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

Safety Spot

Seat belts, defective control systems and the importance of inspections

Hello again, and welcome to *Safety Spot*; thumbs up in the hope that all is well with you and those close to you, wherever you are and whatever you're up to.

As I ponder this month's subject matter, and as the sun climbs northward on its journey to summer, my desk begins to fill with interesting continuing airworthiness tales. I'm briefly distracted by a couple of blackbirds trying to ridge-soar the small rise by the pond just outside the office – they're actually quite good at it.

Well, there's rather a long list of things to chat about in this month's issue of *Safety Spot* and, because I like couplets, the two main subjects, seat belts and loose or rather defective primary control systems are connected. They both offer the opportunity to discuss the importance of the necessary inspections to be carried out by the pilot before and after a flight – a fairly regular theme for this section, although for most of us LAA flyers, not too big an issue as we're used to wearing both engineering and pilotage caps.

Ballistic Parachute Recovery Systems – New Placard Requirement

Before I get into the very interesting world of aircraft seat belts and control systems, I should just mention that the UK CAA have now published a *Mandatory Permit Directive* (MPD 2019-005) requiring owners of all UK 'Permit' aircraft fitted with any type of Ballistic Parachute Recovery System (BPRS) to fit placards to their aircraft alerting first responders that there may be an explosive hazard involved in any rescue they might be presented with. If you've read the caption under the picture (right) you'll know that owners do have quite a bit of time (up to a year) to comply with these new requirements. So if you own an aircraft with one of these devices fitted there's no need to panic just yet, but we will be looking out for an entry about it when we come to check your next permit renewal application.

Even though the actual rules of engagement are defined in BCAR Section S (the UK microlight certification requirements), from 15 May 2019 the MPD affects all UK Permit aircraft. Watch out for the Airworthiness Alert on this subject, if you are affected it will tell you what you need to do to comply and offer a link so that you can purchase the appropriate placards.

The risk to first responders was highlighted by the UK AAIB when a BPRS rocket pack caught fire after a pretty nasty crash following a stall after take-off of an LAA two-seater a couple of years ago. Rocket fuel acts as a pretty good fire lighter – as you can imagine. Burn rate is generally proportional to pressure in the vessel, so if no longer

Safety Directive

Civil Aviation Authority

MANDATORY PERMIT DIRECTIVE

Civil Aviation Authority

Number: 2019-005

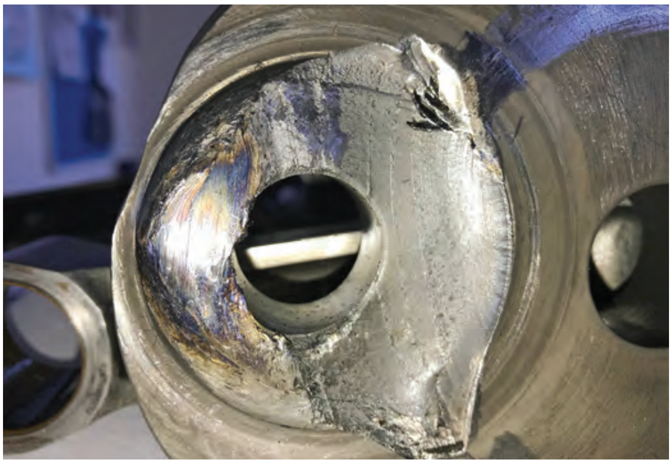
Issue date: 10 April 2019

In accordance with 41(1) of Air Navigation Order 2016 as amended the following action required by this Mandatory Permit Directive (MPD) is mandatory for applicable aircraft registered in the United Kingdom operating on a UK CAA Permit to Fly.

Type Approval Holder's Name: **Various**	Type/Model Designation(s): **Various**
Title:	**Placarding Requirements for Aircraft fitted with a Ballistic Parachute Recovery System (BPRS)**
Manufacturer:	Various
Applicability:	All aircraft operating on a UK Permit to Fly fitted with a Ballistic Parachute Recovery System (BPRS)
Reason:	After consultation with the Section S working group, on 19 December 2018, the CAA published an update to Section S to introduce requirements for Ballistic Parachute Recovery System (BPRS) placarding within Sub-Section K of BCAR Section S. In order to address a number of AAIB Safety Recommendations resulting from an aircraft accident, the CAA has agreed to mandate these requirements across the fleet to ensure standardisation in placarding for such systems. This MPD requires aircraft issued with a UK Permit to Fly and fitted with a Ballistic Parachute Recovery System (BPRS) to comply with the requirements outlined in CAP 482: British Civil Airworthiness Requirements (BCAR) – Section S – Small Light Aeroplanes – Sub-Section K – S 2041. Such placarding ultimately stands to increase awareness to aid in recognising that such a system is fitted and to identify any potentially hazardous areas in proximity to the aircraft for both involved and third parties. This is particularly important in the event of an aircraft accident.
Effective Date:	**15 May 2019**

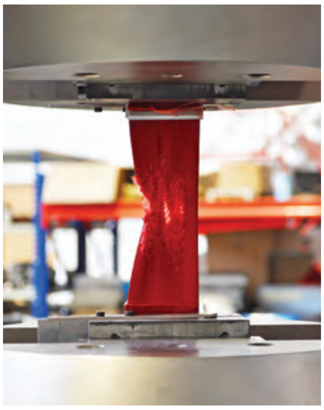
Above Following recommendations from the UK AAIB after a serious accident where the propellant from an un-deployed ballistic parachute recovery system (BPRS) may have exacerbated the effects of a post-crash fire, the UK CAA, after consultation with the BCAR Section S working group, have introduced new rules about placarding Permit aircraft fitted with these safety devices. The primary objective of this new placarding requirement is to ensure that first responders to an accident or incident are able to take into account any potential hazards before they deploy. The CAA have mandated these placarding requirements by issuing a Mandatory Permit Directive (MPD 2019-005) though, to give owners and affected sporting organisations time to arrange for this necessary change, the MPD doesn't come into force until 16 May 2019. Further, the fitment of placards won't need to be done until the aircraft's next annual inspection (or 100hr service).

The BMAA has taken up the challenge of having BPRS placard sets printed and the LAA has placed an order sufficient for the number of systems in use in our fleet. We will shortly be issuing an Airworthiness Alert giving directions to affected owners and their inspectors, we hope that the new placard sets will be available by early June. **Photos: UK CAA**



Above A sudden engine failure can happen to any pilot at any time and, when it does, it always comes as a shock. This Steen Skybolt had recently been imported from the US by experienced flyer, LAA'er Nigel Musgrave. Before the aircraft was put up for sale it had been completely refurbished and the engine overhauled – the aircraft had also flown for 12 or so hours in the States without any sign of trouble – what could possibly go wrong? The picture on the right shows the fracture face from the broken crankshaft which stopped the engine rather suddenly on its second flight in the UK … I haven't put these pictures in as a prelude to a discussion about engines breaking, rather, Nigel is walking around quite happily today because the five-point 'Hooker' harness in his aircraft held him tight after he made less than a perfect job of the following arrival on terra firma.
Photos: Nigel Musgrave/Malcolm McBride

Above The cockpit of a Dyn Aero MCR-01 ULC microlight aircraft shortly after coming to an abrupt stop. At the time of the incident the aircraft was being flown solo and, if you look at the picture closely, you can see that the shoulder harness has failed during the impact. Because of this restraint failure the pilot suffered some heavy bruising on his forehead, though fortunately no long-term damage was done. Because the passenger restraint matched the pilot's perfectly in terms of design, age and condition we decided to carry out some pull tests to see just how strong the belt was. A seat belt on a sports aircraft is required to support the pilot in a 9G acceleration event – to put things into perspective though, if you wanted to drive a racing car then the minimum strength for the seat belts is a 40G acceleration!
Photo: Carl Brown



Above We tested the seat belts from the MCR-01 in two ways – the picture on the left shows the pull test on the stitching, we were concerned that this 'fold-over' design has a built in weakness as when loaded there would be a natural tendency for the belt to twist, which would focus the load into small areas of the belt. As it turned out, the stitching failed at about 2.5 times the required strength, so no worries here. We also wanted to find out just how strong the belt material actually was and took up an offer of help from Cranfield University. The picture on the right shows the test of the belt itself at the point of complete failure. Interestingly, even though this belt had been in service for at least 10 years, this pull-test showed that it was six times stronger than it needed to be to meet certification rules.
Photo: Malcolm McBride

constrained, depending on the constituents, an explosive fuel will carry on burning strongly for quite some time.

There are also more subtle issues where a safety device could actually increase overall risk of an incident generally, and this effect needs to be thought about carefully before including potentially hazardous devices into an airframe. For example, would somebody be sloppy about their maintenance if they felt that they had the safety blanket of a parachute? It all sounds a bit 'WWI', similar to when the authorities refused to issue parachutes to pilots because they thought it would encourage cowardice in the face of the enemy, but the last parachute plus aircraft descent I heard about (in the US) was caused primarily because the aircraft hadn't been 'looked at' properly since new and, when over-pushed by a ham-fisted pilot, it broke.

And do these devices encourage poor decisions about whether it's safe to fly, from a weather point of view? Well, the last couple of deployments in the UK have happened when pilots found themselves unable to cope in IMC for one reason or another.

In both cases it would have been prudent if the pilots facing horrible conditions had diverted, or maybe not departed in the first place. Have autopilot, have gps and have a BPRS system … Let's go – not thinking (perhaps) that they've broken the golden rule of sports aviation as they dropped out of cloud completely out of control towards goodness knows what. Rule one in sports aviation is never put any member of the general public at risk, that's not sporting after all!

Aircraft Safety Harness Integrity

So, what about safety harnesses? Well, I can tell you this much, I don't feel safe in a sports aircraft without one. Certainly this is partially an emotional 'security blanket' effect, after all, most of the time they're not really doing much, but when they are called upon to do work, you want them to do their job properly – be that hanging upside down as you go over the top of a loop just a bit too slowly (been there – done that) or that sudden stop as your nosewheel buries itself in that ▶

previously unseen rabbit hole after a field landing because the engine has quit (been there too!).

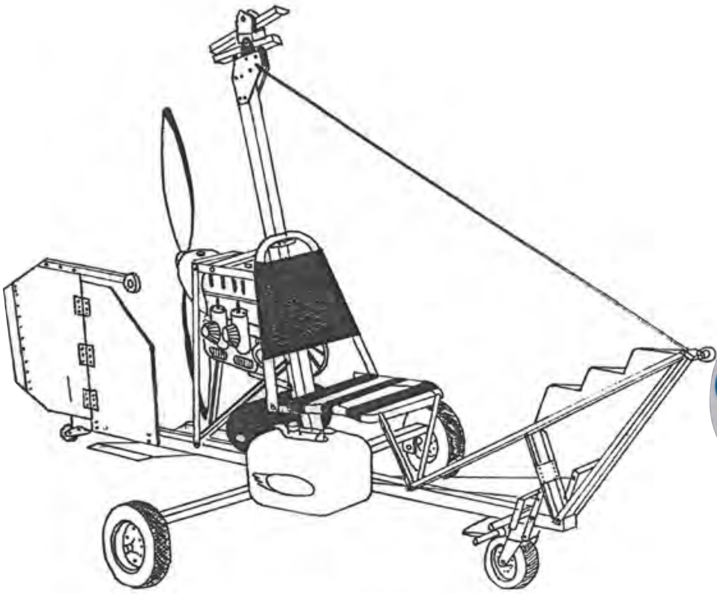
Personally, I've enjoyed an absolutely fabulous sports aircraft flying career and I can happily say that I've almost always felt completely in control of the situations I've been presented with – at least as long as I feel mechanically connected to the machine I'm flying in. Real fear hasn't often entered my heart but I do remember one moment where I was truly terrified – and it was because I'd forgotten to do my lap strap up in a rush to get airborne.

Imagine yourself in a powered hang glider (go on, you know that you want to), before the days of fibreglass cockpits – legs akimbo – two-stroke engine flat out, just about maintaining FL 70 over the very busy, from an airspace point of view, Highlands of Scotland. Nothing but mountains from horizon to horizon – normally a moment to savour – but then you notice that you are just sitting, unrestrained, on a fabric seat with your lap strap flapping in the breeze behind. I still shudder when I think about this silly incident many years ago.

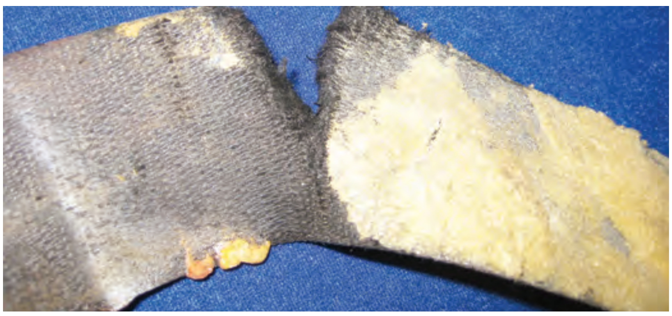
Then there are the times where a harness in good condition has really been the star of the show. Two particular events that have crossed my desk in recent months stand out: one, an incident involving a Steen Skybolt and the other an MCR-01 microlight. There's not space here to go into too much depth about the real causes of these incidents, though interestingly in both cases, before they opened the throttle for take-off, the pilots involved had absolutely no idea that their seat restraint systems would be protecting them from serious injury or worse, just a few moments later. In this necessarily brief discussion about safety equipment, more especially seat belts, let's wind the clock back a little and ask why the nation is looking at this now. Well, as I've pointed out many times before, aviation requirements are almost always put in place because an aviator has been hurt in an accident. When the dust settles, investigators piece together as much evidence as they can and, normally after much discussion and analysis, tweak the rules so that nobody else need suffer a similar fate. It was just such an incident that prompted the UK AAIB to issue a Safety Recommendation (AAIB – 2017-021) which asked the UK CAA to review the maintenance requirements for seat belts and harnesses.

The aircraft involved, a Yak-52, was conducting a flight for a test pilots' school. The commander, a civilian flight instructor, was in the rear seat and a tutor from the school occupied the front seat. Shortly after completing a series of aerobatic manoeuvres, the engine lost power without warning. Attempts to restore power were unsuccessful and, at about 1,100ft agl the commander committed to a forced landing in a field.

Evidence showed that the pilots probably became aware of a farm strip late in the approach to the intended field and made an attempt to land on the strip. The (last-minute) forced landing was unsuccessful and the aircraft struck the ground in a steeply left banked attitude at the southern edge of the strip. The tutor was fatally injured and the commander sustained serious injuries. The cause of the loss of engine power was not determined, but the reported symptoms were indicative of a fuel system problem. The above is simply a synopsis of events but, from an educational point of view, it's certainly worth reading the full AAIB report as there are lessons to be



Above Of course, it is really important in any design that all parts can be inspected fully from time to time. The nature of aircraft structures means that this can sometimes be quite difficult; sometimes extraordinary measures need to be taken to gain access to hidden areas of an aircraft's structure. The inspection of aircraft harnesses is an often overlooked aspect of a pre-flight inspection – though, when you think about it, it shouldn't be. Pictured left is an original Bensen gyroplane as first designed … Certainly, this type of open structure allows for full access for inspection. The lap strap, not shown in this sketch, is attached to the structure behind the base of the pilot's seat.
The picture on the right shows Jim Montgomerie's re-design … A slicker looking piece of kit but, because the fuel tanks are squeezed into the fibreglass cockpit fairing behind the seat, it's impossible to inspect the lap strap and it's attachment. **Photos: LAA Library/Derek Heley**



Left LAA'er Kevin O'Neill decided that it would be an interesting project to completely refurbish a rather sad looking Montgomerie-Bensen B8 gyroplane and set about stripping the aircraft back to its component parts. He dropped into the engineering office here at Turweston with an envelope containing the lap strap as he found it. We have since issued an Airworthiness Information Leaflet (LAA/AIL/MOD/G01A/003 Issue 1) requiring all Montgomerie-Bensen owners to gain visual access to the lap strap's connection to the structure on their aircraft. As you can see, this belt wouldn't have been much use if called upon to hold a pilot secure in the aircraft – being bounced out of any seat in an aircraft is a scary enough thought – but in an autogyro with all that whizziness going on just above your head, it doesn't bear thinking about. **Photo: Malcolm McBride**

learnt for all pilots (see: AAIB – EW/C2016/07/01). In the context of our focus on seat belts though, one feature of this accident was that the front seat pilot's seat belt failed and this failure could very likely have contributed to the severity of his injuries. This pilot wasn't wearing a helmet of any sort and it was not determined absolutely whether either of these factors contributed to this sad loss of life – though the AAIB were obviously concerned enough that the seat belt had failed to issue a Safety Recommendation.

In response to this request, in October 2018, the UK CAA opened an industry-wide consultation on seat harness/belt life.

Naturally, LAA Engineering had a hand in the finer detail of the eventual outcome, a Safety Notice (CAA SN-2019/003), which contained recommendations and inspection advice about the operational (in-service) safety of aircraft harness systems. Taking into account my earlier comments about the importance of the pilot's first flight of the day (Check A) and later walk-round pre-flight checks – a subject to be explored a little later – don't forget to check the seat belts fitted to any machine that you intend to fly.

First, check their general condition against the suggestions in the CAA's Safety Notice (of course you'll need to download and read it first – you can get it via an Airworthiness Alert from the LAA website: *www.lightaircraftassociation.co.uk*). Then, make sure that they work correctly and that you know how to adjust them. Before you actually fly make sure that the belts that aren't actually being used are secured in such a way as not to jam anything during normal operation or whack anybody in the unlikely case of an abrupt stop.

Make sure your passenger understands how the belt works and, very importantly, how he or she can undo the straps in an emergency, don't assume this is obvious, if they're non-flyers then they most likely won't have a clue what's happening. All this seems pretty obvious I suppose, but seat belt related injuries do occur from time to time.

The good thing about this recent Safety Notice is that it isn't too prescriptive, it recognises that the best people to judge whether a restraint system is in good order are the owner and his or her inspector. In the case of the MCR-01 shoulder harness failure there can be no doubt that, even though the shoulder strap failed at a stitched connection, the energy absorbed during the failure reduced the severity of the head injury to a few bruises. This failure though gave us the opportunity to actually test to destruction another identical belt, both at its stitched connection and the belt material itself. To accomplish this, we are indebted to engineers from Cranfield University, especially LAA'er Leigh Dunn, who teaches accident investigation techniques at the university, and postgraduate student (and brains behind the complex test equipment in the test house at Cranfield), Jarryd Braithwaite.

The rules of engagement for VLA and microlight aircraft seat restraint systems include a requirement that they must restrain a pilot of average mass in a nine 'g' forward deceleration. Certification rules dictate a maximum pilot weight of 86kg (189lb or about 13.5 stone) so multiply this pilot weight by 9g and you get 774kgf (about 1,700lb).

How the load is shared through the various belts is dictated rather by the seating position of the pilot of course but, for a person in a normally seated position, engineers typically accept that 40% of the total force applied in this deceleration needs to be absorbed (without failure) by the shoulder harness; in this installation, where the two shoulder harnesses are stitched to one restraint, that means a minimum to failure force of 309kgf (681lb).

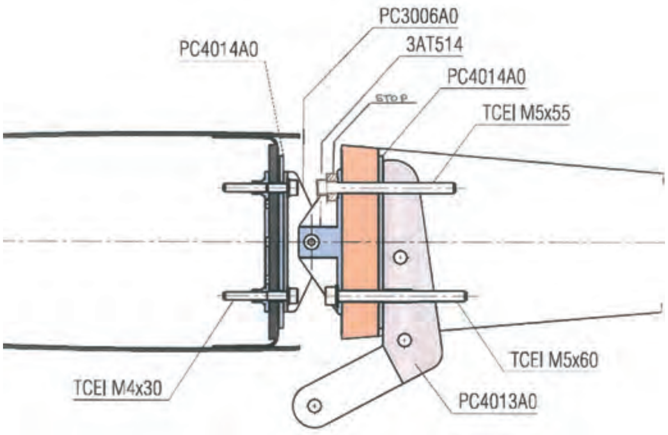
Very happily, especially as we were dealing with a restraint system type that actually failed during an incident, the stitching held together right up to an applied load of 766kgf (1,690lb), just about two-and-a-half times stronger than the minimum requirements (the belt on its own did even better, reaching some six times the requirement).

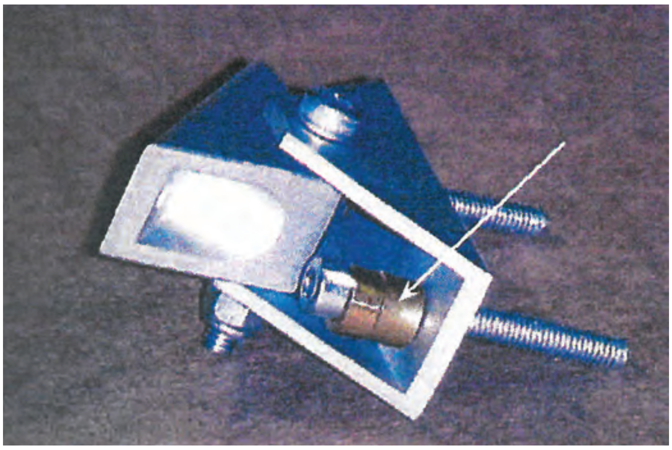
Now, these belts, even the failed one, did appear in first-class condition even though they were more than 10 years old. Often, and worth taking into account during your inspections, the weak point in any restraint system isn't the belt itself but its connection with the fuselage. I've just had the honour of flying Britain's only flying Sokol M1-C (thanks Alan) and noted that the designer had to take the shoulder harness to fuselage connection right back to the rudder post to find enough structure strength to resist the loads required – quite a long cable as you will imagine.

Still on the subject of harnesses, LAA Engineering was recently made aware that there might be a bit of an inspection issue with some of our Montgomerie-Bensen gyroplanes, as the connection of the harness with the fuselage structure (frame) of the gyro is completely hidden in this design by the fuel tank contained in the cockpit fairing. We've issued a 'before next flight' Airworthiness Alert requiring owners to gain access to this connection, and you can see what was found during a complete refurbish in the associated pictures – scary stuff.

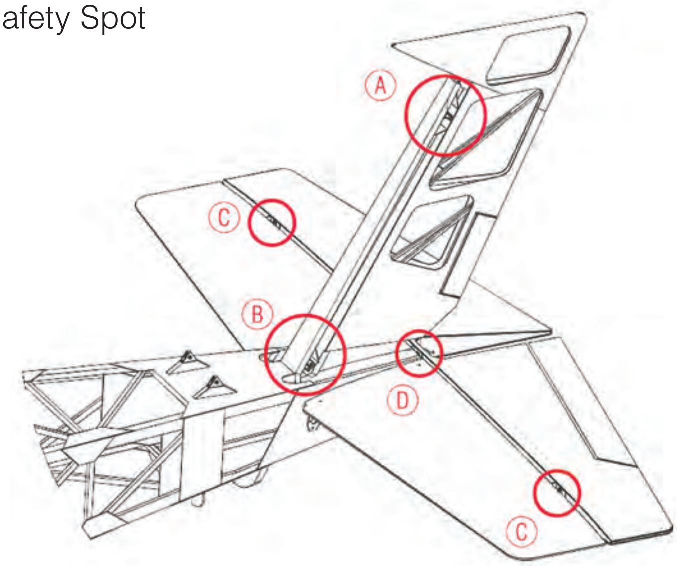
Pioneer P300 and Pioneer P400 Aircraft – In-Flight Control Restriction.

Regular airframe, engine and system checks by a pilot are very probably the most important part of any Tailored Maintenance Schedule (TMS). After all, it's the keen (and hopefully calibrated) eye of the pilot, especially an aircraft-owning pilot, that's most likely going to spot the very beginnings of a problem. However, after watching a fair few pre-flight inspections over the years, I have to say that many pilots, perhaps because they've never found anything amiss, do tend



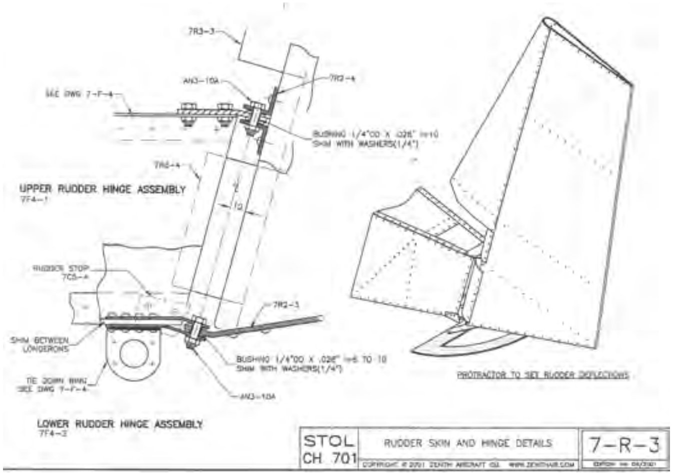


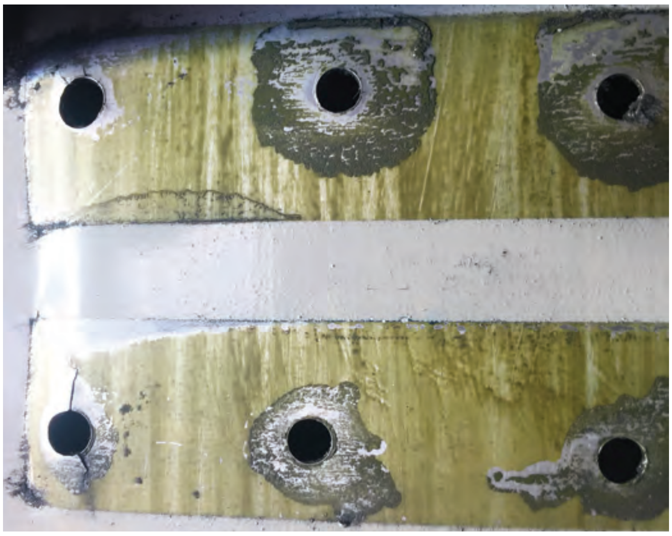
Above Recently, the pilot of an Alpi Pioneer P300 noticed that his landings were becoming faster and faster. Initially he thought that this might be due to the crosswind that was in any event making things a bit tricky, though thinking about it he realised that this couldn't be the case. He decided to take a look at the elevator control horn and set about removing the tail cone. He was shocked to find that the top hinge attachment bolt was slowly winding its way out and, because this bolt acts as the primary elevator stop, the elevator's range of movement was considerably reduced. The sketch on the left shows the general arrangement of this hinge and the picture on the right shows the hinge itself; notice the brass spacers which are filed to get the correct movement. **Photo: Alpi Engineering.**



Above Following the in-flight elevator restriction on an Alpi Pioneer P.300, we wrote to all Alpi P.300 and P.400 owners advising then that it would be a sensible idea for them to check all the flight control hinges and their associated control limit stops before their next flight. At the time of writing we've had one further report of a loose elevator hinge – in fact, I'm just about to pop over to this owner's strip to carry out an initial control system inspection after he's put matters right.
The picture (blelow the sketch) shows a very badly corroded bolt from a hinge of a P.300 – such is the nature of the P.300's design that some of the bolts pass through wood and others pass through fibreglass structure – the bolt shown is suffering the problems associated with bolts in wood, a well-known issue to builders of wooden aircraft. Alpi recommend that these bolts are replaced every five years, though we're considering how we should apply this recommendation to P.300 and P.400 aircraft. **Photos: Alpi Engineering**

Above, Here's a picture of the end of a pitch control rod taken from an LAA administered RotorSport MT03 gyroplane which had been in service for some years. I think that the problems with this component don't need explaining, though it might be worth pointing out that there's no bush protruding from the tube to support a bearing area (and that the bush itself is only just supported). Had there been an extreme control event, perhaps a blade sail, then it's possible that this connection would have failed. Never assume that just because something's been fitted, that it's OK. A pre-flight inspection is all about making absolutely certain that the aircraft that you are about to fly is absolutely, without question, up to the job. **Photo: Malcolm McBride**





Above, It is essential that pilots get into the habit of carrying out thorough pre-flight inspections, at the very least before the first flight of every day. These inspections must include a good look round the flight control hinge mechanisms, after all, these moving parts are bound to wear over time and, if something does begin to fail, an in-flight control jam could result. Sometimes it can be difficult to gain access to a hinge … but if you can't reach it go and get a ladder. Inspector, Nick Stone came across an example where the owner of this Zenair CH701 clearly hadn't looked properly at his top rudder hinge for quite some time. Nick's experienced engineering eye spotted a problem straight away and though a ladder wasn't needed this time, was able to see that the top hinge attachment wasn't going to last for much longer. This is especially worrying when you consider the design of the 701 where two quite close coupled hinges are supporting quite a length of rudder … and there's no fin to fall back on. **Photos: Zenith Aircraft Co./ Nick Stone**

Above It pays to be critical during a pre-flight inspection – don't be frightened to question whether something is OK or not OK. Even if it looks like it's part of a manufacturer fit. The pictures show a close-up view of the front control stick on a RotorSport MTO-3 gyroplane. Note that the plate which is attached to the base of the stick is attached to two steel tubes, one above the other. These tubes form part of the primary control system, the bottom tube rotates left and right, and controls roll input, it also acts as a pivot for the pitch control rod above. The picture, right, is what you should be seeing during your pre-flight – notice that there's plenty of material at the end of the tube, the area looks tidy and there's nothing to obstruct this moving connection. **Photo: Malcolm McBride**

to slip into a rather complacent mode. This 'it'll be alright' attitude will eventually catch out the complacent – even if only because a small problem fixed early will cost a lot less than a problem that's developed into a big issue.

Over the last few years, as all regular readers of this section will know, we've been pushing the idea that all aircraft in the LAA system should be accompanied on their journey through life by a TMS. To be truthful, our main reason for this is that a TMS does allow space for very deep inspections; if you've been following this end of the TMS story you'll remember that we've used the corrosion found in some Luscombe aircraft as a good example of why deep inspections need to be programmed in throughout the aircraft's life. After all, however clever an aircraft designer is, the finished product will almost certainly contain hard (or perhaps impossible) to inspect areas of structure.

The pictures (page 46) showing the failed seat belt found during a deep strip of a Montgomerie-Benson Gyroplane serve, as already mentioned, as a good example of what might be found lurking in the shadows. Clearly if this belt had been asked to perform in anger it wouldn't have been able to cope.

We've just written to owners of Pioneer 300 (two-seat) and Pioneer 400 (four-seat) aircraft asking that they remove the tail-cone to check that the bolts holding the centre elevator hinges in place are all as they should be. The reason for our concerns was that Pioneer 300 flyer, Mike Foreman, had recently suffered a rather frightening incident where he found that he wasn't able to get the stick back far enough to slow the aircraft, let alone flare it correctly.

Naturally, the ensuing landing was much faster than he would have liked, though he was operating from Tatenhill which, as all Staffordshire flyers will know, has a lovely 1,100 metre runway. So, even though he was a bit fast he didn't have any problems stopping.

Mike reports that from the cockpit, the controls felt normal, though after removing the fibreglass tail-cone the cause of the elevator's upward restriction could easily be seen – the top centre hinge attaching bolt, which acts as a limit stop for the elevator, had come loose and was winding out.

Had the bolt wound itself out much further it is possible, perhaps likely, that pitch control could have been restricted to the point where the aircraft went into an unrecoverable dive.

Over the next week or two, after we've discussed the various locking options with Alpi (the Pioneer's kit manufacturer) I expect that LAA Engineering will be issuing an Airworthiness Information Leaflet (AIL) specifying a long-term fix for this worrying problem and a number of other associated issues – notably an issue involving corrosion found by Alpi on some of the hinge attachment bolts.

Among the pictures featured in this month's *Safety Spot* you'll have seen two further examples where worrying engineering issues should really have been spotted earlier than they were.

The first involves a loose rudder hinge on a Zenair CH-701 and the second features a scary find in the control system of a RotorSport MT-03 gyroplane. In the issue involving the Zenair, a problem was immediately spotted by LAA Inspector, Nick Stone. His well-practiced inspection routine spotted an event that had probably been growing for many flying hours before, pretty well straight away. Why the difference? Well, Nick is a very competent aircraft engineer and experience has taught him where to look for potential issues.

Notice in the picture that the Zenair doesn't have a fin – though this makes aerodynamic sense in this type of STOL aircraft as it makes the rudder both light and effective, the lack of a fin means that there's nowhere to put a top rudder hinge.

You can also see that the distance between the top and bottom hinges is really quite small, though the two hinges are being asked to support quite a large overhang. In other words, there's quite a large load on both these hinges, so you can expect them to wear quickly. As it turns out, the reason for the empennage problems on this particular aircraft was that the rivets holding the top hinge in place had become loose, and cracks had started to form in the lightweight structure at the rivet holes.

Nick spotted the problem, first because he knew where to look and secondly because he used enough applied 'test' load (using the Armstrong method) to the assembly – you wouldn't spot a problem like this by wiggling the rudder backwards and forwards.

The problem discovered on the MTO-3 gyro highlights another human factor involved in not spotting problems, actually perhaps, two 'human factor' issues. One, when you look at an item during your inspection, you aren't expecting to find an issue: 'This component is the same one that's always been fitted and presumably the manufacturer of the aircraft meant to make it that way?'

And two, as an eager pilot, part of you doesn't want to find an issue – after all, you've probably been looking forward to opening the throttle at the beginning of your take-off run all week, and subconsciously will be resisting turning up something that might keep you from getting airborne. Ultimately, of course, a problem that shows up in the air will likely be seriously more effective in spoiling your fun... 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) Note: if the	
last Renewal	£250
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.