



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

# Safety Spot

Malcolm has put pen to paper for his final Safety Spot, discussing statistical data, GASCo's Task-o-meter, and composite delamination...

**H**ello to you, and welcome to this March edition of *Safety Spot*. As always, I hope that you and those closest to you are OK or, if not in top form, are at least holding things together during this dreadful time in our nation's history.

I'm sure that you'll be pleased to know that me (and my lot) remain in pretty good shape, although I hope I still feel the same this evening. I've just been 'called up' to present myself for a Covid-19 jab; "be there at 17.19 precisely please". If the car starts – and it's been a while – I'll make sure I walk through the door as the second hand passes the top of the clock!

I have to say that I'm pretty impressed by the vaccination programme in the UK. Being an Oxford 'bloke', even though I've had absolutely nothing to do with the fantastical science surrounding the creation of these magical vaccines, my shoulders rise a little when I hear the term 'Oxford' vaccine, even if only for reasons of personal history and geography. Makes you proud to be British after all.

So, dear reader, we've got to March 2021: 'With rushing winds and gloomy skies, the dark and stubborn Winter dies' to quote a line from Baynard Taylor's lovely poem on the subject of the changing seasons. Seasons inevitably come and go through time, and I'm very sad to say that my season working with the LAA's Engineering section has come to an end or, at least will have done when March closes its back gate and April again opens her shutters. Reading the above back, I note that I shouldn't say 'the' engineering section, rather 'your' engineering section – after all, we're all part of the same team.

I have to say that, as the Airworthiness Engineer for the organisation, it has been a great privilege working alongside you, yes you, and the rest of the team here at Turweston Airfield. I've certainly learned more than I've taught during my time with you – thank you for that - and I hope that you've enjoyed all the *Safety Spots* that we've created together over the years. But retirement beckons, and I have a few more adventures to execute before I move on permanently, so this is the last *Spot* I'll pen.

I'm looking forward to seeing what comes next, both in our mag and, closer to home, in my life. If the past is a guide to the future – I'm sure it will be fabulous.

So, goodbyes said, what are we going to talk about over the next few pages? Well, I expect that you have scanned the photos and know pretty much what's in the store. Naturally, with very little airborne activity, there have been only a very few 'events', in fact the 2021 AAIB 'Initial Notification' folder is empty... not for long now though, I suspect. You'll have seen the pie charts showing a breakdown of the type of incidents

suffered by our colleagues, and you'll have spotted the Mozzie platform covered with bullet holes, ah yes, and what about that Task-o-meter?

### Safety through knowledge

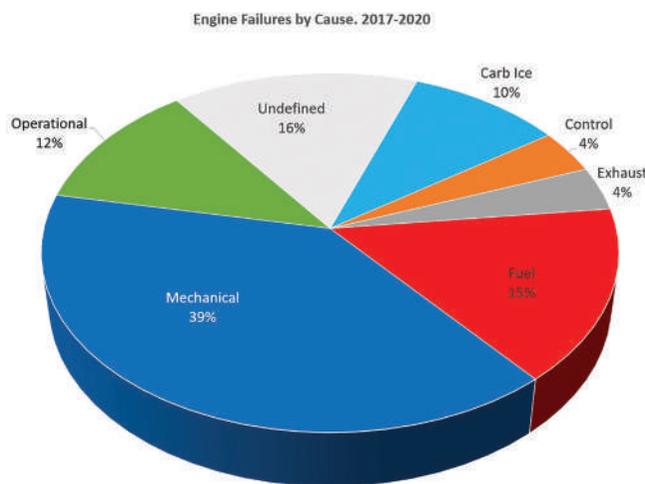
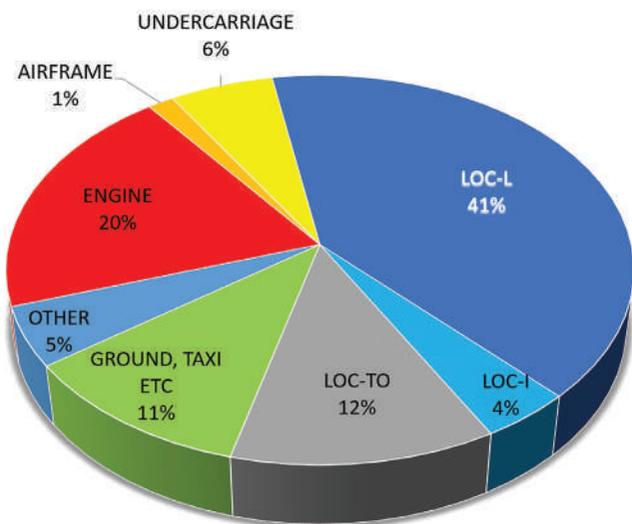
Every year, our masters plough through the previous 12 months' incident reports, looking for clues as to what direction to take in their various safety campaigns and, I suspect, hoping that the numbers justify their endeavours. And, every year, in our world of sports aviation the same conclusion is reached – in about three quarters of all the incidents, the blame can be firmly affixed to the pilot. The rest, well, that's almost always just technical providence!

Some years ago, I got a bit fed up with this Pilot Error (PE) versus Random Technical Failure (RTF) conundrum, feeling that numbers like these had little real value to the safety engineer, and I decided to look at the incident reports in a slightly different way. I discussed my thoughts with my boss, our esteemed Chief Engineer, Francis Donaldson, and he agreed that we should open our minds to the obvious reality that there's never a single cause to any incident, positive or negative. In other words, they'll always be a bit of RTF mixed in with a fair slice of PE.

In the LAA world, as you'll know if you've been following this column over the years, for RTF read TECH, and for PE read OPP. So, for the purpose of initially looking at an incident to see if there were lessons for future pilots and engineers lurking within the complete story, we invented the OPP/TECH category. It's this category that forms the basis of the *Safety Spot* stories – it's generally the TECH category that leads the various Alerts and Bulletins we publish.

It's a human reality of course that only a very few are quick to put their hands up when it comes to being involved, even by association, in a failed project; and we all suffer the consequence of our suite of unconscious biases. Naturally, we also try to push ourselves forward for a bit of credit when things go well... rather like my Oxford vaccine 'association' imagery earlier.

The approvals engineer will always shy away from any issues coupled with design, the inspector will act in a similar way if he or she has missed something important during a check – and it's a rare thing for a pilot, perhaps sitting on a hay bale by the side of a broken aircraft, to say, "do you know what, I got that wrong". But saying that, I've always been impressed by people's honesty after an event, even if they'd prefer that their names didn't hit the titles at the end! I guess that's because we all know that one person's error is another's lesson – thank you to all those who have freely shared their more difficult moments with me over the years, above everything, that's been a privilege and an honour.



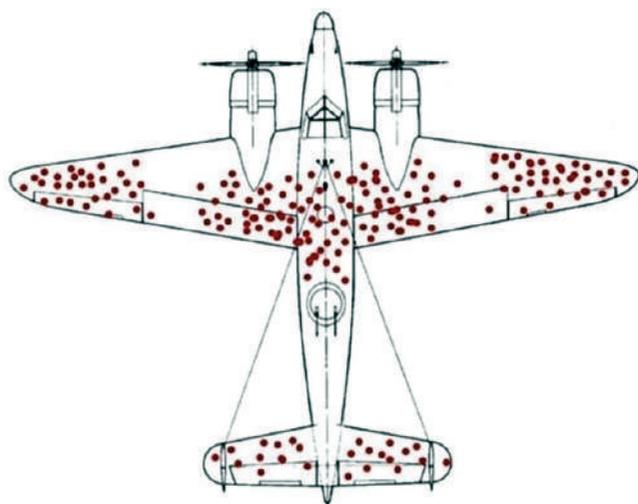
**Above** There are ‘Lies, damned lies, and statistics’ according to a long-forgotten sage, but popularised by the American wordsmith, Mark Twain. Of course, we always have to be aware that simple statistical representation can often hide, often too complex to fully understand, realities. One challenge we have is actually a good thing - with around sixty incidents a year, the overall sample we have to work with is quite small. The pie charts above therefore represent data collected by the LAA over the last five years – over 300 datapoints being used to create them. The left one shows that, as seems to be always the case, Operational incidents predominate, accounting for about 70% of the total. But a question is, how many also had a Technical cause? Or vice-versa, could a Technical cause, better handled or contingency planned, have become a non-incident instead? **Credit: Steve Slater**

**Finding ways to see more clearly (and reduce the number of events)...**

Over the years I've been privileged to be sent many Strut newsletters, each has a different style, though they all make a great coffee break read. My favourite, and yes, I'm allowed to have one now, is the East of Scotland Newsletter. Andrew Macleod, the editor, clearly scours the internet for interesting aviation-related stories... and finds them.

He tells us in the December 2020 edition, that his son found the ‘Story of the missing bullet holes’ (see the planform picture of what, looking again, probably isn't a Mozzie!) and thought that it was an interesting lesson. Andrew explains: “I thought at first it might have been an urban myth, but it looks like it is true, and provides one of those ‘aahh... of course’ moments.”

“During World War II, fighter planes would come back from battle with bullet holes, and the allies found the areas that were most commonly hit by enemy fire. They sought to strengthen the most commonly damaged



**Above** Thanks to the *East of Scotland Newsletter* editor, Andrew Macleod, for including this graphic in their December 2020 edition – it shows a pictorial representation of where returning WWII aircraft had been hit by enemy bullets. Clearly, these areas needed strengthening – but was that really the case?

parts of the planes to reduce the numbers that were shot down. A mathematician, Abraham Wald, pointed out that perhaps there was another way to look at the data. Perhaps the reason certain areas of the planes weren't covered in bullet holes was that aircraft shot in these areas did not return. This insight led to the armour being reinforced on the parts of the aircraft where there were no bullet holes: probably saving many lives.”

From a safety engineer's perspective, and with a nod to the above warnings about over-simplification and bias, this story reminds us that what we cannot easily see, in this case the missing data, can be far more important than the ‘surely that's glaringly obvious’ bits of info. Real solutions to problems often hide in the shadows.

**GASCo's Task-o-Meter**

I recently attended one of GASCo's Safety Evenings, on-line of course. It's been a while since I'd been to one, pressures of work, busman's holiday, and all that. Mike O'Donoghue leads a national team of aviation experts which creates, and I hope he doesn't mind me describing the events as such, an aviation-safety related ‘entertainment’. I'm sure that many of you that have attended an evening's entertainment would both have come away having learnt a bit about staying safe - and done so with a quiet chuckle rattling away in the tonsils.

During the last seminar, engineering test pilot, Nils Jamieson, one of GASCo's regional safety officers, came up with an imaginary instrument for pilots to use when deciding if they, not the aircraft mind, were safe to fly. Of course, I asked Nils if I could spread the idea in *Safety Spot*... here's his reply: *Of course Malcolm, I am very happy to share idea in Safety Spot. If only we had an instrument that told us how capable we are and how hard we are working – it would be simple to see when we are about to get into trouble. We could try to imagine such a gauge though...*

*The ‘Task-o-meter’ shows our current Capability, in green. This varies, dependent on how current, how prepared for the flight, and even how stressed we are at the moment. As the green sector grows and shrinks, so the red Danger sector grows and shrinks too. The trick is to keep the cockpit Workload in the green – within your Capability today.*

*If tricky weather, a malfunction, or just a complex flight, push workload into the red, you risk getting behind the aircraft and potentially having to make decisions in the moment, which is never as good as having a plan set beforehand.*

*Before you fly next time, ask yourself these questions:*

# Safety Spot

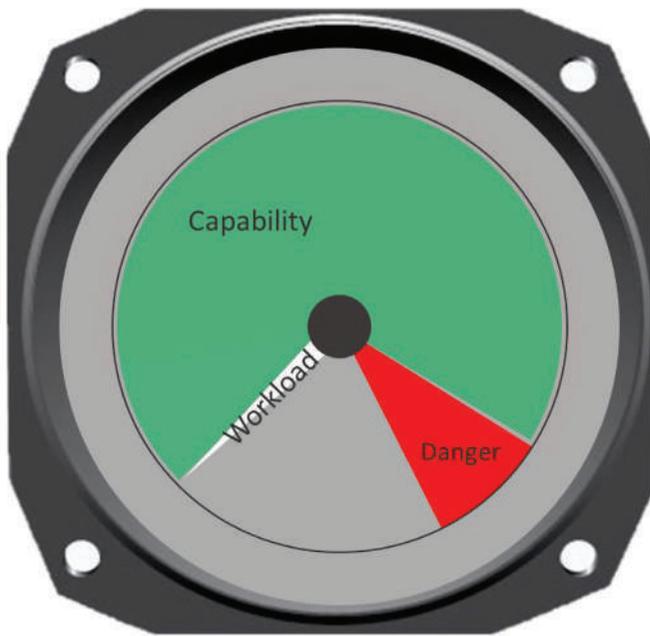
■ How Capable do I feel today? (how big are the green and red sectors?)

■ How taxing is the flight? (how high will that Workload needle go?)

Remember that flying with an instructor or LAA Coach, pre-flight planning and good Threat and Error Management will all make the green sector bigger, and could also stop the Workload needle getting into the red.

For more details, see the GASCo website ([www.gasco.org.uk](http://www.gasco.org.uk)) and register for one of the free safety webinars – they last about 90 minutes and feature a range of speakers. You can also find a link to a short on-line course to help you return to the sky safely, after the latest lockdown.

Thanks, Nils, for your kind comments about Safety Spot when we spoke, it's definitely been a great pleasure knowing you and some of the rest of the team – I like quirky, especially if it gets a not-so-obvious message across!



One of the many realities I've discovered in my years with the PFA/LAA is that, somewhere along the line, in any incident, there will be a Human Factors issue lurking – sometimes many unrelated HF issues.

These, coupled with other more random factors – unexpected weather changes, technical glitches, that sort of thing – are the key players in most incidents or accidents. Certainly, Nils is on to something when he identifies that we humans have a capacity limit, and when we get close to it, our performance drops markedly. Perhaps the Task-o-Meter is a bit of a fantasy instrument, but I think that, in reality, we all have a biological meter built in. Maybe we should remember to look at it a little more often and see how much green is showing on the gauge – if you're 'seeing red', it might be better not to fly.

## Curtis drain valve 'lock-on'



**Safety Notice**

**Civil Aviation Authority**  
**SAFETY NOTICE**  
Number: SN-2021/005



Issued: 04 February 2021

### Lockable Gascolator Drain Valves on General Aviation Aircraft

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).

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

- Introduction**
  - This Safety Notice is published to raise awareness of the risk of engine power loss caused by lockable gascolator fuel drain valves being inadvertently left latched open on general aviation aircraft.
  - Gascolators represent the last opportunity for contaminants to be removed or collected from fuel before entering the carburettor and include a drain valve for samples to be taken during pre-flight checks. Some gascolator fuel drain valves, used on a variety of general aviation aircraft, are designed to latch open to make fuel draining more convenient (see Appendix 1 reference photo). However, if inadvertently left in the latched open position, air can be drawn in through the open valve, temporarily disrupting fuel flow to the carburettor, resulting in a loss of engine power.
  - The condition often only becomes evident shortly after takeoff while in the climb, which is one of the worst times to suffer a loss of engine power.
  - This Safety Notice is prompted by several engine power loss accidents going back more than thirty years. While the issue has primarily affected Piper PA-28 aircraft, not all PA-28 aircraft have their numbers, all aircraft with lockable gascolator fuel drain valves.



**GASCo**

**SAFETY ENDORSEMENT**

This is to certify that the holder of this Personal Flying Log Book has attended a GASCo/CAA Safety Webinar hosted by the LAA Coastal Strut on Wednesday 20<sup>th</sup> January 2021

*Nils J. Jamieson*

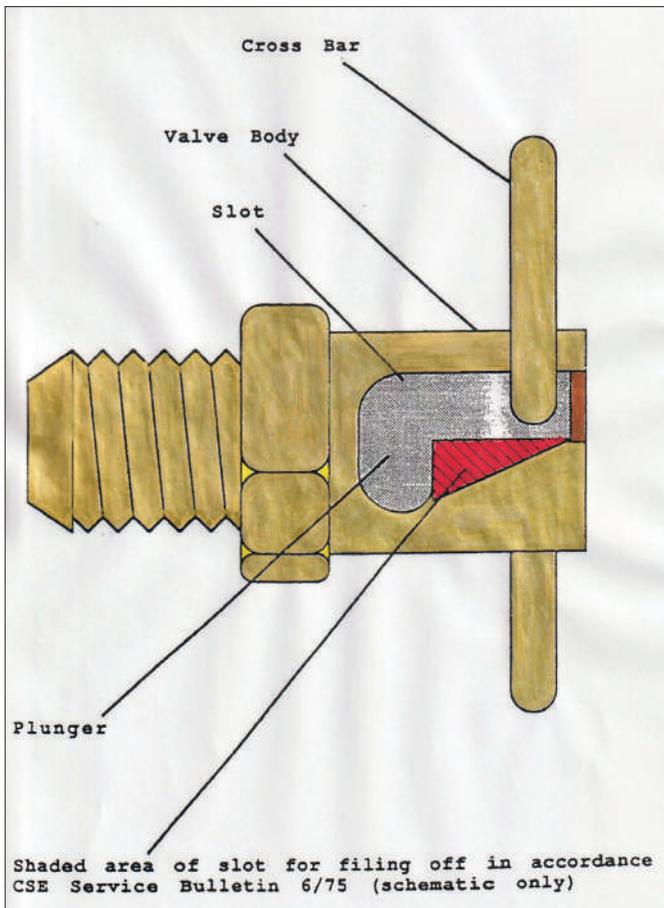
Chief Executive  
The General Aviation





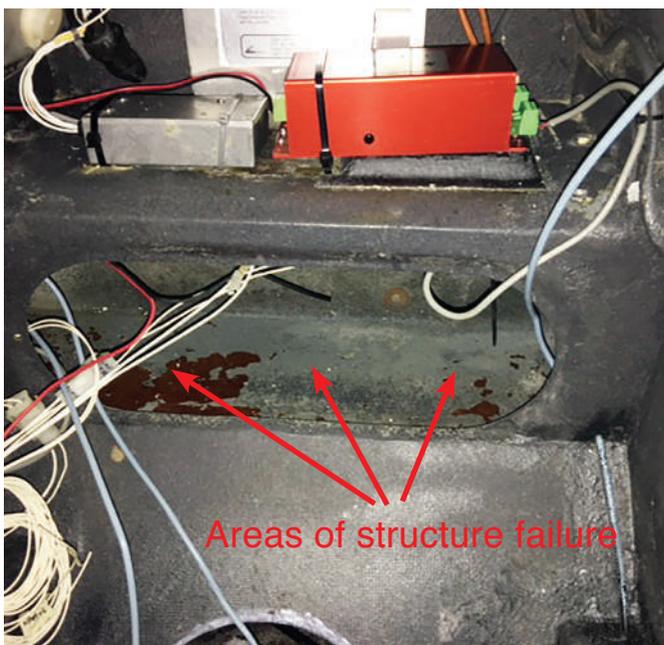
Above Certainly, it seems self-evident that the chances of suffering an incident or accident in an aircraft will be substantially reduced by keeping your pilotage skills in tip-top condition. Nils Jamieson, one of the lead figures in GASCo, has come up with a Task-o-meter to help a pilot determine just how well they're doing in this regard – don't go and search the internet for one just yet, as it's not an on-the-shelf item (at the moment). One item that is available now, and should be in every PPL's log-book, is a GASCo 'Safety Endorsement' ... you have to attend a GASCo Safety Evening to get one but, from personal experience, it's well worth the effort. **Photos: Nils Jamieson/GASCo**



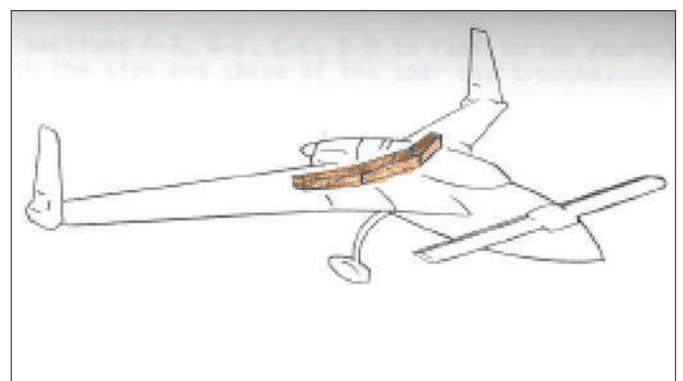
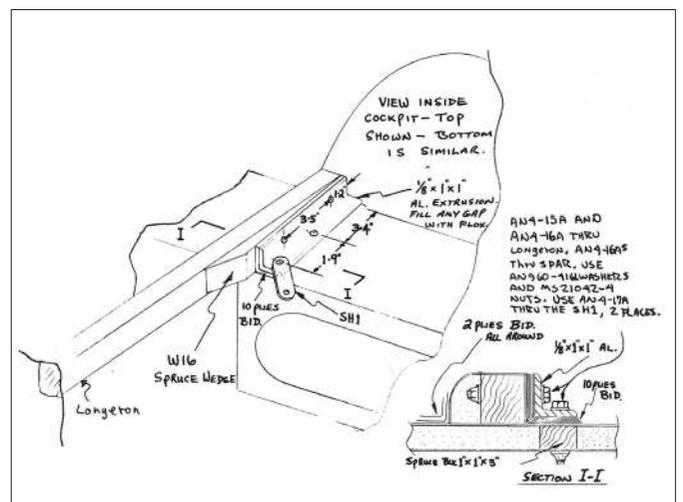
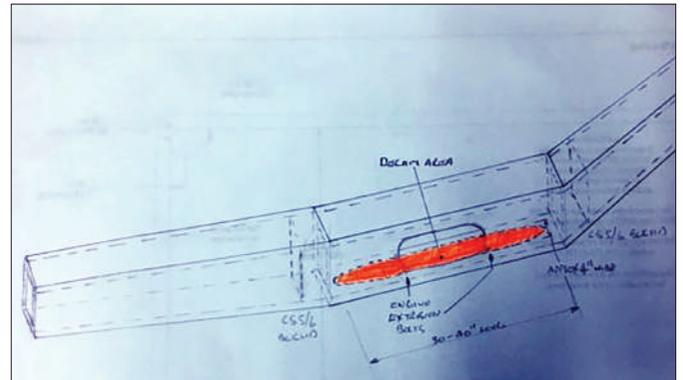


**Above and left** If you regularly check out the 'Alerts' page in the Engineering section of the LAA's website, and, if you're operating an LAA administered Permit aircraft (as you should), you'll have seen an Alert promoting a UK CAA Safety Notice warning of the dangers of leaving a drain valve in the open position after a fuel check. I remember when this issue first reared its head, back in the 1970s, there were a few 'events' where pilots were lucky not to have been hurt after taking off with open drain valves. The original solution, simple and easy to do, was to stop the drain valves locking open – these days you can purchase non-locking valves, but a 1970's SB which suggests filing off the lock tabs (see picture) works just as well. **Photos: CAA/LAA Library**

**Rutan LongEZ delamination**



**Bottom left** When you take on a new aircraft, especially one that hasn't operated for quite a time, it's essential to carry out a fingertip inspection of the whole aircraft. Though a structure may look absolutely fine from the outside, it may not be. This picture, looking at the centre-box section main spar of a Rutan Long-EZ as it passes under the rear seat, shows the area where LAA Inspector, Nick Wolsey discovered a huge area where the fibreglass / foam-core / fibreglass structure had become separated, effectively a structure failure. Without a very detailed look, including a tap-test, this damage wouldn't have been seen. **Photo: Nick Wolsey**



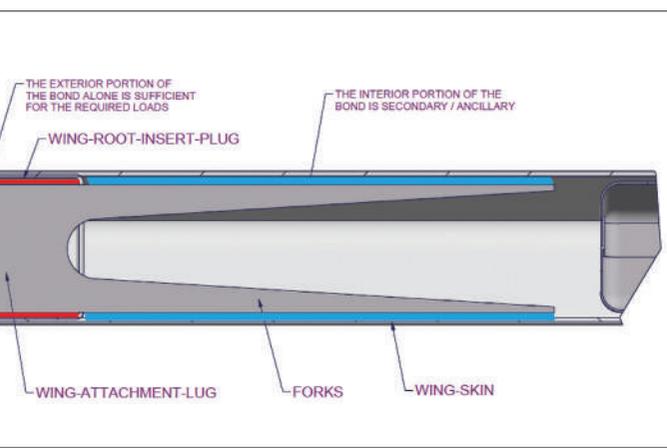
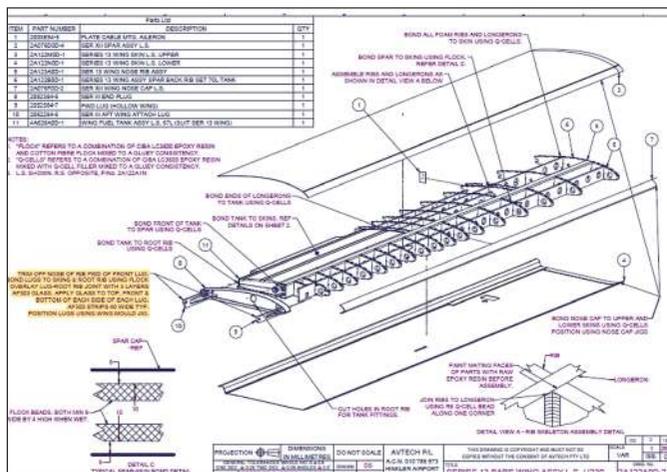
**Above** The centre-box spar joins the wings to the fuselage; during normal flight, lift from the wings means that the lower section of the spar is resisting tension forces. Effectively, in a sandwich construction like this, though the bond holding the sandwich together has failed, the natural tension force generated between the wings and the aircraft's weight will hold the layers together. Predicting the reduction in strength due to this disbond is definitely beyond this engineer's competence, but clearly, a find like this reminds us all that, even if a structure looks good, unless you check closely you can never be completely sure that all's well. This is especially true for composite structures. The sketch, above centre, included for interest, shows the connection of the centre-box spar to the upper pair of the four spruce longerons which give the fuselage most of its strength. **Photos: Nick Wolsey/Long EZ build manual**

### Jabiru wing mounting problems



Above Composite repair specialist, Murray Flint, found problems with a Jabiru J430 forward wing attachment fork and, after seeking advice from the aircraft's manufacturers, decided to replace the part. Though it's not a common repair, Jabiru were able to supply Murray with a 'Factory-Approved' repair scheme which, as you can see from the picture, first involved gaining access through the top of the wing. **Photo: Murray Flint**

Below When the wing attachment fork was exposed, it was clear that, though there was a good bond between the wing's top surface and the fork, the bottom of the fork wasn't bonded at all. Quite rightly, Murray's LAA Inspector, Rex Ford, said that LAA HQ must be informed straight away. After an extensive investigation, Jabiru aircraft were able to provide detailed calculations showing that the exterior portion of the bond is sufficient to carry all the flight loads and the interior portion offers secondary support. Thus, a difficult inspection of the Jabiru fleet was avoided. **Photos: Jabiru Aircraft**



### Woodcomp Classic propeller Failure



Above A recent investigation into an in-flight blade loss on a Woodcomp Classic 170/3/R propeller, fitted to a Sportstar Max, couldn't establish why this propeller blade failed. However, there's a very strong possibility that the propeller, which had been involved in a propeller strike incident some 80 hours before, had been weakened in this event. Following the propeller strike, the propeller was overhauled by the manufacturer and during this inspection, no external evidence of damage was seen. **Photos: UK AAIB**

### Steel tube tailplane corrosion





**Above and bottom left** No *Safety Spot* would be complete without the almost obligatory picture of corrosion in an aircraft structure so, before I sign-off, I should show you these pictures of the 'internals' of a Piper PA-22 Tri-Pacer tailplane.

The top surface of the fabric was lifted because the engineer noticed some rust-coloured staining around the trailing edge, and the fabric was starting to look its age. This aircraft, because of Covid-19 restrictions, had been parked outside for some time and water had found its way into the internal structure.

When these awful restrictions end, and you are finally able to meet up with your beloved aircraft, take note of all the advice 'out there' about the best approach to take in returning your aircraft (and your good self) to full operational airworthiness. **Photo: Malcolm McBride**

## Getting back into the air

Writing a column like *Safety Spot* rather means that you have to wear your heart on your sleeve, if you have been a regular reader over the years and have got to know me through my words and pictures, you'll know that this final chapter is going to be a rather difficult one to write. In a strange way though, there's nothing as constant as change, and because *Safety Spot* was invented to keep you up-to-speed with current engineering issues and events that have affected other pilots and engineers, in real time – and it has to be said that the cupboard on actual recent events is pretty bare – now, as retirement beckons, it is a natural time to hang-up the pencil and the camera.

This last year has been very weird for all of us who enjoy tackling nature using man-made devices; I know many of you share my passion for such activity. It won't be long before I'm able to be back at sea, hard pressed I expect, in my little boat, hopefully travelling to distant adventures... probably after having ridden down to the south coast on the old motorbike.

I also have a bit of a nagging itch to get back prone under a hang-glider, it's been 20 years now since I managed a decent climb in a thermal... pulling the bar in and escaping the sink when leaving the mistiness at the bottom of a tight cumulous cloud... an experience difficult to beat. But I know that all these things we do require great skill and, to use Nil's earlier analogy, you need to be ahead of the equipment you are managing, not behind it. Certainly, this means that you'll need to take things really carefully when you return to more normal operations.

Looking through the incidents that we suffered during that brief summer release from the Covid-19 lockdown, it's clear that most were due to pilots not being fully up-to-speed in this regard.

When we are finally allowed out again, above all the other advice, take this into account before you fly. And don't, whatever you do, think that because you have years of experience and thousands of hours in the air, that this will protect you, it just means that the gotcha will get you from a different direction. If I do decide to risk using my legs as an undercarriage, and you'll remember that I've often said that, if you have an itch you had better scratch it, then you can rest assured that I'll be staying close to the ridge for some time before pushing the limits; and I'm not getting on the bike until I've carried out a full service.

So that's it, the final sentences. Without labouring the obvious, and not to devalue any of the many support systems around, your personal safety is very much in your own hands. But fleet safety, be that flying aircraft of any sort, sailing boats, riding motorcycles, racing motor cars, whatever it is that keeps you alive, can only be maintained by sharing the lessons we learn individually with others. So, wherever the winds of change take the LAA, please keep that sharing culture alive! 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
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### 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
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### 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.