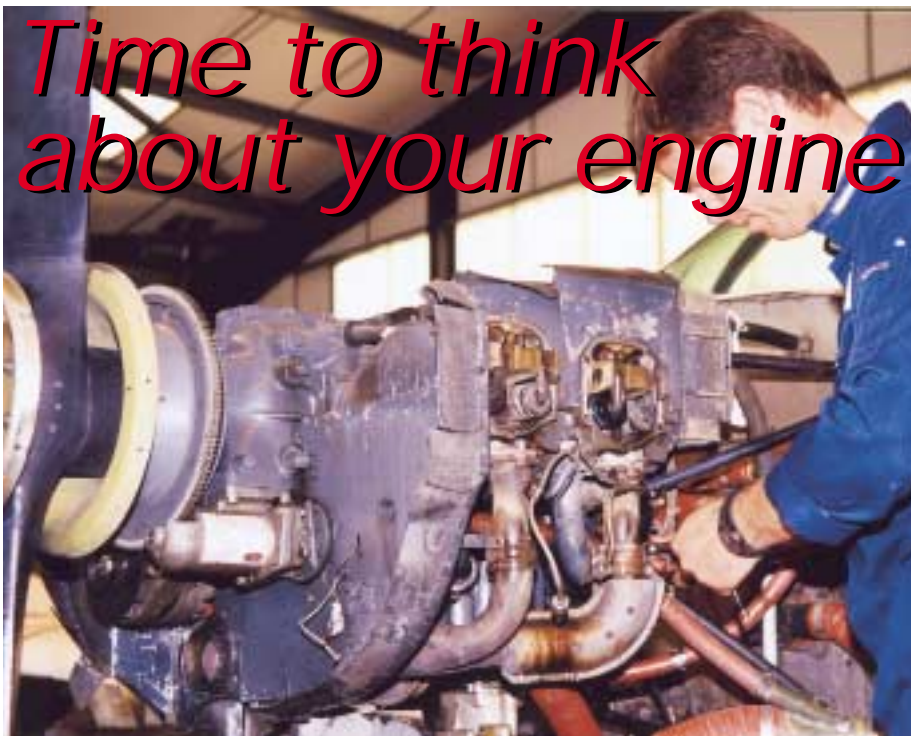


Time to think about your engine



*Engineering problems form a significant part of AOPA's work, as **George Done** explains – and new EASA rules will move the goalposts again*



“There we were, at FL55 to the north of Lyneham, flying our Beech Baron and enjoying the ride when we noticed a slight engine vibration. Hmm, what was that? Ahh, it's gone away again – maybe it was nothing much.” Thus began what may loosely be described as an engineering problem for AOPA members Len Slawinski and Tim Broadhurst, although the word ‘saga’ is probably more appropriate. Five minutes later, the vibration was back. After reviewing the possible causes it was decided to abort the flight, but when the manifold pressure was reduced on the port engine the vibration rapidly became severe, to be followed by a loud explosion and subsequent thud on the port side of the aircraft. Len also caught a fleeting glimpse of the outer cowling door departing the aircraft. At the same time, the rear passenger emergency exit window opened, with consequent distracting wind noise. Concern quickly switched towards the rear seat passenger, a seven-year-old boy who

was along for the ride. “Was that a missile that just passed through the fuselage or did we hit something?”

Luckily, with two pilots on board, they were able to retain control of the Baron, get the emergency window closed and restore a measure of calm. They returned safely to base, making an asymmetric landing. No pilot would ever wish to find him or herself in this highly stressful situation, but that was not the end of the story. There then followed a long, drawn-out process to establish the cause of the occurrence and seek redress, if possible.

What had happened was that one of the cylinders had blown completely off the engine, taking the cowling door with it. It was extremely significant that the cylinder concerned had been removed and replaced just over three flying hours earlier by the maintainer of the aircraft. By the time I had become involved at Len's request, he had already had much discussion with the maintainers, collected a lot of relevant research material, been in touch with the UK Teledyne Continental Motors agent, and submitted a voluntary MOR to the CAA.

Without going into all the detail, which would be enough to fill a small book – except to mention a process of deduction and elimination of various possibilities in which the recent overhaul was a crucial factor – it was possible after almost a year to achieve a happy ending, with Len and Tim back in the air through the goodwill of the maintainer and a brand new engine from the manufacturer.

AOPA help

Not all such engineering problems lead to a satisfactory outcome. It is sometimes impossible to identify the exact cause of a problem – in other words, the incontrovertible evidence that allows clear blame to be identified, and redress gained. In these cases,

the aircraft concerned often remains on the ground for a long time, while the owner devotes a huge amount of time and energy, and often money, to getting the aircraft back into a flyable state. An outstanding characteristic is that such problems are invariably not self-inflicted, as is the case with some of the other problems that AOPA deals with, such as airspace infringements.

AOPA receives requests for help on engineering matters that cause a member extreme grief maybe half a dozen times a year, leaving aside simple enquiries and those that are relatively trivial. It is surprising, perhaps, in view of the number of GA aircraft owned by AOPA members (3,000 or so) and the number of maintenance checks that they are subject to each year that more problems do not land on AOPA's desk. This may be attributed to most owners having a productive relationship with their engineer or engineering organisation, the expertise and trustworthiness of the engineers themselves (licensed or otherwise), and possibly even the regulatory framework. The problems with a strong engineering flavour tend to come my way (as a chartered engineer by training – but not licensed, however), those with a commercial aspect tend to fall to Chief Executive Martin Robinson, and, increasingly, Neil Monks, our Information Officer, is also becoming involved.

Some of difficulties faced by members relate to over-charging for work done, and where this is blatant and obvious, or a mistake, rectification is generally possible. The worst of these is when the maintainer simply goes ahead and rectifies faults discovered at an annual check, say, without informing the owner, and runs up a huge final bill – in one recent case exceeding the value of the aircraft! Some years ago, I found myself working at BA Engineering, Heathrow, on secondment on a TOM project (Total Quality Management, very fashionable at the time) and one of my immediate colleagues was working on the difficulties caused by BA Engineering doing something rather similar to their third party maintenance customers, so the problem in those days was not confined just to small aeroplanes! *The answer is, as an owner, make sure your maintainer is fully aware of your requirement to be informed immediately as to major and costly work that might need to be done, in writing if necessary, if there is any doubt that the message is not being received.* There may well be no alternative to spending lots of money if the aeroplane is to be got back into the air, but it is comforting to be at least involved in the decision.

Factory rebuilds

One particular problem that crops up occasionally concerns engines referred to variously as “factory rebuilt”, “remanufactured”, or “zero-timed”. Often it is a matter of correcting a misapprehension on behalf of the owner, who does not quite understand what he or she originally bought. Long standing AOPA member Jim Thorpe, writing in *Instrument Pilot*, the magazine of the PPL-IR Network for Europe, describes the situation well. “What happens in the factory is that engines arrive for rebuilding and are stripped down and their parts, after cleaning and checking, end up in bins as serviceable, repairable or scrap. When the engine is rebuilt the parts are simply drawn from the serviceable bins or new stock. Hence, your engine, which might have been a first run unit, can emerge with a whole mish-mash of components some of which are new and some



Above: Beech Baron - one of the cylinders had blown completely off the engine

of which might be considerably older than the parts on your original engine. This even extends to weld repaired crankcases. There is nothing intrinsically wrong with this practice – it is just that the marketplace erroneously attributes value to the original manufacturer's work and, of course, the manufacturers make

diameter, and where found, if the damage could not be removed by a tiny (specified) amount of reaming, then the unit was scrap, as in our case. Because the nose of the crankshaft sticks out into the open air it is cadmium-plated, with copper underneath, and I was amazed to find on inspection that the corrosion

(previously Airworthiness Notice 35) that may be found in CAP 747, are going to have to consider the new regime under EASA which will come into play at the next Star Annual, which was when the C of A was re-issued under the now transitional (CAA) scheme. Under EASA, the C of A will be a life long



Left: a 'factory rebuild' can be a cobbled-up mish-mash of parts of vastly different ages
Above: most owners have a productive and trusting relationship with engineers

certificate, and the state of airworthiness of the aircraft will be embodied in the ARC, the Airworthiness Review Certificate. The current CAA categories, "Private", "Public", etc. will disappear, but GP 24 refers to the definitions of "Public Transport", "Aerial Work", and "Private Flight" as provided in the ANO 2005 (as amended). Basically, if you were able to run "on condition" before, you will be able to do so in the future, provided you don't change the purpose for which to aircraft is used. The article "EASA Part M explained" written by Bill Taylor in the February 2005 issue of General Aviation provided some useful background information. However, there are some detailed

no effort to dispel the misunderstanding". Jim's view is that if an owner is in a position to rebuild an engine with known history, then this is better than buying a factory rebuild.

I first learned about factory rebuilds when the aircraft in which I had a share was subject to the infamous 1994 crankshaft Airworthiness Directive. The AD arose, almost as a knee-jerk reaction, because two propellers had detached from their respective aircraft as a result of catastrophic crankshaft cracking at the nose within only a few weeks of each other, and, spookily enough, within a few miles of each other (near White Waltham and on the approach to Blackbushe to be precise – an alien force centred on Wokingham, perhaps?). Our aircraft had a rebuilt Lycoming O-320 engine from a Cincinnati company and had done about 700 hours since installation. The AD required the nose of the crankshaft to be inspected for corrosion pitting on its inner

pits had been plated over so, in the terms of the new AD, the crankshaft was effectively scrap even before it had been through the factory! On splitting the crankcase – which at a later date was found to be of an extremely venerable age – the camshaft was found to be worn beyond allowable limits and was scrap.

This little tale reinforces the opinion expressed above, that where possible, it is best to rebuild an engine with a known history – as was done in the case of the engine above when its time came round again.

Operating "on condition"

The above discussion is relevant to owners of aircraft with an engine nearing its TBO, and particularly those on a Private Category C of A with engines already running "on condition" under the dispensation provided for UK registered aircraft by Generic Requirements 24, "Light Aircraft Piston Engine Overhaul Periods"

aspects of GR 24 involving calendar life, amongst others, which could cause problems for owners of certain aircraft, particularly those that are flown relatively infrequently (PPruNe under Private Flying and Engine TBO provides more information).

Discussions on the transitional arrangements for maintenance and operation under EASA are ongoing with the CAA for all involved on the non-commercial side, and the CAA has set up workshops for maintenance organisations and similar interested parties, including AOPA, to attend at various locations in the UK in May and June, so in due course, you will be able to be advised by your maintainer. Meantime, AOPA will do what it can to divert unwelcome impositions on its aircraft owner members and will continue to keep them informed as to further changes in the pipeline. ■





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