The latest LAA Engineering topics and investigations. By **Malcolm McBride**

Safety Spot

Malcolm McBride takes a look at degradation, be it rubber pipes or propellers

Welcome, as always, to this May edition of *Safety Spot*. I begin this month's foray into the realms of LAA safety matters in the early weeks of spring. The weather's a bit fickle, as seems normal as the sun climbs further northwards towards its summer home (and the atmosphere isn't quite sure what it's supposed to be doing); but this morning, as I peruse the little green outside my rather compact 'working-from-home' office, the weather's rather pleasant. The charts say that a high pressure system is building over the UK and that the jetstream is playing elsewhere, after a difficult winter, thank goodness.

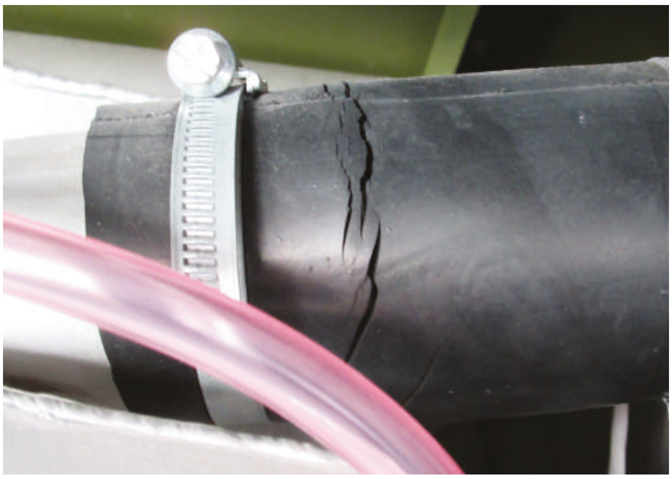
Lifted by the sunshine, I'm feeling rather grateful that I remain in good-enough form to write this – shame I cannot aviate, though, of course, I imagine neither can you? It's small beer I guess, especially when we consider the scale of this virus-driven international crisis, but it would be good to put some wings on and shake the dust off around a cumulous cloud or two. Again, as always, I hope that you and those that you love remain well, and that you're looking forward to getting back into the saddle… whatever your particular saddle fits to.

Looking through the pictures I've collected for this month's sortie into the world of continuing airworthiness matters, there's a clear theme – in a word, degradation. In the context of this article, which stands on the intellectual column that we stay safe through knowledge, the pictures show the pathway. First, there's the issue of degradation of rubber in a pipe fitted to an EV-97 Eurostar, which we spoke of in last month's edition of *Safety Spot*. As is normal, the passing of time revealed more information about this issue, it turns out to be a rather more complicated story than it first appeared. Passing this, our picture-signposts point to the inspection of propellers, there's a couple of examples to peruse. This lane leads us to a rather weedy path, clearly, it's been avoided for a while – the issue of aging components. Space is limited, so I had better get on with it, let's start with the fuel filler pipe.

EV-97 Fuel Filler Pipes & the Tailored Maintenance Schedule

As with most things, in any performance there's always a lot more going on in the background than might first appear, especially if you are just concentrating on the stage. There's no such thing as a simple issue, my experience suggests that if somebody is telling you that this or that is 'just a case of' then they probably don't understand what's going on behind the scenes to create the magic. The recent issue involving a materials failure in a fuel filler pipe that we discussed in last month's *Safety Spot*, is a good case in point.

As you will recall, especially if you own an EV-97, LAA Engineering recently issued an Airworthiness Information Leaflet (AIL) asking owners



Above Two pictures with similar stories – the passing of time degrades most materials. We showed you the picture of the EV-97 fuel filler pipe (left) last month and there's an update about this issue in the main text. And I've been itching to show you the picture (right) of internal fuel pipe degradation. LAA Inspector Dr. Bill Brooks sent it a while back now – he wasn't sure why he appeared to be getting a poor fuel flow until he disconnected the fuel pipe to find that the inner surface of the pipe had completely disintegrated. **Photos: Martin Child/Bill Brooks**

to check the fuel filler hoses on their aircraft as soon as practicably possible, and then every year at the annual. You'll see from the pictures that at least two members have done this, and both have found that the fuel filler pipes on their aircraft remain in 'mint' condition, despite being pretty old. More importantly, their fuel filler pipes are clearly much higher quality components that are clearly marked-up as fuel pipes.

When we wrote the AIL we assumed, wrongly as it turned out, that the fuel pipes (a component supplied by the kit manufacturer), would be a part numbered component – in other words, the same throughout the fleet. When deciding on an inspection schedule for this part we took into account that the manufacturer's maintenance schedule requires the parcel shelf to be removed annually to inspect the fuselage area behind the seats. This is a calendar-based check made regardless of hours flown. Naturally, we thought that, as this rather difficult panel needed to come off anyway, there's no reason why we shouldn't get owners to check the fuel filler pipe every year at the same time.

One or two very experienced LAA inspectors pointed out that many EV-97 owners choose to maintain their aircraft in accordance with a bespoke Tailored Maintenance Schedule (TMS) and that their schedule requires the parcel shelf to come off each three years. There's a good reason for this, their aircraft don't fly many hours in the year so a three-yearly 'big' inspection fits their bill when it comes to staying safe. Added to the fact that their fuel pipes were in an 'as new' condition, they see no reason why the fuel pipes should suddenly start falling apart. In other words, though the initial check requirement makes sense, they see that an annual check is unnecessary, and a check every third year would be adequate.

Looking at the issue with this new viewpoint in mind, we've adjusted the annual check requirements accordingly and re-issued the AIL. You can find the updated version in the 'Alerts' page within the Engineering section of our website.

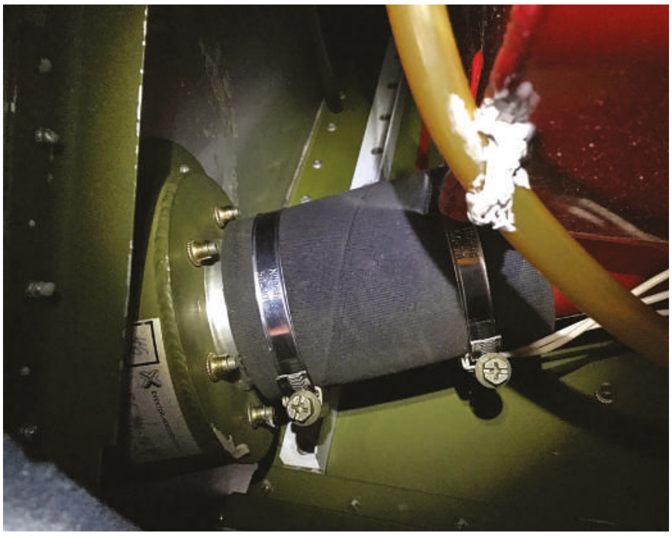
It's very easy, especially if you own an aircraft that doesn't fly many hours each year, to fall into a complacency trap when it comes to carrying out routine maintenance tasks, especially inspections requiring the removal of difficult panels or the dismantlement of assemblies. That's one of the reasons why we came up with the TMS in the first place – this 'homegrown' type of schedule should take into account both the in-service wear aspects, and the temporal ones in a balanced way.

Mind you, the TMS isn't just about reducing the inspection workload, it should, where necessary, increase a check frequency. For example, if you are operating your aircraft from a particularly rough farm strip that has a limited length, you might feel that you need to include more regular checks of the undercarriage (and its mountings). It might also make sense to dismantle the braking system more often than a manufacturer's schedule requires, so that you can be completely sure that it will operate at maximum efficiency when needed. It's all about creating a balanced schedule that ensures that every area of the aircraft, hidden and easily inspectable, is carried out through the aircraft's lifetime.

When it comes to thinking about creating any kind of schedule there are a number of aspects that need careful consideration, this is especially true with a bespoke inspection. Over the years, I've come across quite a few inspection schedules as you might imagine – and I've written a few, too. One thing for sure is that schedules don't just arrive out of thin air, most are copies of previous schedules that appear to have worked, often the actual tweaking is limited to presentation. It's important, for perceived legal reasons, that a manufacturer ticks all of the boxes so, quite often, a schedule will be unnecessarily onerous.

I remember Dick Stratton's view on this. Dick was the Chief Technical Officer of the British Gliding Association – and as a BGA Inspector at the time, my boss – he was against, as he described it, the annual 'sacrificial slaughter' of the aircraft in his ultimate charge. He had a point, but unless you 'actually' schedule in the deeper inspections they'll never get done – recent issues with glue joints on some older gliders is a case in point.

Of the many things to consider when thinking about inspection requirements to include into a TMS, two really stand out. The first, what would happen if the part in question failed? This is a primary risk assessment and should sit at the beginning of any decision tree.



Above Having asked all EV-97 Eurostar owners to take a look at the fuel filler pipes on their aircraft, some owners have now done so, although because of COVID-19 restrictions we're expecting further feedback later in the year. Thus far it's clear that there's a wide variance in the original quality of this part – somebody suggested that the failed part we showed looked more like a component from a washing machine and not something that should have been in an aircraft's fuel system. Because of this variation (and one or two other points) we've 'up-issued' the AIL we published on the matter. **Photos: Gordon Verity/ Eddie Clapham**

Second, an assessment must be made as to the possible future mode of failure. Ask yourself, is the failure likely to be because of material degradation through wear, or material degradation through time? Experience tells us that most components on an aircraft, perhaps all things, eventually fail because of a combination of these two very basic factors.

There's no place in an inspection schedule for complacency, most especially if the part in question sits high in the hierarchical position of potential disasters – we can look at this further by examining a sort-of TMS for propellers, we call this an LPIP Inspection.

The Low-Hours Propeller Inspection Schedule – LPIP

In October 2018, LAA Engineering issued an Airworthiness Alert letting members know that, in association with three nationally recognised propeller overhaul companies, we were beginning formal trials of a new propeller inspection regime – we called this new inspection protocol LPIP. It's a scheme where propellers can be inspected against a different schedule than that laid out in the requirements for a full manufacturer's overhaul and is currently limited to certifiable, variable-pitch propeller types which, under LAA policy, must be overhauled in accordance with manufacturer's overhaul requirements.

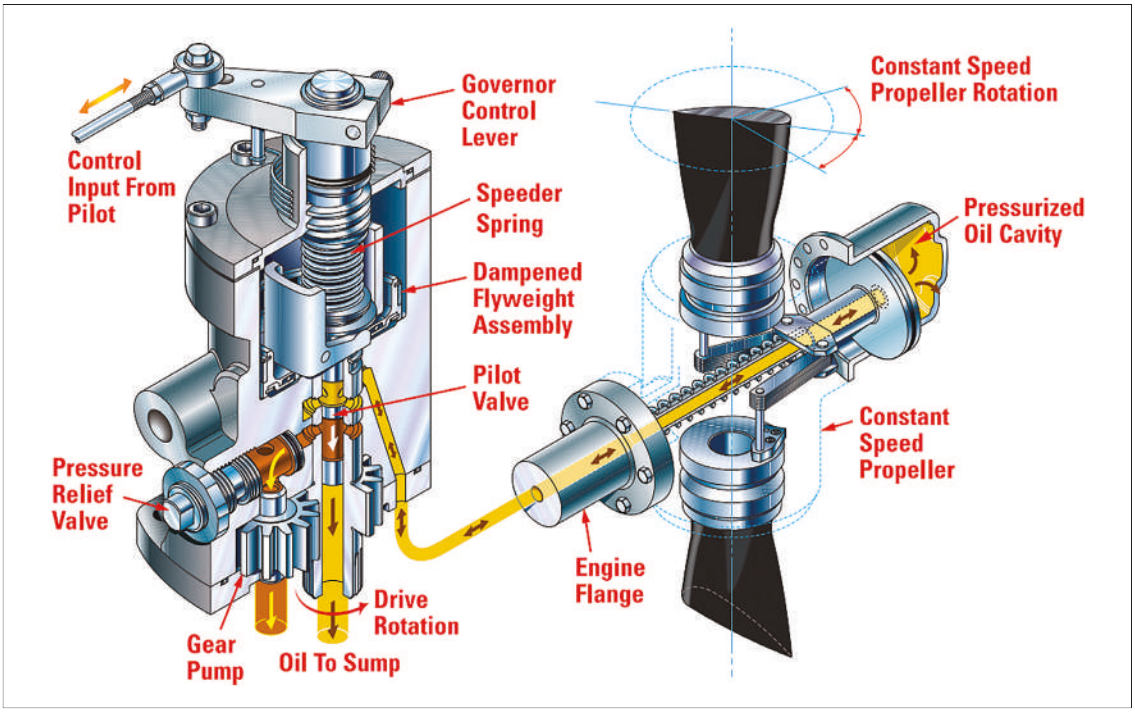
This 'policy' has meant that many propellers that reach their calendar-life limit (and thus become due for a manufacturer's overhaul) but may have only accrued a very small percentage of their hours-based life limits. Over the years many have commented that, in such circumstances, a full overhaul doesn't seem necessary. Both the LAA and propeller-shop engineers agree and, with our partner overhaul companies, a more appropriate regime has been developed – and trials thus far have been very successful. ▶

Above An LPIP inspection takes into account that a propeller that hasn't completed many hours will not need specific checks related to wear and fatigue, so there's not a requirement to strip the coatings from blades or carry out expensive non-destructive testing. **Photo: Ed Hicks**

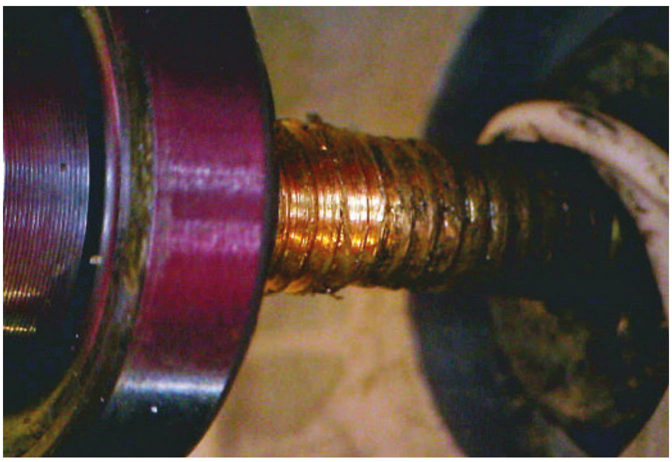
LPIP has been described by some as a 'light-touch' schedule, but this is not the case. The inspection itself is a very thorough one and is completed in accordance with appropriate schedules which already form part of the manufacturer's armoury, albeit when used for other purposes. The LPIP inspection is effectively an Alternative Means of Compliance (AMC) and satisfies the LAA policy regarding propeller overhaul requirements.

An LPIP inspection allows the propeller to remain in service until its next manufacturer's overhaul point when, if desired (and the propeller still meets some basic acceptance criteria) another LPIP inspection can be carried out. It's early days with this inspection protocol but at this stage, with agreement from the propeller shop, we see no reason why this inspection protocol couldn't carry on over many overhaul cycles. Of course, there will be a time when a propeller overhauler will feel that an LPIP inspection wouldn't be appropriate, perhaps because the propeller is nearing its hours-based life limit or other technical concerns. As explained earlier, this inspection isn't a second-rate device, but it may not always be appropriate.

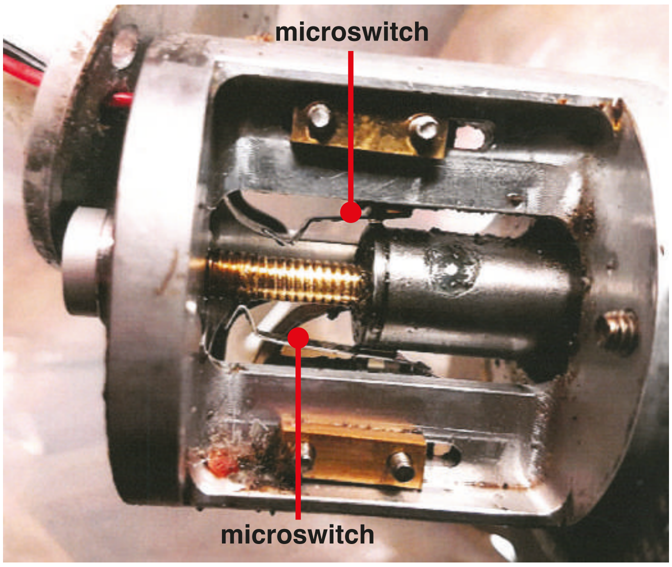
By far, the most common variable-pitch propeller types of 'certifiable' variable pitch propeller operating in the LAA fleet are the Hartzell (HC) series, of which we have 229 in service, and the MT (V) series propellers, about 180 props on LAA machines.

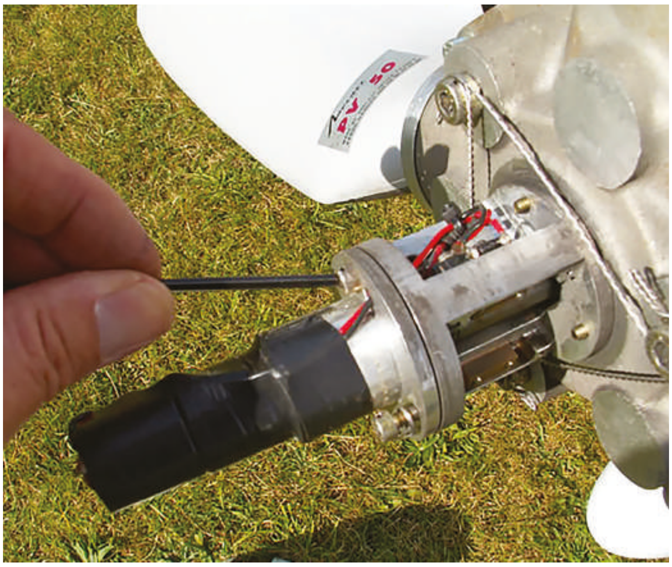


Right LAA Engineering has issued a TL describing more fully the Low-Hours Propeller Inspection Protocol (LPIP). We have been trialling this alternative inspection protocol for a couple of years now, and we're very happy with the feedback that we've received. The picture shows the basic mechanics of a pressurised-oil variable pitch propeller system. **Photo: Hoffman Propellers**



Above In 2007, the pilot of a Europa suffered a loss of propeller thrust shortly after take-off, and in 2018, the pilot of a Kitfox Mk. 7 lost propeller thrust whilst at altitude. Both aircraft were substantially damaged during the following forced landing. In both cases, the initial cause of the propeller pitch mechanism failing was found to be a 'stripped' leadscrew. **Photos: Malcolm McBride/ Alan Bray**





Above Though the initial cause of the propeller returning to fine pitch was the failure of the leadscrew, the reason why a forced landing became necessary was that the mechanical fine pitch stop wasn't correctly set. Under normal circumstances, the position of the electrical fine pitch stop determines the minimum pitch angle for the propeller (see microswitches in the picture on the left). In the case of an electrical or mechanical failure, the fully fine position is determined by the mechanical fine pitch stop. The picture on the right shows that it's easy to temporarily remove the electric motor to gain access to the leadscrew and mechanical fine pitch stop. A recent Airworthiness Information Leaflet requires owners to check that the mechanical fine pitch stop is correctly adjusted. **Photos: Alan Bray/ Arplast Propellers**

Schedules have been agreed, and fully trialled, for both these manufacturers' products.

The LPIP inspection for the Hartzell range is based upon the 'return to service after long-term storage' inspection. This inspection ensures that a brand-new propeller that has laid in storage for (generally) more than two years, is indeed in brand-new condition when passed to the customer. To ensure this, the propeller must be stripped and carefully inspected; it is then reassembled using new seals, gaskets, oils and greases. As part of this check, any outstanding Airworthiness Directives or manufacturer's Service Bulletins or upgrades are complied with or carried out.

Because none of the parts would have been used in service, unless problems associated with damage or corrosion are discovered, there is no need to strip paint or anodic finish, most especially this applies to the propeller blade. And Hartzell deem that, following this inspection, the propeller is, both from an operating-limit and the calendar-based perspectives, zero-houred. However, when used as the basis for an LPIP, only the calendar-based requirements are reset to zero after the inspection, naturally the hours-in-service remain the same as when presented – and will continue to accrue in service.

The schedule chosen as the basis for an LPIP inspection for the MT range of propellers is a specific inspection schedule designed for propellers operating on aerobatic aircraft. This is a virtually identical propeller 'strip' inspection to that used on the Hartzell propeller. MT-propeller GMBH, as do most propeller manufacturers, require a different inspection schedule for propellers fitted to aerobatic aircraft to that used on non-aerobatic types – in what has become an industry standard, a strip inspection is normally required at 1/3 of the normal hours-based Time Before Overhaul (TBO).

The reason for this increased vigilance, understandably, is that the forces on the propeller, in particular the blade shank (the blade section near the hub) and the butt (the portion of the blade inside the hub that retains the blade) are higher during aerobatics, both because of the increased gyroscopic forces and because the propellers will most likely be operating for longer periods at, or close to, maximum rpm.

LAA Engineering has published a Technical Leaflet (TL 2.31) which discusses LPIP Inspections more fully. It is available online, either from the Data Library (which can be found in the Engineering section of the website) or via an accompanying Alert.

Now that we have completed a successful trial period with Hartzell and MT types, we hope to roll the concept out to other types.

Arplast PV-50 Electrically controlled Variable Pitch Propeller – Pitch-Stop Check

In 2007 the pilot of a Europa suffered a loss of propeller thrust shortly after take-off. The cause was found to be a failed leadscrew (the threaded shaft that drives the pitch change mechanism). The pictures show a more recent example where the lead screw's thread has stripped, most likely through lack of lubrication. Under normal circumstances, the position of an electrical fine pitch stop determines the minimum pitch angle for the propeller, this is normally a microswitch designed to isolate the motor when contacted. In the case of an electrical or mechanical failure, the fully fine position is determined by a back-stop device known as the mechanical fine pitch stop. In this instance thrust was lost because the mechanical fine pitch stop had not been correctly adjusted.

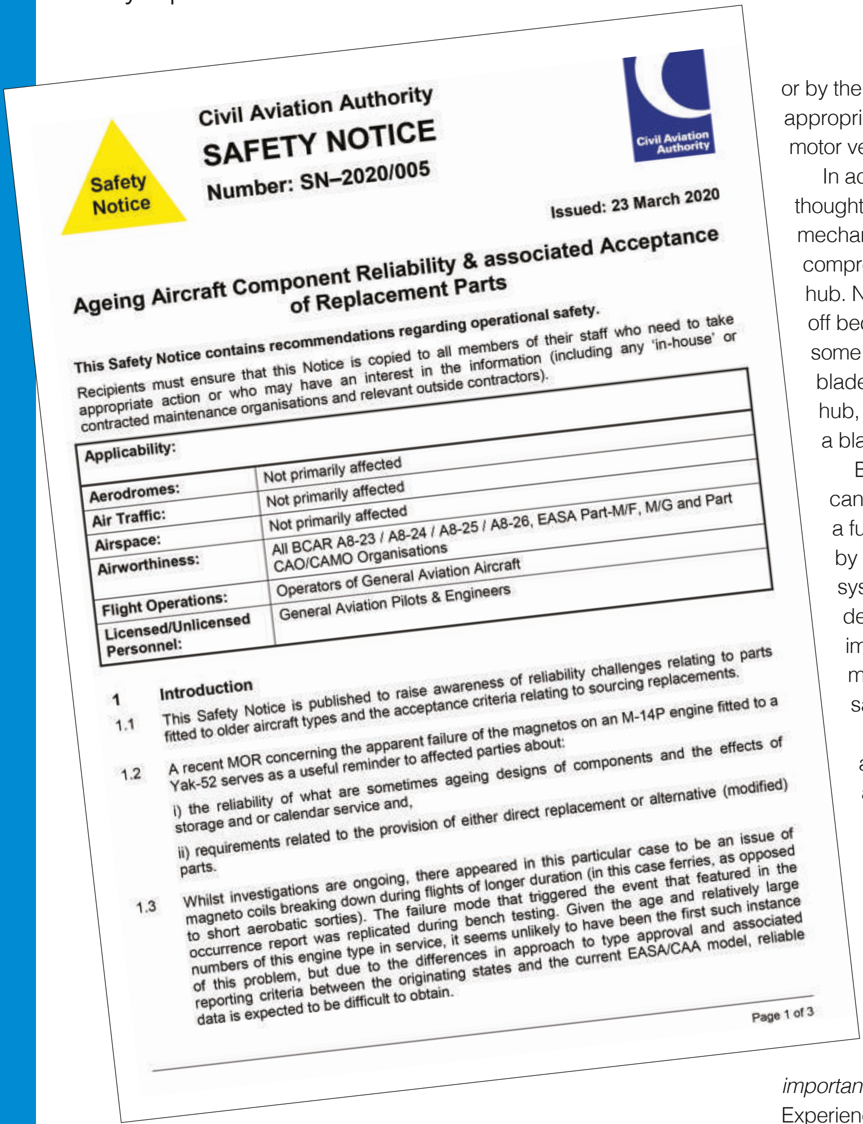
Following this incident, an Airworthiness Information Leaflet (AIL) (MOD/PROP/08-007 Issue 1) was issued requiring that the leadscrew be inspected and lubricated at 25-hour intervals. To be certain that the mechanical fine pitch stop could do its job when required, we asked that the position of this be checked - this initial check was done by measurement against a manufacturer's drawing.

In August 2018, the pilot of a Skystar Kitfox Mk. 7 lost propeller thrust whilst at altitude, for similar reasons.

In this class of uncertified propeller, there have been a number of mechanisms used to change the propeller's pitch – the PV-50 uses a threaded shaft, named the leadscrew. This screw, driven by an electric motor, drives a follower (called the swashplate by the manufacturer) which, in turn, twists the blades appropriately.

The electrical motor that drives the leadscrew is controlled either by a switch in the cockpit (called in-flight adjustable pitch) or, more commonly, via a constant speed unit where the pilot selects a propeller rpm and the propeller, once set, will adjust its pitch (and therefore the load on the engine) to hold a particular rpm. Sometimes, these 'controllers' will have a pre-select; for example take-off (fully fine) or cruise (a pre-selected rpm remembered by the controller).

Remember, a variable pitch propeller allows a fine pitch for maximum static thrust with the aircraft stationary, on the PV-50 that's about 15˚ at a pre-defined point on the blade (75% R). As the forward speed of the aircraft increases, the relative angle of attack of each blade decreases and, as the work done by the blade decreases, the rpm will naturally increase. The propeller's pitch can be increased either by the controller ▶



Safety Notice

Civil Aviation Authority

SAFETY NOTICE

Number: SN–2020/005

Civil Aviation Authority

Issued: 23 March 2020

Ageing Aircraft Component Reliability & associated Acceptance of Replacement Parts

This Safety Notice contains recommendations regarding operational safety.

Recipients must ensure that this Notice is copied to all members of their staff who need to take appropriate action or who may have an interest in the information (including any 'in-house' or contracted maintenance organisations and relevant outside contractors).

Applicability:	
Aerodromes:	Not primarily affected
Air Traffic:	Not primarily affected
Airspace:	Not primarily affected
Airworthiness:	All BCAR A8-23 / A8-24 / A8-25 / A8-26, EASA Part-M/F, M/G and Part CAO/CAMO Organisations
Flight Operations:	Operators of General Aviation Aircraft
Licensed/Unlicensed Personnel:	General Aviation Pilots & Engineers

1 Introduction

1.1 This Safety Notice is published to raise awareness of reliability challenges relating to parts fitted to older aircraft types and the acceptance criteria relating to sourcing replacements.

1.2 A recent MOR concerning the apparent failure of the magnetos on an M-14P engine fitted to a Yak-52 serves as a useful reminder to affected parties about:

i) the reliability of what are sometimes ageing designs of components and the effects of storage and or calendar service and,

ii) requirements related to the provision of either direct replacement or alternative (modified) parts.

1.3 Whilst investigations are ongoing, there appeared in this particular case to be an issue of magneto coils breaking down during flights of longer duration (in this case ferries, as opposed to short aerobatic sorties). The failure mode that triggered the event that featured in the occurrence report was replicated during bench testing. Given the age and relatively large numbers of this engine type in service, it seems unlikely to have been the first such instance of this problem, but due to the differences in approach to type approval and associated reporting criteria between the originating states and the current EASA/CAA model, reliable data is expected to be difficult to obtain.

Page 1 of 3

Above Following the receipt of a Technical Mandatory Occurrence Report (MOR) detailing the failure of a Magneto on an Ivchenco Vedeneyev M-14P, powering a YAK-52, the CAA has issued Safety Notice (SN-2020/005). The SN is designed to raise awareness of the reliability challenges faced by engineers relating to parts fitted to older aircraft types, and acceptance criteria relating to sourcing alternative components. The LAA has published an Airworthiness Alert (LAA/AWA/20 08) which gives access to this document. **Photo: UK CAA**

or by the pilot, so that the propeller's angle, in effect, maintains an appropriate torque and therefore rpm. It's rather like changing gear in a motor vehicle as it accelerates.

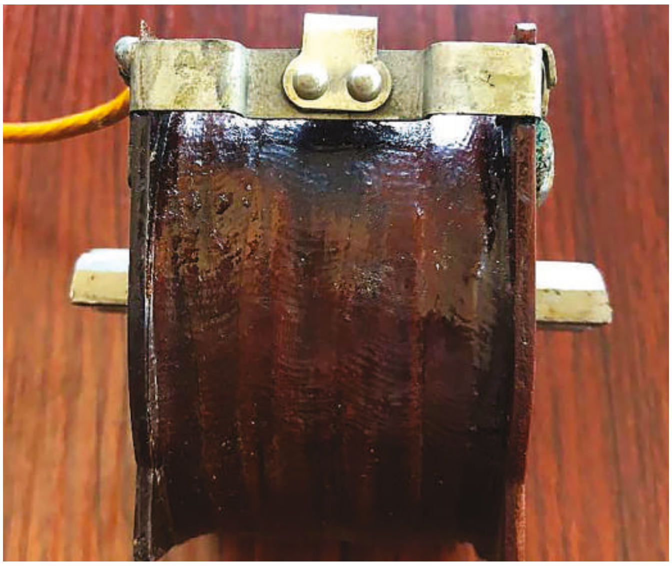
In accepting these uncertified propellers into service, considerable thought was given as to their safety – after all, on the surface, the mechanisms often look far from robust. So, one area where no compromise was given (or sought) was the blades' attachment to the hub. Naturally, the last thing that anybody would want is a blade to fly off because its mounting wasn't strong enough. This conservative (in some people's view) approach has paid off and, apart from one blade departure incident occurring with a highly modified propeller hub, in our experience an LAA propeller in this class has never shed a blade.

But, what of the pitch change mechanisms themselves? Well, we cannot say the same for them. It was agreed that in the absence of a full proof of reliability, a 'light-touch' approval route could be used by the LAA when approving a new type of variable pitch propeller system. A positive assessment could be made, subject to a demonstrable and acceptable performance in service and, importantly, provided that the likely failure modes of the mechanism, should they occur, would be benign in terms of flight safety.

In other words, if the whole pitch change system failed (in any way), the aircraft could still be safely flown to its destination, albeit perhaps with reduced efficiency or performance. To ensure this, LAA rules demand that at all available pitch settings from full coarse to full fine, the engine speed must not become dangerous or the aeroplane unable to climb, cruise and descend safely.

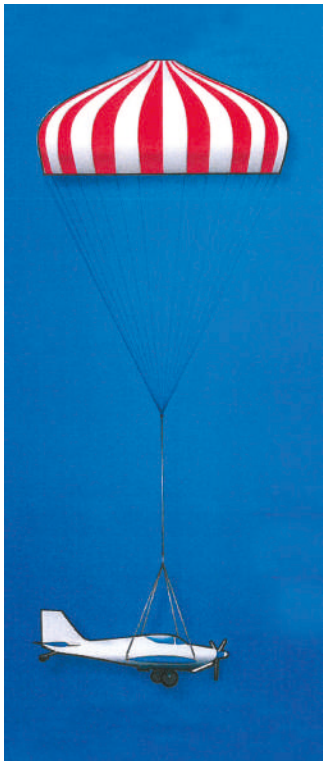
In this context, a propeller, at its very minimum pitch setting, must hold the rpm within the engine's maximum rpm limit and, importantly, in this state the propeller must be able to produce enough thrust (at normal climb speed) to affect a positive climb at maximum weight. *It is therefore extremely important that the mechanical fine pitch stop is correctly adjusted*. Experience has shown that this needs to be tested by ground running the engine with the propeller at its minimum pitch angle as defined by the stop. This stop will, naturally, be set just aft of the electrical microswitch which, in normal service, will set the minimum pitch available.

In light of this latest incident, we've reissued the original Airworthiness Information Leaflet, so LAA/MOD/PROP/08-007 has been raised to issue 2. This latest issue reaffirms the importance of the 25-hour lead screw inspection/lubrication requirement and introduces a one-time



Above The picture on the left shows the high-tension coil from a magneto off a Russian-made M14P – one of the most successful small radial aircraft engines built and which is recognised for its reliability and durability. However, its ignition system is particularly susceptible to the influence of aging. The insulation on the coil in the left picture is breaking down when the coil becomes hot – notice the burning due to arcing at the top of the coil. The picture on the right shows the plastic foil-type capacitor, which has also failed. **Photo: AutoYongChen**

check to ensure that when the propeller is operating against the mechanical fine pitch stop with the electrical side of the mechanism disabled. The resulting minimum pitch angle must be sufficient to hold the engine rpm within manufacturer's limits – thus ensuring that a positive climb can be achieved should a lead screw fail during flight.



Left Different views abound about the wisdom of fitting explosive safety devices to amateur-built aircraft but I'm sure all pilots would agree that the safety of first responders to an accident or incident, involving an aircraft fitted with BPRS, is of paramount importance. Though many have expressed a view that placarding an aircraft 'spoils' its appearance, it is absolutely vital that aircraft fitted with BPRS equipment are appropriately placarded. In the event of an accident or serious incident, it's only fair that those first on scene are able to take account of the associated risks involved in un-deployed ballistic parachute systems.
LAA Engineers have written a Technical Leaflet, TL 3.27, giving further advice on the fitment of placards to aircraft fitted with ballistic devices. All the TLs can be found in the Data Library in the on-line Engineering section of the LAA's website. And there's a link to this one in the Alerts section of the website.
Photo: Magnum

Aging Aircraft Component Reliability – A CAA Safety Notice

As you will recall, it was announced at the 2019 Rally that the LAA has agreed to take on the continuing airworthiness oversight of what has become known as the YAK fleet. At this moment in time, two aircraft are in the process of transferring from a CAA administered Permit to Fly to a Permit overseen by the LAA.

Personally, I've never had anything to do with Yaks. Actually, thinking about it, that's not completely true, I once spent some work in Nepal and met some of the local wildlife! But it is nonetheless true that, with exotic types like the Russian-made Yak 18, 50 and 52s, or their Chinese counterpart, the Nanchang CJ-6, LAA is now absorbing technical information and gaining expertise as the fleet starts to transfer.

The reason I'm including the welcome arrival of (hopefully) many of these aircraft into our fleet into this section of our mag is twofold. Firstly, it's a complex aircraft in LAA terms, and this requires a slightly different approach to the aircraft's oversight, particularly from an inspection-oversight perspective. Secondly, because of a recent CAA Mandatory Occurrence Report made by an engineer, the aircraft type comes across to us with a new airworthiness issue – this being what appears to be, an age-related problem with the magnetos. Specifically, there are issues with the degradation of performance of the main capacitor fitted to the mag and coils that, again due to normal aging, are starting to break down when running at higher temperatures.

It's quite normal for aircraft, once they become effectively historic machines, to have to operate without much, perhaps any, manufacturer's support. Parts, if they are available at all, are very likely to be becoming well past their normal shelf-life. Certainly, capacitor degradation over time is a well-known issue, so ongoing recycling of these parts is a dangerous practice.

There's also the matter of specific expertise – just because a part was designed many years ago doesn't mean that it's a simple thing. To some extent the opposite might be true, as we now live in a world where microprocessors can, relatively straightforwardly, control systems. When I started in my aviation career, albeit half-a-century ago, system management was a very complicated affair. There wasn't a little brain in every component, so getting one thing to communicate with another was quite a challenge. When we bring these old parts to life, we bring the challenges with them, but often without the expertise or product support available to our forebears.

This is the beginning of the Yak story for us, though we're up for the challenge; after all, it's what we do. The CAA have cleverly opened the batting with this complex subject by issuing a Safety Notice (SN-2020/005) discussing the issues raised by the magneto issue on the Yak, which is available via the CAA website or via the Safety Alert on the LAA's website. The LAA is well placed, and has existing systems in place, to offer modification expertise to its members and this is one good reason why the Yak-owning community have joined us – welcome aboard.

Don't forget, *Safety Spot* is as interesting and informative as the stuff you send in so, if you have any thoughts on the above, or any other issue, please drop me a line, you know the email by now. Fair Winds. ■

LAA engineering charges

LAA Project Registration	
Kit Built Aircraft	£300
Plans Built Aircraft	£50
Issue of a Permit to Test Fly	
Non-LAA approved design only	£40
Initial Permit issue	
Up to 450kg	£450
451-999kg	£550
1,000kg and above	£650
Permit Renewal (can now be paid online via LAA Shop)	
Up to 450kg	£155
451-999kg	£200
1,000kg and above	£230
Factory-built gyroplanes (all weights)	£250
Note: if the last Renewal wasn't administered by the LAA an extra fee of £125 applies	
Modification application	
Prototype modification	minimum £60
Repeat modification	minimum £30

Transfer	
(from C of A to Permit or CAA Permit to LAA Permit)	
Up to 450kg	£150
451 to 999kg	£250
1,000kg and above	£350
Four-seat aircraft	
Manufacturer's/agent's type acceptance fee	£2,000
Project registration royalty	£50
Category change	
Group A to microlight	£135
Microlight to Group A	£135
Change of G-Registration fee	
Issue of Permit documents following G-Reg change	£45
Replacement Documents	
Lost, stolen etc (fee is per document)	£20
Latest SPARS – No 17 April 2018	

PLEASE NOTE: When you're submitting documents using an A4-sized envelope, a First Class stamp is insufficient postage.