraft to someone else. Is your provider licensed and fully insured to provide trust (fiduciary) services? What level of professional indemnity insurance do they maintain? Do they have in-house lawyers and accountants? What amount of assets do they have under management?

What should you look for? A special purpose company or corporation as a legally distinct entity set up to own the title to your aircraft, and only your aircraft, not anybody else's as well. The ownership of the company shares must comply with FAA rules and will normally involve the use of a US trust. The trust deals with the relationship between the company, its shareholders and you, the real owner. The company and the trust should both be managed by a reputable, licensed agent.

N-registration and UK training

Foreign registered aircraft may only be used for flying training in the UK if the flying instructor does not receive valuable consideration for his services, or permission has been obtained from the Department for Transport under Article 140 of the Air Navigation Order. Permission will normally be given only to the owners of the aircraft concerned, or to any pilot employed by the owner to fly the aircraft on their behalf. If the aircraft is owned by a trust, permission may be given to the real owner. If this is a group or company, permission may be given to members of that group or directors if the number of members or directors is no more than four.

FAA pilot responsibilities

Under FAA rules pilot responsibilities include:

- monthly VOR equipment checks prior to flight under instrument conditions FAR 91.171;
- recent flight experience FAR 61.57;
- valid biennial flight reviews FAR 61.58;
- pilots must be in possession of a valid FCC radio operator permit as well as a radio station licence.

UK Air Navigation Order (ANO) – public or private?

Under the ANO, requirements for a flight to be deemed as a private flight include:

1. where an aircraft is owned jointly by natural persons (not a company) who each hold not less than a 5% beneficial share and the aircraft is registered in the names of all the joint owners; or
2. where it is registered in the name(s) of one or more of the joint owners as trustee(s) for all the joint owners and written notice has been given to the CAA of the names of all the persons beneficially entitled to a share in the aircraft; or
3. where it is owned by a company in the name of which the aircraft is registered and the registered shareholders (each

of whom is a natural person) each hold not less than 5% of the shares in that company.

If you ask a passenger to contribute valuable consideration in any way to the costs of a flight then the flight is likely to be deemed to be public transport. This includes a payment in kind e.g. the right to stay at their villa in Malaga.

Pre-flight

Whether ownership is by a company or by an individual, regard must be had to Article 52, which provides that the commander of an aircraft shall reasonably satisfy himself before take off that:

- the flight can safely be made, taking into account the latest information available as to the route and aerodrome to be used, the weather reports and forecasts available and any alternative course of action which can be adopted in case the flight cannot be completed as planned;
- that the equipment required to be carried in the circumstances of the intended flight is carried and is in a fit condition for use;
- that the aircraft is any every way fit for the intended flight;
- that the load carried by the aircraft is of such weight, and is so distributed and secured, so that it may safely be carried on the intended flight;
- that sufficient fuel, oil and engine coolant (if required) are carried for an intended flight;
- that having regard to the performance of the aircraft and the conditions to be expected on the intended flight, and to any obstructions at the places of departure and intended destination and on the intended route, it is capable of safely taking off, reaching and maintaining a safe height thereafter and making a safe landing at the place of intended destination;
- and that any pre-flight check system has been complied with.

Also be aware of Article 53, which requires the commander to take all reasonable steps to ensure, before the aircraft takes off on any flight, that all passengers are made familiar with the position and method of use of emergency exits, safety belts, oxygen equipment and lifejackets and all other devices intended for use by passengers in the case of an emergency; and that in an emergency during a flight, all passengers are instructed in the emergency action which they should take.

Company ownership?

A company is a body corporate. It is a legal person distinct from its members and officers i.e. its directors and secretary. Even if a company is 100% owned and controlled by one shareholder, that company is a completely separate legal personality from that of the shareholder. This becomes a particularly relevant consideration should, for example, there be an accident and a claim made which is beyond the insurance policy limit, or if the aircraft has been flown outside the terms of the insurance e.g. geographical limits.

Whilst a company structure is not assured to give protection of personal assets, and it involves extra set up and administration costs, it nevertheless adds to the smoke and mirrors! However, there are circumstances in which a court may be willing to ignore the fact that a company is a separate legal person. For example, any person who is, or was, knowingly a party to 'fraudulent trading' by a company whose business has been carried on with intent to defraud creditors or other persons, may be liable to pay the debts of the company; and the directors of the company may be personally liable in cases of 'wrongful trading', which arises where a company becomes insolvent and the directors then fail to take steps to protect creditors. Remember that, as per the ANO, as an exception to public transport and aerial work, shares have to be taken by a natural person - so a company cannot own shares in a company.

Whichever route is chosen, there should be an agreement drawn up to regulate the relationship between the individuals involved.

Insurance cover

Under the strict letter of the law, the duty of good faith which you owe to your insurer, includes not only a passive duty to refrain from misrepresentation but also a duty to volunteer information on material circumstances. Material is if it would influence the judgment of a prudent insurer in fixing the premium or determining whether to take the risk. The remedy for non-disclosure is that the insurer is entitled to refuse all claims.

The Financial Services Authority introduced the Insurance Conduct of Business Rules, which impose a range of statutory duties on insurers and intermediaries and in particular require that insurers cannot unreasonably reject a claim.

The Financial Ombudsman Service (FOS) is not bound by the strict law and will not support an insurer avoiding the policy unless the consumer was asked a clear question about the matter under dispute. If the FOS is convinced that the question answered wrongly induced the insurer, the outcome depends on the policyholder's state of mind at the time the misrepresentation was made.

The Law Commissions started an extensive review process and a consultation paper was published in 2007, whereby it is proposed to abolish a consumer's duty of disclosure. It is stressed that the Law Commissions are of the view that consumer insurance should be subject to a different regime to business insurance. It would not be possible to contract out of the new rules governing misrepresentation and non-disclosure in consumer insurance except in favour of the consumer. Consumer is an individual acting for purposes which are outside his trade, business or profession.

Detention and sale

Finally, consider section 88 of the Civil Aviation Act if you allow a flying school/club to use your aircraft. An aircraft can be detained and sold, not only for certain airport's charges relating to that aircraft, but also for charges owed by any other aircraft of which the person in default is the operator. So, with no minimum amount owed, your aircraft could be detained, and even lost, for the debts of the flying school/club.

Therefore, before you start up your pride and joy, there is much protection to have considered!

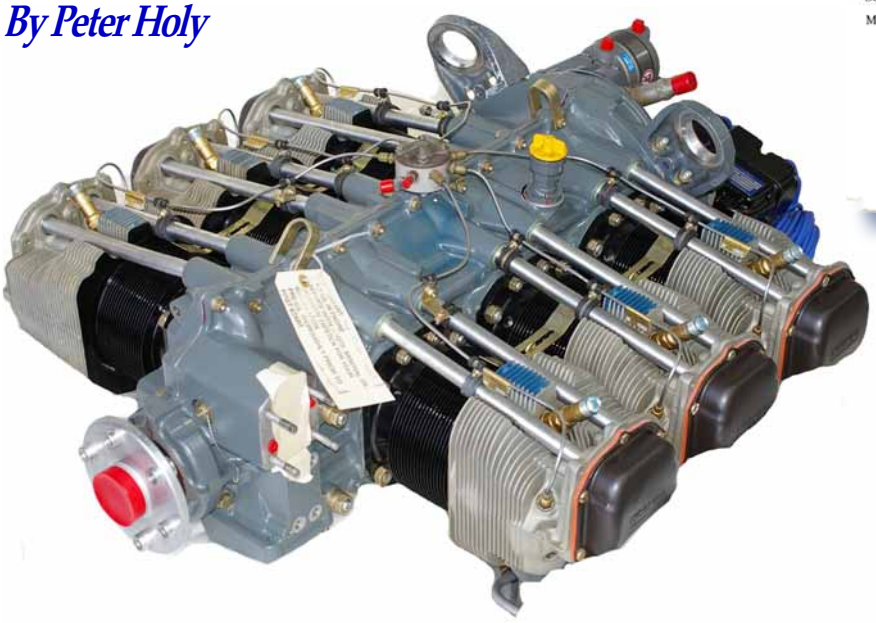
Ajay Wiltshire is an in-house Solicitor working for Heritage Corporate Services, which specialises in the provision of FAA aircraft registration for non-US citizens and, using a network of professional advisers, offer bespoke solutions.
Telephone: 01481 704681
E-mail: ajay.wiltshire@heritage.co.gg

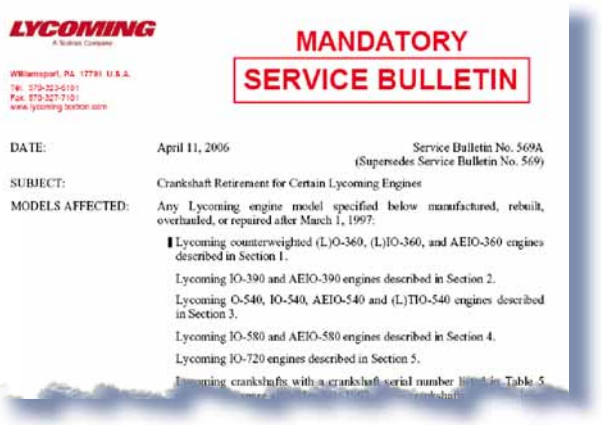
Ian Gee is a Solicitor with Jobling & Knape, specialising in aviation law and is a member of Heritage's network of professional advisers. He is honorary solicitor to PPL/IR Europe, holding a UK PPL/IR and an FAA CPL/IR (see Instrument Pilot No. 64).
Telephone: 01524 598304
E-mail: ig@joblingandknape.com

SB569 crankshaft swap

(part 2)

By Peter Holy





LYCOMING

MANDATORY SERVICE BULLETIN

DATE: April 11, 2006 — Service Bulletin No. 569A (Supersedes Service Bulletin No. 569)

SUBJECT: Crankshaft Retirement for Certain Lycoming Engines

MODELS AFFECTED: Any Lycoming engine model specified below manufactured, rebuilt, overhauled, or repaired after March 1, 1997:

- Lycoming counterweighted (L)O-360, (L)IO-360, and AEIO-360 engines described in Section 1.
- Lycoming IO-390 and AEIO-390 engines described in Section 2.
- Lycoming O-540, IO-540, AEIO-540 and (L)TIO-540 engines described in Section 3.
- Lycoming IO-580 and AEIO-580 engines described in Section 4.
- Lycoming IO-720 engines described in Section 5.
- [illegible] crankshafts with a crankshaft serial number [illegible] in Table 5

This article is the second of two parts describing an IO-540-C4D5D engine rebuild, to comply with Lycoming's service bulletin SB569. The first part, published in the last issue of ***Instrument Pilot****, described the background and process leading up to the decision to use an US engine builder - Barrett Precision - which confidently quoted a five weeks turnaround time.*

Shipping the engine

The new crankshaft was ordered from Lycoming some weeks before the engine was shipped. I had heard some scare stories (from UK engine shops) about long delivery times on crankshafts. My original intention was to not send off the engine until the crankshaft had arrived; Barrett advised that the crankshaft was due around mid-December 2007. Unfortunately there was a mix-up somewhere on the delivery time, the crankshaft did not turn up, and my own enquiries with Lycoming found it was scheduled for mid-January 2008. I was going on holiday in late December and do not have access to the hangar over Christmas, so I decided to ship the engine off mid-December as I would not have been flying anyway.

The engine was packed using a method recommended by Barrett, involving a standard 47" x 41" pallet with a sturdy 47" x 41" x 36" high cardboard box sitting on top of it. The engine is drained of all fluids, wrapped in a polythene sheet, and lowered into the carton with a crane, leaving several inches' gap underneath. The void is filled by injecting commonly available expanding foam (I used Foamseal 200). Used aircraft tyres were placed in the corners of the carton so less foam was needed. The pack purchased claims to do 0.5 cubic metres which was somewhat optimistic. Finally, the carton is strapped to the pallet with some tape. The pallet must carry appropriate 'treated timber' markings otherwise the whole shipment will be rejected upon entry to the USA.

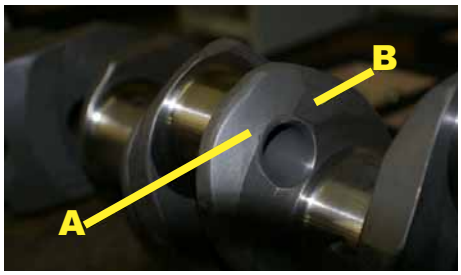
I had asked Barrett to ship the specially-marked pallet and the carton to me, which they did using a shipping company which will best remain nameless. Unfortunately the delivery man discarded the pallet upon delivery, making this the most expensive delivery ever of a cardboard box, at about £200! A phone call to the UK office of the shipper revealed that these pallets are dead common and cost about £10 and they delivered another one.

This is where the problems started. The engine package sat at Heathrow for two weeks, awaiting some documentation. It then sat at Tulsa, Oklahoma for two more weeks because a lazy shipping company employee was (on her own admission) too busy to process the US customs paperwork. four weeks, for a transit which should normally take four days!

The disaster was alleviated to some extent by another disaster: much of Oklahoma suffered a severe snowstorm over Christmas which cut the power to a huge area, so Barrett would not have been able to do much on the engine anyway. At the same time, the UK was having one of the worst winters for flying.

The engine rebuild

I visited Barrett Precision in mid-February and some of the following is based on my visit. Barrett dynamically balanced the new crankshaft when it arrived. It was 15 gram-inches out when it arrived from Lycoming; they brought this down to 0.7.



The illustration above shows some of the areas (A, B) where Lycoming remove metal (a lot of it; 5-10mm in thickness) to dynamically balance it, to 15 gram-inches. The illustration below shows additional surprisingly rough machining by Lycoming.

The original crankshaft is nitrided - this is a surface hardening process which yields a hard-wearing surface while preserving a tough core. The additional machining done by Barrett Precision is done in similar areas to A/B; less than 0.010" of metal is removed and if more needs to be removed the crankshaft is re-nitrided.

When the engine was stripped down, the biggest surprise was a fair amount of corrosion inside the cylinders.

This was below the level of the top piston ring so was not affecting compression. It's a mystery how it got there since I fly once a week, for never less than 1 hour, and the longest the engine ever went without flying was about 3 weeks. This is a high level of usage for a private pilot and if this is not enough to prevent engine corrosion, what is? Also the aircraft is always hangared. On the basis of this usage, Barrett believe that the corrosion was most likely there before the aircraft was delivered, but this leads to another mystery: the engine had a shock load inspection (prop strike during taxi) when just a few hours old. This was done by a well known UK engine shop (no longer trading) that could not have possibly missed this corrosion.

Some cylinders were a lot better, with the corrosion only just visible. Fortunately, the corrosion was not as bad as it looked. It was smooth to touch and not deep enough to require a rebore; it came out with a standard re-hone which should always be done anyway whenever piston rings are changed.

The combustion area was fine in all cylinders and most importantly none of the cylinders had the most feared and very common aircraft engine problem: cracks.

The only other notable items were the tappets (cam followers) showing spalling (breaking up) of the tappet surface. This is a well known issue with Lycoming engines. These tappets were replaced for about $200 each.

Surprisingly, the camshaft - a common problem location in early-2000s IO540 engines - was clean and had very little wear.

It was reground to new factory limits as Barrett Precision rebuild an engine to these not to overhaul limits which are looser. This is a bonus over what one normally gets in an overhaul from elsewhere but it does mean some parts are discarded when they could have been re-used in a legally overhauled engine.

The rest of the engine was in good condition, very clean and confirming that 700 hours of lean-of-peak (LOP) operation is just fine.

The exhaust valves were about 0.002" undersize on the stems - this is within overhaul limits but outside new limits - and were replaced; a significant item at $200 each. The exhaust valve stem is filled with sodium which becomes liquid at about +97°C and helps to transfer heat away from the valve face. The illustration above shows both the exhaust valve and the larger inlet valve. Inlet valves rarely show much wear as they run much cooler.

The conrods were fine - nothing to wear on them as the bearings are separate - and were re-used after non-destructive testing using a magnetic field method to check for cracks. The conrod bolts were replaced with new, this is mandatory.

Most engine shops, Lycoming included, assemble the engine and spray over the whole thing, covering all the bolts and other fittings. Barrett paint the major engine parts (cylinders, crankcases) separately and install the fittings (screws etc) afterwards. The original fittings were largely re-used after re-plating as shown in the photo above and this results in a much cleaner looking engine.

There are various options on engine colour, from the Lycoming grey through various 'look what I've got' options such as the one shown above which are more attractive than the standard Lycoming grey, but here in Europe would be a 'red rag to a

bull' to any inspector looking at the aircraft at a later date who would immediately assume the engine belonged to a cowboy who filled it with speed mods from an American hot rod shop. So I reluctantly went for the grey.

The cylinders are painted on the steel sections but left bare on the aluminium sections for best heat transfer to the air.

The engine is reassembled by one person on a bench, and then goes into a dynamometer (dyno) room - the illustrations below show another, turbocharged, engine with instrumentation in an adjacent room, to measure torque and power characteristics.

The dyno run turned up a problem with the fuel servo: the fuel control valve was not closing properly, causing a shudder at shutdown. This surprised me, as the shudder had always been present, and is usual with these engines. However, according to Barrett, this is not how it should be.

The finished engine

Around 10 weeks after it was delivered to Barrett Precision, the engine was ready to come back.

To avoid another disaster with the original shipper, I sought the help of some colleagues in the USA. It's usually much cheaper to book UK-USA or USA-UK shipping from the USA end. One of them had a good contact at FedEx who delivered the engine back to the UK with great speed, in about three days door to door. I did try to get Barrett Precision to get some quotes in the USA from the usual courier firms but they were too busy. Barrett Precision require payment in full at the very end, before shipping. This was done by a bank transfer which arrived, surprisingly, the same day.

As expected, it was very well packed using the polyurethane expanding foam method.

Initially it appeared that taking the foam apart would make a huge mess but in fact it was packed between two sheets of plastic which created two foam 'caps', one under and one above the engine, and these two halves opened up easily. It looked good too.

The only reservation was a cosmetic one: the aluminium pushrod shrouds were unpainted and are likely to corrode fast. Unfortunately removing them for painting is a big job which involves removing the rocker covers and gear and draining the tappets and would take all day, so I decided to simply coat them with some clear protective spray. One of the pushrod shrouds was bent, which is a mystery given the very good packaging of the engine. Fortunately they cost only £15, but the labour cost is significant.

A dyno report was included which showed that the engine delivered 231hp which after correcting for nonstandard pressure and temperature comes to 246hp. The actual fuel flow rate was 23 USg/hr. This is close to the 250hp book performance at standard atmosphere (ISA) conditions. 246hp is very good for an engine with new bores and pistons which is still tight. The dyno report also shows the lean check on the GAMI injectors where they check that the six EGTs peak at the same common fuel flow rate.

A couple of things were forgotten at the Barrett end in the final days before shipment. The five-hour dynamometer run was done for just 1 hour which is their standard procedure. I wasn't bothered about this because it turns out that they cannot do it continuously at 100% or even 75% power due to insufficient cooling air, and at $500/hour the cost is a lot more than flying the whole aircraft! The 8130-4 form (export certificate of airworthiness) never happened which doesn't matter as the engine is being fitted to an N-registered aircraft; but not having the 8130-4 could be a disaster if fitting to a G-registered (the engine may have to be opened for 're-certification').

The cost

The basic engine repair came to $11,600. This includes the $2,000 Lycoming exchange crankshaft kit and $2,400 on new exhaust valves and tappets. The remainder is mostly small parts and labour. By any measure, this is a very competitive price; however, the freight both ways and import duty and VAT have the potential to add a lot on top.

The eventual invoice from the shipper for the outbound journey was $625 for the UK-USA air freight which is very good value and would be great if they did not take 4 weeks! Curiously, the shipper quoted $1400 for the return journey… but I had enough of them by then anyway.

It is very important that the outbound documentation describes the engine as going to the USA for a repair and return to the UK. Similarly on the way back to the UK otherwise import duty on the whole engine value will be charged for duty and VAT.

Project management

On this project, three things went wrong on timing: the new crankshaft, the outward shipping and the engine repair itself. Clearly there are lessons to be learnt.

Firstly, the specially treated pallet is widely available for about £10. What is not available off the shelf is the correct size carton for the engine. One could get Barrett Precision to ship one of these (flat packed) by any conventional means but it is quite large and this is likely to cost at least £100 using for example DHL. For £100 one can probably get any packaging company to make a stack of such cartons out of standard triple-wall card. Do not ask Barrett to ship this carton by air freight!

The crankshaft delivery time turned out to be within days of the date quoted to me by Lycoming's distributor (Omaha). After the crankshaft has been ordered, anybody can phone up the distributor with the crankshaft serial number and check

when it is due to be shipped. So, I should have waited until the crankshaft arrived at Barrett Precision and had been dynamically balanced. Then I should have waited until Barrett Precision had a time slot available to actually work on the engine. Only then should I have shipped the engine.

What to do about idiotic shipping companies is a difficult problem. I have 30 years shipping experience from my business. Air freight is not an area attracting good people and many firms (particularly the cheaper ones) are badly disorganised. The most popular 'workload minimisation tactic' seems to be: something is not right on the documentation, so you make one phone call to the sender and if the line is busy or he is out, you chuck the whole wad of paperwork (with a post-it sticker saying 'unable to contact') into a tray where it rots until somebody raises hell. No effort is made to contact the sender by other fairly obvious means e.g. fax or email, or perhaps trying to phone a few more times. In extreme cases, the shipper might even charge storage costs and these can be substantial. So, one must phone the shipper every day to check progress and make sure nothing is 'stuck'. Obviously there is little point in speaking to the same person who is sitting on the documents so one needs to be ready to escalate an initially polite telephone enquiry to 'The management' if not getting a satisfactory answer. The reality is that most air freight shipments are completed within one week but some get stuck and that is why one needs to keep on top of the job.

The express parcel companies (DHL, FedEx, etc) are generally much better and are set up to deal efficiently with the most complicated part of the shipping process (the documentation and getting the package through Customs) but are very expensive, and some do not handle large items like an engine weighing 250kg. DHL UK quoted me £1600 ($3200) each way and this is probably at the top end of the scale.

Finally, one needs to make it clear to the company collecting or delivering the engine that they need to come with a vehicle which has a forklift in the back of it, unless you have a forklift available locally.

A common occurrence with engine work is that some accessory gaskets are missing. For example, when you purchase a new fuel pump, unless you request it to be installed, it will come in its box and without a gasket. It therefore pays to buy all external gaskets just in case there is a problem. In this case we ended up a couple of gaskets short but engine parts are commonly stocked and usually easy to get.

This rebuild took around double the original five week estimate, but they had what must have been a considerable backlog of work due to the storm over Christmas. Currently, Barrett Precision estimate a reasonable turnaround time at eight to nine weeks. It would appear that the best approach is for the customer to pre-book a slot with Barrett and arrange his own shipping even if this can be much more expensive if booked from the UK end. Try the usual express companies first: you may get a surprise especially if e.g. your employer is their major customer. The best quotes will however be obtained via a contact in the USA.

If fitting to a G-registration aircraft, make absolutely sure you get the 8130-4 form which needs to be generated and signed by an FAA designated airworthiness representative who has inspected the engine at the engine shop prior to shipment. To avoid any possibility of it being missed out, I would suggest obtaining a faxed copy of this form before making the payment.

Did it work?

The engine was reinstalled in the aircraft, prepared as per the instructions provided, and started. Initially there were some problems: the bottom spark plugs kept filling up with a thick oily liquid, and had to be removed twice for cleaning. Eventually, a longer run was done, including a full power test and that cleared everything out.

During the brief full power ground run, it was noticed that the engine runs much smoother than before. Also, it shuts down with much less 'shudder', confirming that there was indeed something wrong with the fuel servo.

During the initial two-hour flight test it was immediately apparent that the engine really is much smoother than previously. The difference is most noticeable at full power but is evident throughout the operating regime. Previously, the engine was smooth at 2200rpm, rough at 2300rpm, smoothest at 2400rpm, and rough at the max value of 2575rpm. The 2300rpm 'bad spot' is still there but the others are much better.

Surprisingly for a new engine which should still be 'tight', the aircraft performance exceeds the previous. The verified indicated airspeed has increased from 138kt to 141kt under identical conditions (economy cruise at around 60% power) which is probably equivalent to an extra 5% horsepower over the old engine. Interestingly, the 138kt figure was consistent throughout the previous six years so there is something definitely 'better' about the new engine.

▶

Report in-flight GPS anomalies

Private pilots who experience problems with their Global Positioning System navigational devices can now report the issue and share their experience with other pilots on a new website. The site at http://nano.aero is run by specialist consultants Helios and sponsored by the CAA.

Pilots using the site can report a range of issues including loss of guidance; position errors; database errors; satellite outages; and human factors occurrences. As well as being able to post reports, pilots can also add comments or provide additional information on existing reports. Pilots can post anonymously if they wish.

As well as being an educational source for pilots on GPS anomalies, the data and experiences collected will also allow issues to be investigated and passed on to equipment manufacturers.

◀

The engine is for all intents and purposes a brand new engine and needs to be run in as per Lycoming's recommendations. In short, these involve running for a number of hours at a high cruise power setting of 75%, occasionally dropping to 65%, and this needs to continue until the oil consumption has stabilised. This process ensures the piston rings get properly seated into the bores without the bores suffering from being glazed over by burnt oil which results in an engine which has high oil consumption. I found the oil consumption initially very high (around one quart per hour) with the expected spark plug fouling issues, but after about ten hours it reduced to a quarter of that, followed by a further reduction to one quart per ten hours at about 30 hours.

At the 25-hour check (there are two 25-hour checks on a new engine installation) a few small oil leaks were found on the flexible oil feed pipes to the rockers; this is not unusual and they were tightened up.

I am very pleased with the whole job but wish that the project timing had been managed better; and, of course, wish that Lycoming had not hidden behind their lawyers and done the decent thing which is to pay for the crankshaft replacement as a whole, in the same way they paid for it on the early-1990s airworthiness directives.

EUROSTUFF

By John Pickett

European Commission

The EC recently signed an agreement with the USA that is intended to result in the improvement in harmonising aviation safety systems between the USA and Europe. More details on the Europe press release site; search for reference IP/08/1059 here: http://europa.eu/rapid/searchAction.do.

eLORAN

The recently commissioned eLORAN transmitter located in Cumbria, UK has gone live. It is complementing other eLORAN stations in Europe.

New satellites causes GPS problems

The updating of the American Department of Defence Global Positioning System has created a few problems with older GPS receivers. The original GPS system used 24 satellites. Today there are 32 satellites in orbit. The 32nd satellite, named PRN32, is the one causing the problems. It appears that with some older GPS receivers inaccurate fixes are being given. The inaccurate fixes occur when PRN32 is above the horizon. Only a small number of receivers are affected but if in doubt you should contact the manufacturer of your GPS receiver who should have a software update available.

UK IMC rating

Considerable discussion has gone on about the UK IMC rating and whether it is going to be retained. Patrick Goudou, executive director of EASA publicly supported the retention of the UK IMC rating. In a speech to the Royal Aero Club he assured members and others that 'the EASA objective is not to abolish it (the IMC rating). On the contrary we want to allow this rating to continue. There are many opponents of the IMC rating across Europe, which will have to be convinced of its importance. But we have in front of us a transition period of up to four years, during which our objective is to find a European solution'. EASA has already established a working group tasked with examining the privileges and training of the existing rating. There is a strong lobby that is seeking the introduction of an IMC rating equivalent for helicopters.

Extension of Danish VAT rules

The Danish authorities have confirmed that aircraft may be imported through Denmark until the 31st December 2009 at zero rate VAT.

Low go-arounds

The UK CAA has recently published guidance on go-around training. Several accidents have occurred to serviceable aircraft carrying out go-arounds. Whilst we are all familiar with the go-around from decision altitude very little training is given in go-around techniques from below DA. Information can be obtained from the CAA website: www.caa.co.uk/docs/33/FOD200811.pdf.

Deadline looms for EC laws

The EC recently re-emphasised that the new laws the EASA are working on in relation to aircraft operations, personnel licensing and third country operations have to be in place by the 8th April 2012. That is in just over three years time! EASA having been granted the powers by the European Commission is able to make laws that are enforceable throughout the 27 EU member states. This is very different from the JAR system where individual member states needed to incorporate the JARs into their own laws.

Yves Rossy - Fusion Man

On the 18th May this year, Yves Rossy became the first man to attach jet engines to a single wing strapped to his back and fly. He jumped from an aircraft at 8,000ft over Bex airfield. Herr Rossy achieved a speed of 180mph before landing. He is now working on the development of another wing in order to fly across the English Channel in August. It is wondered how EASA will categorise this aircraft for flight crew licensing purposes? Certainly with four jet engines it is outside the scope of the LPL(A)!

End of 121.5 MHz frequency monitoring

From next year the distress frequencies 121.5 MHz and 243 MHz will cease to be monitored. This means that all safety equipment such as ELTs that rely on these frequencies will become redundant. There are no changes intended for equipment operating on 406MHz.

EASA licensing update

EASA has recently published a Notice of Proposed Amendment for consultation setting out the implementing rules for pilot licensing. NPA 2008-17 can be found on the EASA website (www.easa.europa.eu/ws_prod/r/r_npa.php) and the consultation period has recently been extended by a further 40 days to 15th October 2008 due to the importance of the subject. A combined total of nearly 800 pages make the documents a very weighty read! The major changes proposed are designed to invigorate general aviation in the 27 countries of the EU.

The introduction of a new Leisure Pilot Licence (LPL) and ratings is a major part of the new personnel licensing system. The basic LPL will have reduced privileges allowing only local area flights (50km from the aerodrome of departure without intermediate landing) and the restriction of allowing only one passenger to be carried.

The privileges of the full LPL are to fly single-engine piston engined aeroplanes or touring motor gliders with a maximum certificated take-off mass of 2,000 kg or less and carrying a maximum of three people.

20 hours of flight training are required for the basic LPL(A) and the full LPL(A) will require 30 hours of flight training. The main differences compared with the full LPL(A) are a reduced amount of navigation training, less supervised solo flight time and no solo cross country flights. The training required for the LPL is considerably less than that required by existing JAR rules which require a minimum of 45 hours of flight training.

The proposals also include the introduction of the LPL(H) – the Leisure Pilot Licence for helicopters. The privileges of this licence will be to fly single-engine piston or turbine helicopters with a maximum certificated take-off mass of 2,000kg. Here the training requirements are basically in line with the training defined for the PPL(H) with 45 hours of flight training required.

The NPA also proposes a welcomed change to the privileges of the Instrument Rating (Helicopters). Currently the IR(H) is type specific. This means that the holder of an IR(H) must renew or re-validate their IR on each type of helicopter that they fly. It is intended to change this rule so that an IR(H) holder will only need to renew or re-validate their IR on one type of helicopter. It will then be valid on every type of helicopter for which the holder has a current type rating.

Whilst the existing system for the issue of Class 1 and Class 2 medical certificates is unlikely to change substantially it is proposed that medical certification for the new range of licences and ratings will be dramatically different. Doctors practising as GPs, who have completed a short course in aviation medicine or have experience as a pilot, will issue medical certificates. Medical certificates for the LPL will be valid for periods varying between 24 months and many years dependent upon age of the pilot. The proposal states that the LPL medical certificate would be valid until the holder becomes 45 years of age. From 45 to 60 years of age re-certification would be required every five years and over the age of 60 every two years.

LAPL = LPL?

The debate continues concerning the title of the new EASA licence which is referred to as the Leisure Pilot Licence (LPL) in the latest NPA referred to above, instead of the former Light Aircraft Pilot Licence (LAPL). There appears to be considerable opposition to the new title but to avoid confusion we have used the same term as used in the NPA in this issue of ***Instrument Pilot***.

Airship instrument rating

A major change published in the EASA proposals is the introduction of an instrument rating for airship pilots. The rating will follow a similar format to that of the aeroplane IR and the helicopter IR.

PPL instructors

EASA has confirmed that it is proposed that instruction for various private pilot's licences and ratings can be given by the holder of a PPL with a flight instructor rating. Under the new proposals remuneration can be given for such instruction. This change is intended to provide a solution to the shortage of instructors for general aviation in Europe. It is an ICAO requirement that an instructor can only give instruction for a licence or rating that he or she holds. For example if an instructor does not hold a current commercial pilot's licence, he or she cannot instruct anybody on a CPL course. It appears that this requirement will not be changed. However, ICAO will have to be informed when the law is changed to allow instruction to be given by PPL holders who are paid for their instructor services. Other countries then may or may not accept licences issued by EU member states. This would apply if a LPL holder, taught by a PPL instructor, wished to fly a foreign registered aircraft in a country outside the EU.

Examiners

A major change is proposed by EASA in the appointment of flight examiners. This includes examiners appointed to conduct skill tests for instrument ratings.

Hitherto, the regulatory authority of the Member State appoints examiners. For example, in the UK the CAA has a number of flight examiners employed by the Authority. It also delegates the powers to conduct skill tests and examinations to suitable qualified examiners in the aviation industry. The CAA also determines the number of examiners it needs.

Under the new proposals examiners will draw their privilege to assess the skill of pilots directly from the EC. Under this system any regulatory authority, in the EU, will be unable to determine the number of examiners in the aviation industry. It is understood that this rule is being introduced because it is a principle of the EU that everybody has a basic right of access to a profession.

Concorde trial

A French judge has ordered that an American airline, Continental Airlines, and five people should stand trial. The trial involves the crash of the Air France Concorde that killed 113 people. The judge said that the airline and the individuals should be tried for involuntary manslaughter. Air accident investigators found that a narrow strip of metal had fallen onto the runway from a previous Continental Airlines flight. The piece of metal burst a tyre of the Concorde aeroplane and sent shrapnel into the aeroplane's tanks that then caught fire.

Breath test for pilots?

In some western parts of France a new system is being tested. The Minister for Ecology, Monsieur Jean-Louis Borloo, has introduced a breath testing protocol in bars that stay open until 2am. Customers are invited to check their alcohol levels prior to driving. Could EASA extend this to flying activities?

Pilots' talk

Compiled By David Bruford

Dates for your diary

UK key airshow dates 2008 from the Aeroflight website

At http://www.aeroflight.co.uk/shows/showdate.htm.

Mid September Autumn tour

A seven/eight day European tour is under consideration. Expressions of interest and booking details from Jim Thorpe (chairman@pplir.org).

18th October 2008 *PPL/IR Europe* meeting

Please note the date in you diary. We are currently negotiating a venue at an RAF airfield, not yet confirmed, and topics of presentations still to be decided. Further details will appear on the website and in the magazine.

Early 2009, guided visit to AAIB, Farnborough

This will be a half day visit, midweek. Visit agreed but date still to be confirmed. Further details will appear on the website. Questions or expressions of interest to Steve Dunnett (meetings@pplir.org).

Second half of March 2009, Australia tour

Flying out by commercial airlines, allowing one-two days to validate CAA/JAA/FAA licences for issue of Australian CAA restricted licence, followed by seven-ten day coastal and outback tour in locally rented aircraft. Trips may be extended at beginning or end for personal sightseeing. Organised by ***PPL/IR Europe*** member David Massey now living in Sydney. Expressions of interest and booking details from Jim Thorpe (chairman@pplir.org).

April 2009 *PPL/IR Europe* AGM

Date venue and presentation topics still to be determined.

June 2009. Aero Expo, Wycombe Air Park

Following the successful participation in 2008, we propose to maintain a ***PPL/IR Europe*** presence on both the network stand and organisation/ contribution to the seminar programme

26-27th June or 4-5th July 2009. Angoulême/Cognac

Combining gastronomy, tour of vineyards and a major cognac house (Courvoisier in Jarnac) and seminar presentations on the Sunday morning. We will be staying at the chateau de l'Yeuse. We propose to use Angoulême (LFBU) as the airfield for arrivals, as it is a designated customs/ immigration port of entry with full IFR procedures, whereas Cognac is military and does not have customs facilities. Full details on the website. Organised by local member Willem van Rijk. Please address visit queries to Willem (vanrijkwillem@orange.fr) and expressions of interest and booking forms to Steve Dunnett (meetings@pplir.org).

Airfield updates – courtesy of the Airfield Research Group

Birmingham International Airport has now formally submitted its application for a runway extension. The request asks for a 405m extension to the existing 2,605m runway as well as a 150m starter strip and a new air traffic control tower. The planning process will now undergo a 16-week evaluation although this could also potentially take up to a year. At that stage, the application could either be approved or go to a public enquiry. Birmingham closed its existing cross-runway in January. Despite being the same length as London City Airport, it has not been used for two years and Birmingham has dropped plans for a second strip, preferring to concentrate on securing approval for an extension to the current runway (15/33).

Carlisle airport

It was announced on the Stock Exchange on 10th March 2008 that the Stobart Group, which owns the famous road haulage company Eddie Stobart Ltd, proposed to enter into an option agreement to acquire **Carlisle Airport**. In a press release it was stated that the airport comprises 460 acres of land on which Stobart proposes to build a new logistics centre to consolidate its facilities in the region. The acquisition would give the Stobart Group the ability to develop aviation activities, including air freight, from the site in future. The decision to acquire the site is subject to a comprehensive appraisal with feasibility and valuation studies.

The Welsh Assembly Government has announced that **Llanbedr Airfield** had been offered on a 125-year lease to Kemble Airport Ltd, operators of **Kemble Airport** in Gloucestershire. The Kemble team also operates a business park on the former US Navy submarine listening base at Brawdy, Pembrokeshire.

At **Oxford Airport**, Oxfordshire work has started on a new business aviation terminal for private jet crews and passengers, destined to triple existing capacity. Slated for a June completion, building the terminal is part of Oxford's wish to cater for fully-fledged executive handling in anticipation of which, the airport is recruiting for a raft of senior management. The work is the concrete manifestation of investment from new

owners the Reuben brothers, who purchased the site from BBA Aviation last year. It also recognises that business aviation movements have doubled at the airport during the past three years. Facilities included in the upgrade are separate crew lounges and rest areas, VIP and 'VVIP' zones, private shower rooms and crew kitchen, as well as customs and immigration.

Potential for the airport was demonstrated towards the end of 2007 when a Flybe Q400 landed at Oxford to trial the new runway, while the high-bearing strength apron can now take aircraft of more than 77 tons. Acquisition of a third fire tender will also allow the airport to raise its fire and rescue cover to Category 6, allowing larger aircraft to use Oxford. The airport will shortly increase its licensed hours from 06:30hrs to 22:30hrs, while weekend access has been upped with a further two hours per day. During the next two years, available times will progressively increase from 06:00hrs to 24:00hrs. Oxford had 50,000 movements last year - 36% of this in its capacity as Oxford Air Training - and has the potential to accept 160,000.

Business aviation gains at airlines' expense

It's long been touted that business aviation traffic would soar as so-called 'premium' passengers, those who insulated themselves from some of the discomfort of airline travel in the more hospitable front part of the plane, fled the shoe searches and surly service at the hubs. Apparently, it's all come true. A study by the Stanford Transportation Group says the number of passenger flights on private jets and turboprops now equals 41 percent of the number of people who fly first class, business class or full-fare economy. While the number of high-priced airline seats sold has stagnated around 41 million for several years, business aviation passenger trips have more than doubled in the last eight years to 16 million.

Stanford says the US Department of Transportation now estimates that less than 10 percent of airline passengers are springing for the high-priced tickets and Stanford's Managing Director Gerald Bernstein says that's bad news for airlines. 'It's tough for most of the carriers to make a decent profit with over 90 percent of passengers flying on discount fares,' Bernstein said. 'This erosion of Premium travel diminishes the one group where the airlines are able to make a profit.' Bernstein said increased choice in business aviation travel options and lower prices for some of those products has fuelled the trend.

Mooney Type S - the fastest certified production single

In an industry built on superlatives there can only be one "fastest", and Mooney's recently certified Type S model now holds the crown as the fastest production single. It'll do 242 knots at 25,000 feet and it doesn't use extra power to get to those lofty numbers. 'There have been a lot of subtle enhancements,' Mooney Sales Director Rick Neely said at Sun 'n Fun 2008. Gap sealing, a composite front gear door and other improvements that have 'slicked up the airplane' are responsible for the performance.

The Type S has a turbocharged Continental TSIO 550 engine that puts out 280hp. The base airplane is fitted with a Garmin G1000 standard and deluxe interior. Options like air conditioning are also available.

However, economic uncertainty and high gas prices are hurting sales of general aviation aircraft - as shown by a 28 percent drop in piston aircraft sales in the first quarter of this year - and at the end of June, Mooney Airplane Company said it is responding to that reality by slowing down production and laying off 80 staff. 'These decisions will not have an adverse effect on the quality or safety of our products, nor will they delay scheduled aircraft deliveries' Mooney CEO Dennis Ferguson said in a statement. 'They were made to create corporate resiliency in the present economic conditions.

Our plans include positioning Mooney as a strong contender in the international market.' The weak dollar has created a strong market for US goods overseas. 'We are strengthening our business in Europe, South America and Australia, where Mooney's high performance, efficiency and pricing are especially appealing' Ferguson said. 'Our focus is to ensure the long-term viability of the company through prudent management and expansion of our market reach.'

The laid-off workers will get a severance package and career-transition support, Ferguson said. The production rate will slow from eight aircraft per month to five, for the rest of this year. Mooney Airplane Co., based in Kerrville, Texas, has delivered more than 11,000 aircraft worldwide since 1946.

IndUS diesel Thorpedo - 100 knots at three gph

The WAM diesel-powered IndUS Thorpedo LSA arrived on schedule to a packed news conference at the US's Sun 'n Fun and there was a cluster of people around it most of the day. With the numbers IndUS is reporting, it's no wonder. The supercharged and turbocharged three-cylinder, two-cycle inverted cylinder diesel puts out 120 hp. Spokesman Scott Severin said that it pulls the low-wing along at 100 knots on three gph. While the LSA flew for the first time with the diesel only recently, company spokesman Scott Severin said the engine has been extensively tested by IndUS. The engine is undergoing Light Sport certification and initial TBO is 1,000 hours but is expected to go to 3,000 hours.

Mooney pilots aim to break round the World record

Carol Ann Garratt has flown around the world in a Mooney before - taking her time, on a seven-month trip that she wrote about in a book, 'Upon Silver Wings.' This time, she is taking a co-pilot and aiming to break the round-the-world record for single-engine aircraft, by making the flight start-to-finish in just seven days. The team will fly for 140 hours and make only nine stops. Garratt said it's not just flying time that counts, but total time. 'We'll have ground crew to meet us at each stop, to help fill up with fuel, dump our trash, pick up our supplies, stretch, and get back in the air. We'll take turns sleeping in the airplane. We're installing a big extra fuel tank behind the seats, so we're hoping we will be able to recline at least a little.' Garratt and team-mate Carol Foy, a past winner of the Air Race Classic, plan to launch this December. They are paying all of their own expenses, but hope the world flight will raise $1 million for ALS research.

More than 350,000 people worldwide suffer from ALS, also know as Lou Gehrig's disease, for which there is no cure.

Diesel market changes

AOPA USA says Cessna has suspended its delivery schedule of 172 TD models in light of the crisis at Thielert Aircraft Engines, which supplies the engines. According to AOPA, Cessna intends to continue with certification of the diesel Skyhawk but none of the 100 on order will go to customers just yet. 'At this point we have decided that we will not deliver 172TD aircraft during 2008, and we have informed our customers accordingly,' AOPA quotes an unnamed Cessna spokesman as saying.

Meanwhile, Diamond Aircraft appears to be moving aggressively to establish technical and parts support for its installed base of Thielert diesel engines, following Thielert's recent bankruptcy filing. In a series of letters to owners, Diamond says it plans to order a 'significant spare parts inventory' and is asking dealers and owners for status reports on parts needs. It has also established a North American hotline for owners and shops that can be reached at 888-613-0096 or via e-mail at DA42-TAE-NorthAmericaSupport@diamondair.com. Thielert declared bankruptcy due to a looming liquidity crisis and on news that German authorities were investigating the company for financial anomalies relating to its IPO filing in 2005.

However, in late June, Thielert Aircraft Engines stated that it had resumed full production of its diesel engines. At the same time, Diamond Aircraft updated customers on its plans for getting by in a post-Thielert world, by certifying its airplanes to fly with Lycoming engines and accelerating the development of its own Austro diesel, already in the works. Now Thielert says it can produce up to 80 engines per month, almost as many as before the insolvency problems began. 'We very much regret that losses were incurred because of the company's insolvency,' said Bruno M. Kubler, the company's insolvency administrator. 'I am pleased that we can now supply Thielert customers with engines and spare parts once again.'

There is no relief in sight, however, from the high parts prices Thielert posted a month ago. The company is offering a guarantee against defective materials and labour, but so far they have not offered to cover the expense to owners of required inspections of gearboxes. Kubler said a company audit will be completed this week, and then he will select 'suitable investors' from more than 50 prospective buyers.

EU emissions plan gets roughed up in Congress

John Bruton, the European Union's Ambassador to the US, received a decidedly undiplomatically rough reception while testifying on aviation emissions before the House aviation subcommittee last month. The ambassador got into an acerbic verbal exchange with Rep. Peter DeFazio, who was designated acting chairman of the subcommittee at the time. What drew the congressman's ire was an EU proposal that an airline flying from Los Angeles to London would pay carbon allowances to the EU for the entire 6,000 miles and not just the portion flown in EU airspace. Asked why the US should have to pay a premium for flying over its own airspace, Bruton responded that the pollution eventually flows over to Europe. When asked where the money would go, the ambassador said it would improve the EU ATC system. 'You want to tax our airlines in order to make your air traffic system more efficient?' asked DeFazio. 'You are looking for a trade war.' The dust-up ended when the congressman left the room to cast a vote on the House floor. I wonder if the EU's next proposal will be to ask the US DoD to subsidise Galileo on the grounds that coverage will theoretically cover the whole world. Perhaps the response that they would get to that suggestion might influence the cancellation of the whole Galileo farce.

Eurocontrol worries about bizjet growth

The number of business jets operating in Europe is expected to double to about 4,000 in the next ten years and that has officials with the continent's air traffic control organization wondering how it will accommodate the growth. 'The levels of growth that we are seeing provide a real challenge for airports and air traffic control across Europe,' David Marsh, Eurocontrol's manager of forecasting and statistics, said in a news release. 'Business aviation uses different airports, but flies mostly in the same densely-used airspace as the rest of the traffic. In addition, business aviation generates more and bigger unanticipated peaks of demand which puts pressure both on airports and on air traffic control. As a result, delays to business flights have increased over the last two years.'

The agency said most business aircraft are based in France, the UK, Germany, Italy, Switzerland and Spain and that more than 700 operators run the 1,900 aircraft currently in operation. The unknown factor is the impact of a number of start-up air taxi operators, some of which have ordered hundreds of very light jets. 'This study underlines the changing nature of air traffic, with low-cost carriers and business aviation the main contributors to that change,' the news release said.

GA makes strong showing at Berlin air show

The Berlin Air Show, officially known as Internationale Luftfahrt-Ausstellung (ILA), opened at the end of May with its biggest show ever, which should provide some reassurance to those who tend to worry about the future of aviation in an uncertain economy. More than 300 aircraft were on display, and over 1,100 exhibitors from 37 countries welcomed record-setting crowds. Visitors saw the world's largest aircraft, including the Airbus A380, an Antonov An-124 and a C-5 Galaxy. GA had a home of its own along General Aviation Avenue.

'The ILA is the most important meeting of the year on the European continent for the industry - which, in Germany, has become one of the few sustainable expanding industries and has bucked the current trend by actually creating more jobs,' said Dr. Thomas Enders, president of the German Aerospace Industries Association, which organized the event.

Turboprop and business jet sales up but piston sales fall

First quarter 2008 shipments of airplanes manufactured worldwide

	2007	2008	Change
Pistons	554	399	-28.0%
Turboprops	79	85	+7.6%
Business jets	211	297	+40.8%
Total shipments	844	781	-7.5%
Total billings	$4.6bn	$5.3bn	+16.1%

continued from page 1

but at the Pole; but it requires more space to describe than available here. A paper on polar grid navigation by Squadron Leader K. C. Maclure, R.C.A.F. can be found at http://pubs.aina.ucalgary.ca/arctic/Arctic2-3-183.pdf.

My guidance tools were GPS, dead reckoning (DR) and sun navigation. I cannot say which of these was the principle means of navigation, as I used all three simultaneously and was therefore ready to deal with any discrepancy. Each of the three has its shortcomings, as I will describe below, so it was comforting to know that each backed the other up.

Flying low out of Spitsbergen en route to the North Pole

Sun navigation

Sun navigation might sound like an esoteric art that our fathers and grandfathers practised using astrodomes, sextants, tables, slide rules and incantations: the truth, when applied to polar navigation, is much more prosaic and simple. It is based on the facts that (1) the sun is always visible and (2) it will always be vertically above the location where the Local Mean Time is midday. Of course, you don't know or care what the Local Mean Time is in Moscow or Tokyo. But, conveniently, you do know Greenwich Mean Time. Seen from the Pole, the sun will always be 15° west of Greenwich for each hour after 12:00Z. Thus, if you are, as I was, over the Pole at 16:00Z, then 0° is 60° left of the sun and therefore 114° (my track to the magnetic Pole) was 54° right of the sun. Of course, an hour later it was 39° right of the sun and by the time I got there it was 9° right.

At first glance, sun navigation might appear to be pretty foolproof, having no components to fail, but, as with any other means of navigation, it has some disadvantages and points of failure. The most obvious is that you need a working and accurate watch or clock. If that fails, you are stuffed. Also, it only works by day, or at least when you can see the position of the sun below the horizon. This means that there are about three months of the year when it is unusable. Furthermore, the aircraft must be above cloud though I imagine thin or broken cloud would be OK. As a pilot interpreted readout, it suffers from the disadvantage of precession of 1° every four minutes. And finally, it becomes increasingly inaccurate the further you are from the Pole. However, the further you are from the Pole, the closer you are to other means of navigation (not least land features, but also the odd NDB), so this shortcoming is neatly balanced; like an ILS, it is more accurate the nearer you are to where you need it!

I would love to be able to report that I was assiduously taking sun readings every four minutes and adjusting my heading accordingly by a degree at a time, but the truth is that I merely made an estimate every fifteen minutes or so and kept a weather eye for where I hoped and expected the sun to be.

Dead reckoning

All our navigation is, to some extent, DR. Even flying the ILS we are using DR, because we are flying a heading, waiting until we have some evidence on which to base a change of heading, then flying a new heading to double the correction then halve it back. This methodology, though, does depend on some fixed datum (magnetic north in lower latitudes), some knowledge that a heading adopted one minute is equivalent to the same heading adopted a few minutes later. DR in polar regions is severely hampered by two factors: firstly, the absence of such a useable datum and secondly, the increased precession of the DI.

My experience of variation was that on our side of the world it is not too bad. Most of the way from Svalbard to the Pole the compass was pretty accurate. However, as soon as I passed the Pole it became erratic and completely unusable. Apart from anything else, the compass dipped so much that, even though it continued to turn, I could not be sure the extent to which it was jammed against the stops. Flying from the geographic Pole to the magnetic, I was expecting to see 180° variation i.e. magnetic north was ahead of me while I flew geographically south, but that is far from what I saw. The compass swung around a fair bit, but was pretty settled on a variation of 90°. No doubt this has to do with the fact that the isogonal lines (equal declination between magnetic and true north) are neither straight nor parallel, but I must say that I haven't studied the question in detail.

The second issue was the DI precession. As you will all remember from your IR or professional exams, a DI is 'tuned' to be at its best for the latitude in which it mostly flies. The change in precession in the plus or minus 15° of latitude that we normally venture is not very noticeable. But if we use an HSI with remote flux valve we are protected from precession and tend to forget it; however, if you are flying in polar regions where the flux sensor must be ignored, you set the HSI to unslaved and it reverts to being a basic DI, and indeed a DI without a latitude nut. Therefore the HSI precession is 15° per hour.

So that means that you are using as your principle DR heading reference a datum that has a built in inaccuracy of about 15° per hour; scarcely inspiring confidence. I guess that this could be factored in to a plan, but I wasn't ready for it and simply reset the HSI against the GPS backed up by the sun.

The one place where the HSI was required was for the turn at the Pole. I wanted to orbit the Pole on arrival, and indeed did so at rate 2 in order to circumnavigate the world in one minute, so it was important to have a reference to roll out. I achieved this by ensuring that my heading was north as I approached the Pole, but that my beam bar was set to the relative outbound track. This procedure worked well to get me established on an outbound track, which I could then verify after a few minutes by GPS and sun sighting.

◀ P 19

Using the GPS

You might think that GPS takes all the difficulty out of the exercise, and it is certainly a reassuring backup; but I encountered enough problems with GPS to convince me that it is not suitable as a sole means of navigation.

I have two, potentially three, GPS receivers, a Garmin 530 and a Garmin 155XL which feeds a Skymap IIIc. The Skymap is only a slaved map to the 155 but if necessary I could reconfigure it to work standalone. I was able to configure the Garmins to true navigation, but never worked out how to reconfigure the Skymap (if indeed it is possible).

The first thing I noticed was that the mapping on the Skymap was very distorted at the Pole. It looked as if the distance from NP to STH1 was orders of magnitude further than Borneo to NPOLE whereas in fact it is the same distance. Furthermore the aircraft symbol set off backwards from the Pole, did a neat three point turn about half way along and then tracked at 45° to the desired and actual track for the next 2000nm!

Mapping on the Skymap was very distorted at the Pole. The aircraft symbol set off backwards from the Pole, did a neat three point turn about half way along and then tracked at 45° to the desired and actual track for the next 2000nm!

Arrival at the North Pole

The other issue with GPS was that the 530 stopped repeatedly with an INTEG warning from about 85°N to 87°N. I switched it off and on a number of times and eventually (after maybe four cycles) it started working again. But my confidence was dented. The 155 soldiered on while the 530 struggled, but nonetheless one continues to wonder whether the satellite or atmospheric conditions that lead to the failure of one will lead on to the failure of the other.

Another issue of the 530 that most of you will not have encountered is that the mapping gives up completely at 75°N. The map becomes covered with a cross-hatch grid as can be seen in the photograph going North to Svalbard. On the other hand, the Skymap does show worldwide mapping, albeit at very low resolution, with no elevations, in remote regions.

No map on the GNS530 north of 75°N

True aviation

The airfields in the far North of Canada all use true datum for runway designation, VORs and NDB relative bearings. This can be more than somewhat disorientating, because your natural tendency is to look at the compass to check you are on approach to the correct runway. The Twin Otter pilots of the far north taught me how to set up a waypoint five miles out and to track in relative to the line that joins that point to the airfield. If you do go there you will be as surprised as I was just how disorientating the experience is.

Modern technology – limitations?

One final word for anyone thinking of following in my footsteps in an aircraft fitted with a glass cockpit. The DA42 is not permitted to fly north of 70°N in European airspace and 65°N in the Americas and Far East. Presumably this is because of a combination of mapping issues and variation; however, the limitation does not apply just to navigation, it is a blanket ban on the aircraft. I would guess that the DA42 is not alone, so you should check for any limitations on your aircraft.

*Piper PA23 Aztec owned by **PPL/IR Europe** member Timothy Nathan at Resolute Bay in Canada, after reaching the North Pole*