



With Malcolm McBride  
Airworthiness Engineer

# EXTRA CARE AS THE NEW SEASON STARTS

In a real mixed bag this month, we look at the crucial role of a decent pre-flight check, seat-belt brackets and control systems

**W**elcome again to Safety Spot; I do hope that you, and all those close to you, are in good form and I trust you are enjoying, as I am, this spring weather. The period January through to March is notoriously quiet for the UK aviator. Certainly, there are good days during the winter but, in general, the weather is, well to put it politely, not that conducive to flying light aircraft around. Even catching-up with the maintenance tasks on a machine can take a supreme effort as, for most of us who are forced to work on our machines in cold hangars (or even outside), you can only do so much with freezing fingers.

So, to start, now that my own fingers have warmed up a little, let's have a quick look at what's been going on here at LAA HQ. LAA Engineering has recently published a couple of *Airworthiness Information Leaflets (AIL)*, effectively mandating factory Service Bulletins. One Bulletin relates to checks on the flap drive pin as fitted to the EV-97 Eurostar, while the other directs Cessna 120 owners to check their seat belt attachment brackets. We automatically send these AILs out to members

who own the target machines but if you're interested yourself in seeing the AIL itself, we normally simultaneously issue an Airworthiness Alert about the particular subject, with these Alerts being available to all from our website [www.laa.uk.com](http://www.laa.uk.com) (See Engineering/Alerts).

In fact, looking at the paperwork on my desk, my file of 'reportable' accidents is very thin, even for this time of year. Naturally, the fewer accidents the better, let's hope this trend carries on through the rest of the flying season. I expect that you are aware that the 2015 accident 'year' started badly as the result of a double fatality in a very nasty accident near Popham, involving a Pioneer 400.

Naturally, this accident is being investigated by our UK AAIB and we're all interested in learning what went wrong on that fateful day; the basic premise safety engineers work within is that we all learn from others' accidents. I was at a meeting at the AAIB's HQ at Farnborough a few days ago and the investigator showed me the remains of the aircraft. Not a pleasant sight, as you will imagine, but, for me, a cogent reminder that our sport can be dangerous and that fact should never be forgotten.

Incidentally, there have been three other accidents reported since the beginning of the year: an Auster tipped onto its nose after landing, probably as a result of an over-enthusiastic use of brakes; and two crashes involved Jabiru UL-450 aircraft, both effectively due to loss of control after landing.

I've often chatted in this column about the risk of using statistics to guide safety policy in the sports aviation world, the reason for my reluctance being two-fold. One, accidents are only very rarely caused because of one thing. An end-result statistic, if it's ever going to be meaningful to the reader, must be presented in an understandable form: how and who manipulates the relevant weighting arguments in any data-set will mean, inevitably, that bias will be introduced. Number two issue is that the data-set of all UK aircraft accidents is going to be relatively small which, for straightforward reasons, will exacerbate the other errors; one 'unusual' accident will have a significant and perhaps unwarranted effect on the overall shape of the graph.

Mind you, it's certainly worth chugging through the statistics; I've been recently

**Many of you will have seen a device just like this; the idea, of course, is to prevent bugs from entering the pitot system and making it their home. As the aircraft accelerates, the air pressure on the plate at the top opens the pitot to oncoming airflow. Pitot pressure, and therefore airspeed information is then available to the pilot. It's a good idea to check instruments as soon as you're able to, preferably before flight. For example, you can check a turn and slip as you're taxiing... 'turn right, indicating right, ball left, compass increasing'. Early on during the take-off run it's worth checking that you're getting full power and that your airspeed is increasing.**

*(Photo: Duncan Campbell)*



The pilot of this Luscombe didn't quite have enough distance to stop his aircraft after his passenger noticed that the bug-protector pitot cover had got stuck closed. Fortunately, he ran into the hangar at the end of the runway very slowly indeed and the damage was minor. (Photo: Duncan Campbell)

surprised by the simple average number of flight hours completed by LAA members. My gut feeling, based on looking at pretty much every Permit Renewal form that comes into the building, is that the average would fall somewhere between 20 and 25 flight hours per year per aircraft with, as you would expect, some doing far less. Recent work being conducted alongside a few manufacturers (relating to airframe life) has required me to look a little more closely at these numbers and I note that many of our aircraft are flying double this number: the LAA's EV-97 Eurostar, for example, completed as a fleet average, 48.8 hours during the 2014 season.

One thing for sure, and this is a good maxim for the aviator in my view, is if you're not sure, double check; all three of the landing incidents so far this year have been due primarily to pilot error in one way or another, just about what you would expect at the very beginning of a flying season when we're all a bit rusty. Learn from other people (and perhaps the statistics) and if you're out of practice, don't be too embarrassed to ask for a check-ride with an instructor, it's cheaper than an airframe rebuild and a darn sight less painful than a spell in A&E!

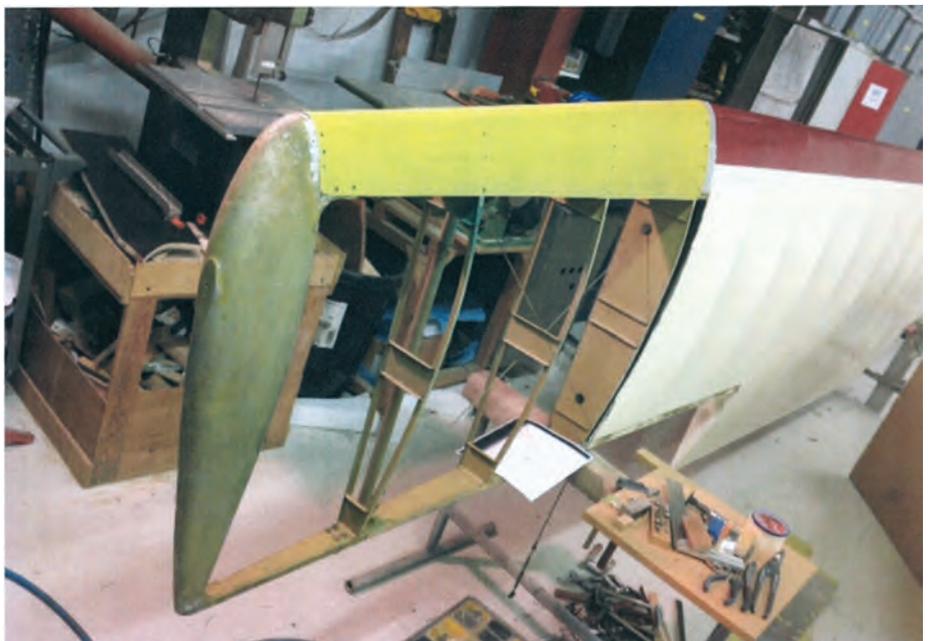
As we move into the 2015 season, previous accident stats advise that engine failures after take-off will start to rear their ugly heads within the reports... For goodness sake, don't fly your aircraft without checking it through thoroughly after the winter lay-up, and it's never a good idea to rely on last year's fuel; use it in the lawnmower, it won't be long before the grass starts growing!

#### Luscombe 8E (Silvair Deluxe) – ASI Failure on Take-Off

We're beginning to notice an increasing number of group-owned aircraft in our fleet; of course, group ownership is a great way to help to reduce the burden of the fixed costs and, if the group is well managed, a good way of sharing the maintenance tasks.

As engineers we've been pondering on the inevitable continuing airworthiness implications of group ownership for a while now here at HQ, mainly because of recent maintenance 'fall-downs' in one or two of our rather larger groups. It's also fair to say that the fundamental philosophy of the LAA is based upon self-reliance within an association of like-minded individuals, not disparate groups.

I suppose that the first question to ask is, 'how many people constitute a group?' >



The Luscombe being repaired; I've included it so that you can see the structure inside the wing – it's a bit like an atom, mostly space! (Photo: Roger Targett)

## SAFETY SPOT



**This is a picture showing the connection to the flap drive to the torque tube in an EV-97 Eurostar and is an example where a close system inspection is warranted: notice the scoring made by the edge of the bolt as it rubs alongside the fuselage structure – of course this scoring shouldn't be there; it is a clue that all is not well in the system and must not be ignored. (Photo: Malcolm McBride)**

Well, the LAA has a long history of informal partnership agreements, often two or three members will get together to operate an aircraft: maybe one person owns a machine and a friend, in return for some hands-on maintenance, might regularly fly the aircraft. Normally, where the ownership remains with one LAA member, the LAA doesn't need to even know about the arrangement and I'm sure that you would agree that this isn't a group.

Incidentally, if the ownership of the aircraft extends to more than one person, then it's an LAA rule that both owners must also be LAA members. As the rules of the Association stand today, only one of the members need be a full-plus member and this, normally by default, will be the person that we'll send technical information to (and expect to get reports from).

Personally, I don't think that I would class one, two or even three people as a group, at least in the sense where a formal management structure needs to be constructed to ensure that continuing airworthiness needs are met. Any more than three people, in my view at least, and a rather more formal arrangement between the – and please forgive the use of the rather fashionable word – 'stakeholders', should be installed into the arrangement. For example, it might be worth considering a daily inspection book where deferred defects (or even day-to-day reminders) are listed. If any pilot maintenance has been carried out, this would be a good place to keep a record so that everybody is aware of the activity. "I see that Jack's pumped the tyres up... I might just check that he's put the valve caps back on!"

I've included a few recently received photos of some very poor quality workmanship on a group-owned LAA aircraft; in the sender's view, the members of the group had no interest in the day-to-day maintenance of the aircraft and are only looking for a few cheap flying hours.



**As it turns out, an unnoticed dimensional error during the drilling of the flap's torque tube led to side-to-side movement in the torque tube on final assembly, something that wasn't spotted by the inspector who cleared the aircraft for flight. The pictures aim to provide a measurement of the side-to-side movement; the first picture measures 33mm and the second 40mm, that's a sideways movement of 7mm, easily enough to allow the pin to escape from the flap during normal operation. (Photos: Malcolm McBride)**

Why, you may ask, do I mention this now? Well, an accident last summer involving a Luscombe, where the group-owned aircraft crashed into a hanger after an aborted take-off, led me to telephone the group's Technical Representative (and, as it turned out, the pilot during the 'event'), LAA'er Duncan Campbell, to remind myself about the exact circumstances. As you can see from the accompanying pictures (one page 49), the aircraft is nearly repaired and it won't be long before the machine is back in the air.

When we spoke, Duncan reminded me of something that I thought back in July last year when he reported the accident to us; what an excellently managed five person group this actually was. Duncan and his gang appear to put their aircraft in the centre of a relationship which extends well beyond their small strip near Albourne, West Sussex. In fact, as I write, the team is on a special visit to the Joint Helicopter Support Unit at RAF Odiham, a trip which was arranged after discussions with the CO about how to improve communications between the LAA Group and the Chinook pilots operating nearby. Well done to them.

The safe operation of an LAA aircraft relies heavily on the full participation in the safety management process' surrounding an aircraft: in the LAA world, where shared responsibility sits at the heart of our association model, it's important that all members of a group understand this. Certainly, it's generally much cheaper to fly an LAA machine than a comparable machine operating under a Certificate of Airworthiness, but it could be very dangerous for the pilot of a Permit to Fly aircraft to adopt the dubious role of a 'freeloader' and assume that somebody else is looking after the maintenance.

Now I've got that off my chest, what happened to poor old Duncan back last July? The synopsis of the event, directly out of the Air

Accident Investigation Branch's report into the affair, describes this well.

*During the take-off a hinged cover on the aircraft's pitot probe, designed to deflect under air loads, did not operate correctly, giving erroneous airspeed indications. The pilot abandoned the take-off but the aircraft overran the grass strip and collided at very low speed with a hangar.*

Duncan explained, *"We always check that this pitot cover flap is free to move during every pre-flight inspection, and I'm sure that I did this on this occasion. I have no idea why the flap should have failed to open during this particular take-off. I think that we failed to stop because the grass had just been cut and braking efficiency was significantly reduced. As it turned out, we only hit the hangar at a very slow speed so the damage seemed limited to a new propeller and a replacement leading edge skin but, serving perhaps as a warning, when the aircraft went to a professional repair outfit to deal with the damage, they discovered that the minor impact on the wing tip had, in fact, buckled the roof quite badly. The whole group is really looking forward to getting our 'girl' back."*

A little bird tells me that they shouldn't have to wait very much longer to get their Luscombe back. Let's hope not, the weather's starting to look pretty good!

#### **EV-97 Eurostar – Mandatory Check of Flap Drive Pins**

One thing that a pilot doesn't need at any time during a flight is a control system failure, which is one of the reasons why if any part of a control system on an aircraft is disturbed in any way, two inspections are required before the aircraft can be released back to service. Older readers will remember that these inspections used to be called the 'initial' inspection and

the 'duplicate' inspection but, I think because these terms imply a hierarchy with regards to their individual importance, the modern terms are 'first' inspection and 'second' inspection. Terms aside, the point made is that both these independent inspections must, if they're to have any validity, carry equal weight.

Back in April 2011, LAA Inspector and Eurostar specialist Chris Theakstone asked me to come to look at an aircraft on which he'd been asked to carry out a minor fuselage repair. When I arrived at the hangar, the aircraft's wings, tailplane and interior seats had been removed. It turned out that he wasn't looking for any advice about the skin repair to the fuselage – that was a fairly straightforward business – instead he wanted, quietly, to show me a few worrisome features about the aircraft's initial build.

I agreed with Chris that many of the things he pointed out were indeed troubling and made a note to write-up Chris' points in a report to the Chief Inspector about poor quality inspection and work on this particular machine. All the individual issues pointed out by Chris were important in terms of overall quality of build but none of them in my view would have caused a catastrophe. Chris, however, had saved the best (or perhaps more appropriately, the worst), until last. In a jaw-dropping moment, he proceeded to demonstrate that he could push the flap torque tube from side to side quite freely. It was clear that at one extreme the flap mechanism itself was fouling the fuselage structure which was, naturally, totally unacceptable, but the full possible consequences of the lateral movement at the other extreme didn't, I confess, immediately dawn on me. However, with the torque tube pushed hard that way, the flap's drive pin could have at any time become disengaged from the flap itself! >

**The connection method used between the flap drive and the flap on an EV-97 Eurostar. It's a very neat idea and allows for a simple de-rig. A recent problem occurring on a foreign aircraft has led to Evektor, the aircraft's manufacturers, issuing a Bulletin requiring checks to ensure that the flap drive pin cannot inadvertently come out. (Photo: Evektor)**



## SAFETY SPOT

I could imagine, as I expect you can, the horrible consequences of one flap becoming disconnected, perhaps during a low-level turn onto finals. I've included a few pictures I used from the internal report into this inspection failure, as you can see. I think that everybody concerned in this particular event, minor poor quality build issues aside, realised that the 'double' inspection, required for control systems of any kind, either hadn't been done or this constructor error was simply missed. It is likely that, had this aircraft not been involved in a minor incident which required a structure repair, the flap system could have failed at any time.

We now have to wind the clock forward to 2014. I received a telephone call from Dr Edmund Otun, Light Sport Aviation Ltd's Technical Director, asking if I'd seen the Mandatory Bulletin issued by Evektor-Aerotechnik, the EV-97's Czech manufacturer, about checks it requires on the flap drive pin engagement. I was, on reading the Bulletin, immediately reminded that this is a critical inspection point on this type and set about creating an Airworthiness Information Leaflet to promulgate Evektor's obvious concerns and required measurement checks to ensure full engagement of this Flap Drive Pin.

Regular readers of this column will know that I'm a bit of a fan of the EV-97 aircraft, the machine offering excellent two-seat performance for a kit-built aircraft in this class. The original EV-97 Eurostar was manufactured as a microlight (with a max gross weight of 450kg). The EV-97A, which was virtually identical, is an SEP Aeroplane with a maximum gross weight of 480kg. The latest machines, the Sportstar range, have a 600kg maximum

take-off weight. The LAA looks after the original demonstrator of this mark, but other UK machines have found themselves caught up in the certification issues surrounding the introduction of EASA's LSA class and, until further checks are made, fall between categories. We have 86 Eurostar aircraft operating under an LAA administered Permit to Fly.

### Cessna 120 – Seat Belt Bracket Inspection

There have been a few times in my life when a safety harness or seat belt has saved my bacon; I make no bones about the fact that I consider seat belts and their attachments to

be an essential element in any aircraft inspection but know, from experience, that they're often taken for granted and checks on the harness and its attachments are overlooked. As I write, I'm reminded that one of the very few times I've been truly terrified in an aircraft involved a seat belt, or rather, as it turned out, lack of a seat belt.

The incident involved me climbing through about 6,000ft to get over the top of some or other restricted airspace in a two-seater, but flown solo, trike. I'm not sure where I was going or why but, in my haste to get airborne I had forgotten to do up my lap-strap which, as I climbed skywards, ended up flapping wildly behind me. Bear in mind, as you picture this scene, that this was an early microlight which didn't have a fibreglass cockpit surround, so it was very much like flying 'acapella' – scary at the best of times! As is fairly usual with an aircraft with a very low wing loading, I was being bounced about a bit and was working quite hard keeping the aircraft straight, which is one reason I didn't immediately notice my pre-take-off oversight.

As I climbed above the developing cumulus, the bumps settled down and my work-load dropped, I became aware of the sound of flapping and, to my horror, looking backwards, spotted both parts of my seat belt flapping underneath the rear-mounted two-stroke engine. Looking down for confirmation I could see that I was a mile up just sitting on a piece of wood. I can remember suddenly not feeling part of the aircraft at all: as I say, absolutely terrifying, I'll never forget the experience. I've been upside-down in a couple of bigger aircraft when they've flipped over in boggy terrain after an engine out too; and >

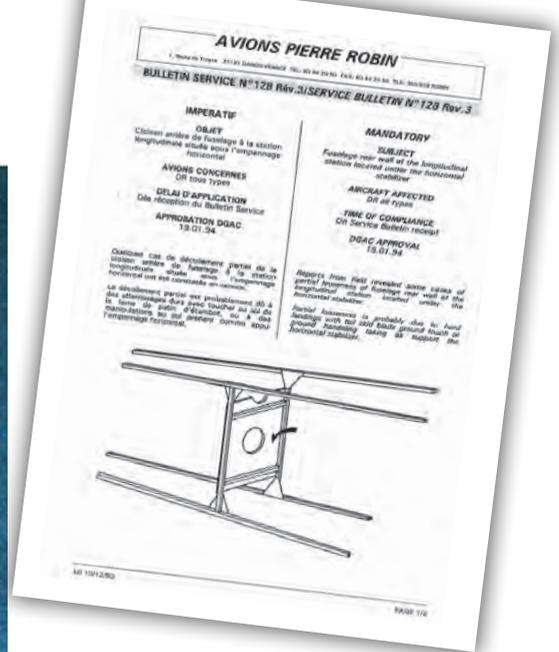
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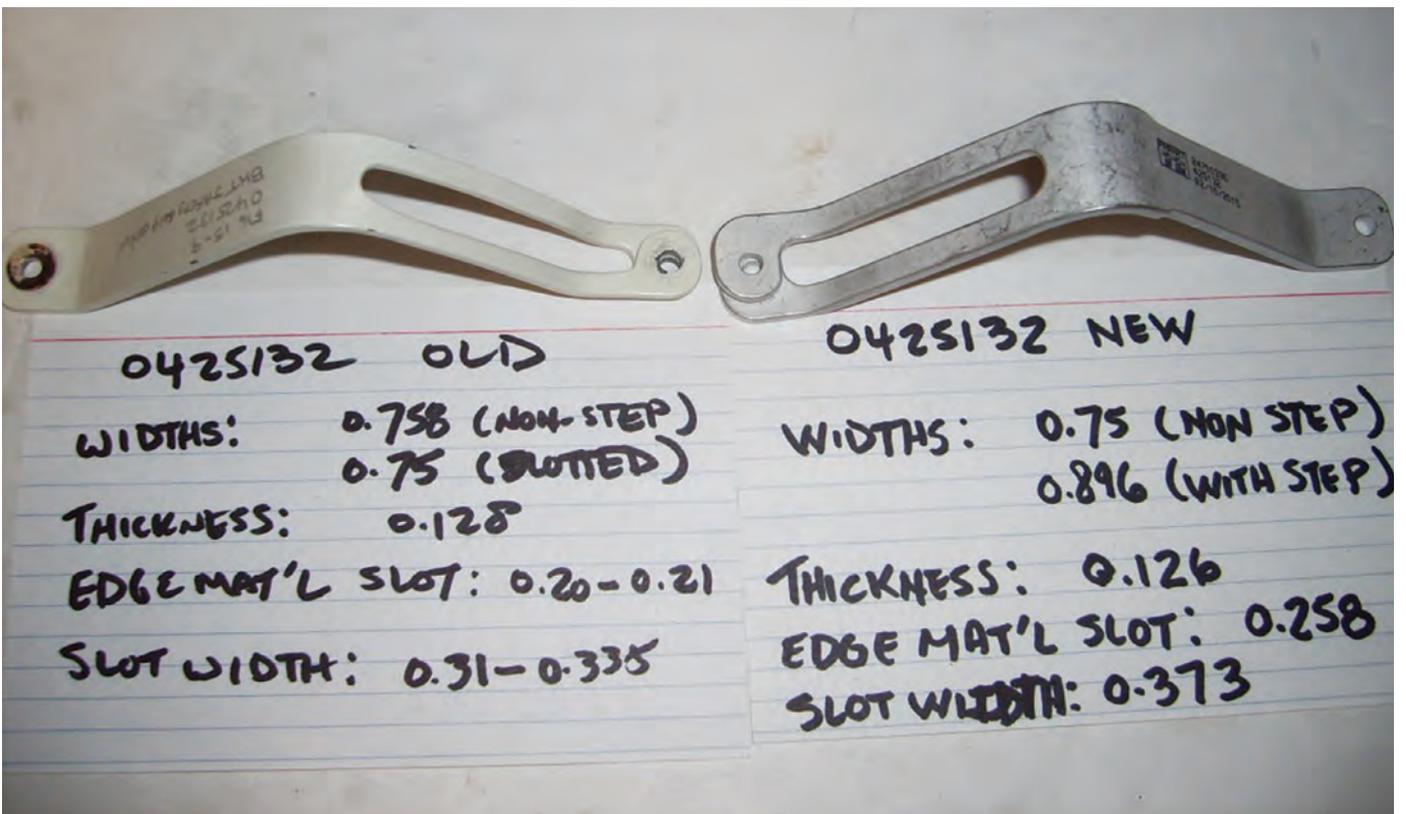
The pilot of this Luscombe, who had approximately 60 hours experience on tailwheel aircraft but only two hours on type, had completed a check flight on the Luscombe 8A a few weeks earlier. He reported that on this landing the aircraft had floated much longer than he had previously experienced and did not slow down as quickly as expected. He applied the brakes towards the end of the landing roll, at an estimated speed of about 20mph. Initially there was no response, then the brakes locked up, pitching the aircraft over onto its back. The pilot considered that the long float prior to touchdown and his inexperience on this type, which is not equipped with flaps, were contributory factors. I show this picture to remind pilots why seat belts are so important. (Photo: LAA library)



(Above) The seat belt attachment on a Cessna 120; note, it's not that big a component when you consider that it might have to take the combined weight of two hefty pilots! Cessna has recently issued a Bulletin suggesting that these early aluminium brackets should be changed for far stronger steel replacements. We agree with Cessna and are issuing an AIL requiring the upgrade. (Photo: Cessna Web Forum)



(Above) We discussed, in last month's Safety Spot, the runway excursion suffered by LAA flyer Chris Jolly at Lee-on-Solent in November 2014. This feature has generated quite a bit of interest and some debate, something that can only be a good thing. Interestingly, there have clearly been problems involving the rear fuselage area before and thanks to LAA Inspector Mike King for reminding me of this. This is a picture of the front page of a 1994 Service Bulletin suggesting checks in this area of the fuselage every 100 hours, after a heavy landing or, and I quote, 'after a flight under high load factor or in hard turbulence'. I've amended the LAA's recent Airworthiness Alert LAA/AWA/15/02 to include a link to this rediscovered SB (Avions Pierre Robin SB No. 128 Rev 3) should you want to download it for your records. (Photo: Mike King)



This photo shows the small difference between the aluminium original bracket and the newer steel replacement. (Photo: Cessna Web Forum)

## SAFETY SPOT

on both occasions, the seat belt held and I wasn't in any way injured. Seat belts, and their associated attaching structure, are vital and must be kept in very good order.

I received a telephone call from one of our LAA Inspectors, Michael Powell, who asked whether I'd seen the recent Service Bulletin issued by the Cessna Aircraft Company. I explained that I hadn't and asked what it was about. Mike explained that the mandatory Bulletin required all seat belt attachment brackets to be checked at, or before, the next 100 hour inspection (or at the next annual). He explained that the Bulletin itself was a bit thin on explanation but, in essence, looked as if it was going to require that most of the brackets in service would need to be replaced.

I thanked Mike for letting us know about the SB and got a copy from Cessna. I agreed with Mike about the thickness of the document – all the Bulletin said in terms of explanation was, 'Cessna Aircraft Company wishes to update the seat belt bracket for airplanes in the field to the latest design', and offered a brief explanation as to how this change should be accomplished.

This type of Service Bulletin is rarely, if ever, published without good cause and, after looking online, it was clear that the failure of at least one of these brackets was being implicated as a possible component in the cause of death of a pilot in the US. The possibility of a lawsuit may have contributed to the lack of narrative in the Cessna SB.

I had a long chat with another LAA Inspector, David Jones, who knows these aircraft well. As it turned out, he was just changing a bracket on a customer's Cessna 140. David explained, "On our C140, the bracket is held in by captive bolts so I didn't even have to take an access panel off to remove the bracket – and, with the bracket removed, it's a good time to get a very good look at the belts themselves and the mounting structure. As it happens, our 140 already has a 'stepped' bracket made of steel, but it is worn and battered and will get a new one regardless..."

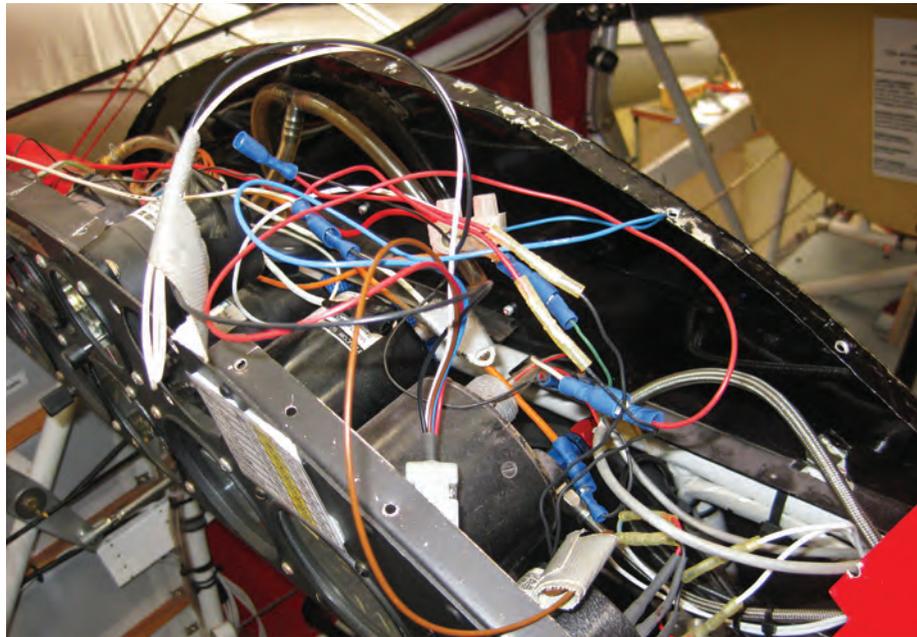
I then spoke to Textron's 'man in the UK', Stewart Baxter, to see whether parts supply is going to be an issue and he explained that all



the UK normal supply points have parts in stock and, if an owner wants, the part is available mail-order from Cessna directly. Prices will vary of course but \$40 wouldn't be far away from the mark.

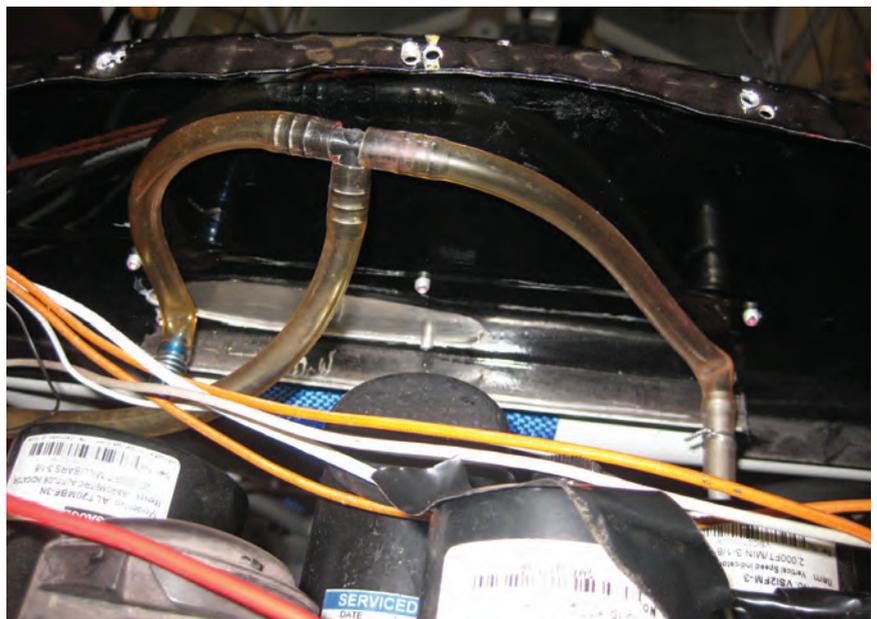
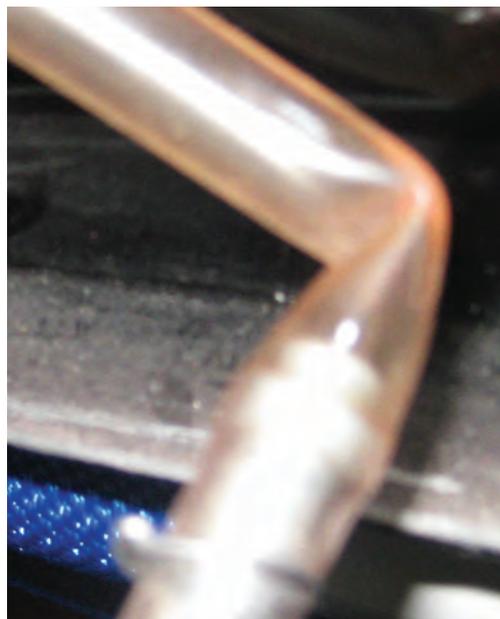
Steward agreed that this would be a good opportunity to take a good look around the seat belt attachment area on these quite geriatric types and that changing the bracket from one made of aluminium in the late 1940s, to one made from steel last year would be a good idea.

We don't have any Cessna 140s in our fleet but we do have 19 Cessna 120s operating under the LAA banner and they all fall within the serial number scope of this latest Service Bulletin. As always, Fair Winds. ■



*(Left) Carrying on with our theme of acceptable/unacceptable standard of work, I'll show you what one inspector recently called me into the hangar to look at. I hope that you'll agree that, whilst it might all work, it's very gash workmanship and not anything like what's acceptable on an aircraft. Whilst we're talking about airspeed indicator failures, notice the pitot tubes top left... (Photo: Malcolm McBride)*

*(Below two) These two pictures are a good example of 'the picture tells the whole story'. (Photo: Malcolm McBride)*





(Above) Thanks to North Country LAA Inspector, Nick Stone, for sending in this picture of a 'just about to fail' fuel filter. You can see, I hope, that this plastic filter has got hot at some point in its life and, although at a glance, the filter only looked a little discoloured, removal of one of the pipes shows that the outlet from the filter had nearly melted closed. A good aircraft inspector will never take anything for granted so if your inspector asks you to dismantle something for a closer look, do it with a fair heart. He might just find a problem that will have caused you trouble sometime in the future.

(Photo: Nick Stone)



This problem, picked-up by a glider inspector, could have led to an in-flight fire, not a happy prospect... Clearly at some point in the past, the correctly sized Jubilee clip couldn't be found so 'the engineer' refitting the pipe decided to do a bit of whittling; the inspector who sent in this picture explained that the pipe itself ended up being 'very thin in places'. (Photo: LAA library)



What drew our BGA man to the aircraft were concerns about the apparent 'closeness' of the exhaust system to the fuselage; you can see that this exhaust has actually worn a groove into the bottom of the fuselage structure, clearly a massive fire risk. This is the sort of problem that can have all sorts of unexpected consequences: think, just for example, if a small hole in the exhaust system appeared and this forced exhausted gas into the cockpit... Experience shows that carbon monoxide poisoning is insidious and deadly.

(Photo: LAA library)

### LAA ENGINEERING CHARGES – PLEASE NOTE NEW FEES APPLY FROM 1 APRIL 2015

#### LAA Project Registration

Kit Built Aircraft	£300
Plans Built Aircraft	£50
<b>Issue of a Permit to Test Fly</b>	
Non-LAA approved design only	£40
<b>Initial Permit issue</b>	
Up to 450kg	£450
451-999kg	£550
1,000kg and above	£650
<b>Permit renewal</b>	
<b>Up to 450kg</b>	<b>£155</b>
<b>451-999kg</b>	<b>£200</b>
<b>1,000kg and above</b>	<b>£230</b>
<b>Modification application</b>	
Prototype modification	minimum £60
Repeat modification	minimum £60

#### Transfer

(from CofA to Permit or CAA Permit to LAA Permit)	
Up to 450kg	£150
451-999kg	£250
1,000kg and above	£350
<b>Four-seat aircraft</b>	
Manufacturer's/agent's type acceptance fee	£2,000
Project registration royalty	£50
<b>Category change</b>	
Group A to microlight	£135
Microlight to Group A	£135
<b>Change of G-Registration fee</b>	
Issue of Permit Documents following G-Reg change	£45
<b>Replacement Documents</b>	
Lost, stolen etc (fee is per document)	£20
<i>Latest SPARS - No.16 February 2015</i>	