With Malcolm McBride
Airworthiness Engineer

SUFFERING A DEFINITE DISCOMBOBULATION OF THE SPIRIT…

The latest LAA Engineering topics and investigations

Welcome again to *Safety Spot*. As always, I'm hoping that all's well with you and those close to you. I have to say that I'm not exactly feeling one hundred percent this morning, though hitting that figure in anything is a rare thing, I suppose. It isn't that there's anything missing, you understand, so it's nothing to do with mass – if I look down I can see a pair of legs and my fingers appear to be doing just what they're told. But there's a definite discombobulation of the spirit this morning, and it isn't just because I'm suffering from the horrible cold that's been passed, like a baton, through the staff here at the LAA's Turweston HQ this past week. In between sneezing fits, I'm still feeling a little weird…

It may just be the changing of the guard, season-wise – after all, March is very definitely knocking on the door of the (hopefully, just around the corner) nice weather. It might also be that all three of my children – who are now grown up, of course – have decided to move house, within a few months of each other. As you can imagine, my place is full with the stuff they 'don't actually need at the moment'. There's only so many fridge-freezers a small back garden can take, after all!

However, the above distractions, when I face up to it, are mere tickles in comparison to the fact that I'm feeling rather homeless at the moment. LAA Engineering, myself included, has been elevated to the upper floor of our fabulous Turweston HQ building and I'm nearly installed onto my new – well, partly used, just one previous owner – desk. Yes, it's official. Finally, after nearly ten years, we've got a permanent home. Hats off to Steve Slater and Jon Viner who have jointly managed the move.

I'm not actually working next to a fridge – the 'white goods' are breeding in my back garden, along with the frogs in our pond – but I am surrounded by boxes of 'must-sort' paperwork and essential reference books. Everywhere I look it's new, and I have to say that the view over the airfield is spectacular from 'up here'. Once the discombobulation of moving has passed, I expect that we'll all stop 'seeing' the view… there's usually too much going-on on my nearly new desk to take any notice of anything happening outside!

I don't know whether there's a biological reason for the fact that most sport pilots don't tend to do much, if any, flying during the winter months. Perhaps it's some throwback to a time where a distant ancestor chose – or was more than likely forced – to shut the hatch on the rigours of the winter and not bother to set the alarm for a few months.

I came into work on my aging Triumph this morning, and a very nerve-racking and wobbly ride it was too. Of course, I haven't really ridden the thing, in anger anyway, since the autumn and, well, one gets rusty.

March and April are notorious months for aircraft incidents, and the two big reasons for this seem to be 'out of practice' aircraft or pilots – sometimes a combination of both. So, hopefully without sounding too preachy, the message is: if you haven't flown for a while, go and get a bit of practice with a trustworthy pilot before going off on your own. Remember, give the aircraft a thorough check-over before setting off. For example, make sure that you drain off any water that may have accumulated at the bottom of the fuel tank, and also be wary of using old fuel (especially Mogas).

Don't rely on a half-charged battery to start the engine… top up the charge with a battery charger if the engine hasn't run for a while.

Check every system on the aircraft, to make sure they still work. Brakes, for example, don't like sitting about for long – they become sticky and can jam on. This is particularly important with taildraggers, of course, where you don't have a nosewheel to keep you straight.

When you do fly, don't just head-off on a cross-country to your mate's flying field – that cup of tea can wait. Take the opportunity to practice a few manoeuvres – try a tight turn to the left, then fly level then one to the right; watch the ball, I bet it's all over the place. Try flying slowly for a time, half-flap, to get your feet going. Bounce yourself an engine failure… did you make the field? If you didn't, have another go.

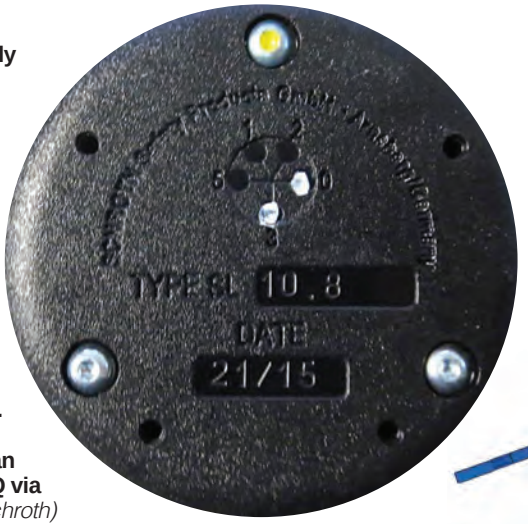
Flying an aircraft is a complicated business and you need to be in good shape if you're going to make a good job of it, especially if things start going wrong. Yes, in some respects, flying – like riding a bike – is a skill that, once learnt, isn't forgotten. But being a pilot isn't just about poling an aircraft about, it's about much, much more.

So, what's in store as a 'special offer' this month? Well, we've had a worrying report that some models of Schroth harness have been failing so we've created an Alert about that, which is where we'll start. One member switched on his electrical fuel pump, only to find that he'd entered thick cloud and couldn't see anything – we'll talk about that horror story. And finally we'll take a look at a few undercarriage failure incidents that have – or at least appear to have – bedogged our Alpi Pioneer fleet.

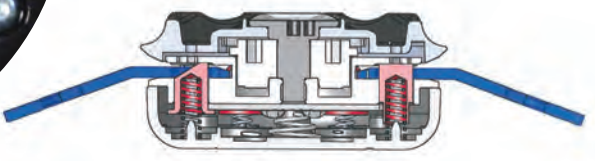
(Above) **Last month's *Safety Spot* talked about Rotax 9 series engine-mounting bolts coming loose and failing through fatigue. That item generated a big response and it seems that this has long been a design issue. However, my take on this is that no design is perfect and there's much compromise in a lightweight aircraft structure, which is why close (and timely) regular inspections are so important. Here's a good example of a materials failure in a different kind of engine mounting. This 912 ULS is fitted to a Zenair 701 and, yes, both sides were cracked (below the the cap-headed bolt). Judging by the amount of corrosion around the crack, it had been there for a while.** *(Photo: Sandy Hutton)*

SCHROTH HARNESSES: NO AERO'S WARNING FROM MANUFACTURER

LAA Engineering recently received, via de Havilland Support Ltd, a copy of a Service Information Letter (SIL) relating to a potential safety issue affecting some models of the



(Right) **LAA Engineering has recently published an Airworthiness Alert, giving access to an important SIL from the manufacturers of the Schroth Harness. We've written to all Tiger Moth and Bulldog owners under an LAA-administered Permit to Fly, advising that, for the time being, it isn't a good idea to fly aerobatics if you've a harness affected by the SIL. You can check if a harness is affected by the SIL by looking at the 'Type SL' and 'Date' on the rear of the buckle. There may be other types using a Schroth system so if you know of an example please email us at LAA HQ via *engineering@laa.uk.com*** *(Photo: Schroth)*



(Below) **The problem with some of these Schroth harnesses appears to be that the latching mechanism can unlatch when it's under a consistent but varying load. Though the nature of the issue hasn't, at least at the time of writing, been fully disclosed, we're working closely with de Havilland Support Ltd, who hold the Type Responsibility Agreement (TRA) for the Bulldogs and the DH-82s.** *(Photo: Schroth)*

Schroth Harness. After reading through the SIL, it's clear Schroth are concerned that some types of rotary buckle can suffer a failure of the latch mechanism during aerobatic manoeuvres. Of course, this could lead to a situation which doesn't bear thinking about, even if you do wear a parachute! De Havilland Support are particularly involved with this issue because many Tiger Moth aircraft have had these harnesses fitted as replacements for their original Sutton or 'Z' type harnesses. A few are also fitted in Bulldogs.

There are a number of Airworthiness Directives affecting aircraft harnesses, principally their life, and these directly affect LAA aircraft types which have been accepted, in the past, for a Certificate of Airworthiness. However, ensuring that a harness doesn't diminish, just because an aircraft is only operated as a 'Permit' type, is crucial. There are two main areas of concern with harnesses: materials degradation and mechanical wear, the effects of which can be difficult – in some systems, impossible – to inspect for, hence the need to 'life' some harness types.

With regard to materials degradation, it's essential that the whole harness system is inspected. Take a close look at the fuselage-to-harness attachment points and check closely for corrosion or any sign of fatigue in this important, but often overlooked, connection. There, the fabric part of the belt often bends through a large angle and probably moves about quite a bit during normal operation, so it's essential to check both sides of it carefully. If you aren't sure, remove the belt and inspect it carefully on the bench, under a good light.

I've often found, during routine inspections, that a belt has, at some point in the past, been removed but not refitted correctly. So during your inspection don't assume that it's going through the buckle in the correct sequence. Sometimes it's difficult to work out which way the belt should be threaded through a buckle. An incorrectly folded buckle could fail, if called upon to provide high levels of restraint.

At the time of writing, we aren't sure of the exact problem that's led to the issuance of this SIL, in which Schroth explain that: *It has been noted that in some cases it is possible that an individual latch of the restraint system could be unfastened from the buckle without prior activation of the release mechanism.*

Investigation has shown that this effect is caused by certain patterns of load changes that typically occur during acrobatic flying, in combination with very tightly attached belts. Such operating conditions may result in unusually high abrasive wear of the retaining pins and/or latches which, in turn, creates the conditions for the inadvertent release of an individual latch.

LAA Engineering, as I explained earlier, has placed an Airworthiness Alert on our website which, as well as describing the situation, provides a link to Schroth's SIL. We've also written to all Tiger Moth and Bulldog owners, advising them of the problem, suggesting they take Schroth's advice and not perform aerobatics if their aircraft is fitted with a harness model which may be affected.

VANS RV-6: ELECTRICAL FUEL PUMP FAILURE INCIDENT

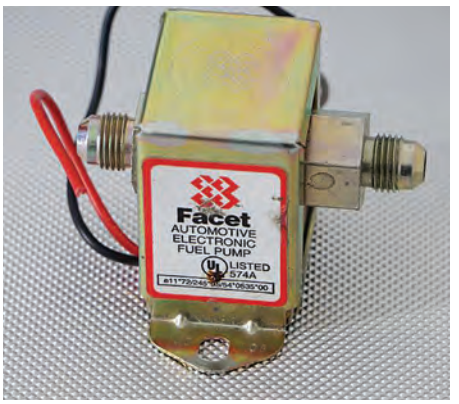
I've learnt, since working here at LAA Engineering HQ, that at least as far as kit-building aircraft is concerned, there's no such thing as a one-size-fits-all circumstance. Perhaps expecting such a thing in any area of our lives is a mistake in the first place.

I've had the privilege of building a few aircraft over the years – some from plans, one from a kit – and to be honest, there was always a bit of pressure on me, albeit personally generated, to get the aircraft flying as soon as possible. This expeditious route to first flight is true of quite a few kit-built machines being assembled within the LAA system. But for some, time isn't an object – a year here, a year there, who's counting anyway

The aircraft this item relates to is a good case in point. The final builder, LAA'er Richard Parker, acquired an unfinished Van's RV-6 in 2012 and, in a two-year spurt of energy, finished the aircraft off. The kit was first registered with us in 1998, but life – sadly, sometimes also death – gets in the way of a big project like building one's own flying machine.

LAA Engineering finally issued a full Permit to Fly for this machine in March 2015 and Richard, along with his son, then enjoyed over a year of trouble-free flying. For those of you who aren't aware of the type, the Van's RV-6 is an all metal, two-seat, single-engine, low-wing monoplane. The aircraft can be assembled as a nosewheel machine, the RV-6A, or in the original configuration, as a taildragger. Richard's machine is the latter.

The RV-6 was the first aircraft in the popular Van's RV series to feature side-by-side seating and a nosewheel option. The type was first flown in 1985. It's a very popular LAA type – there are over 140 RV-6s on our books, 39 of them still under construction. Together with the later RV-7, these side-by-side two seaters account for over three hundred aircraft in the LAA fleet and, if incidents with particular types are a good measure – and I see no reason why it shouldn't be – the lack of incidents and accidents these machines present suggests a very successful and safe sports aircraft.



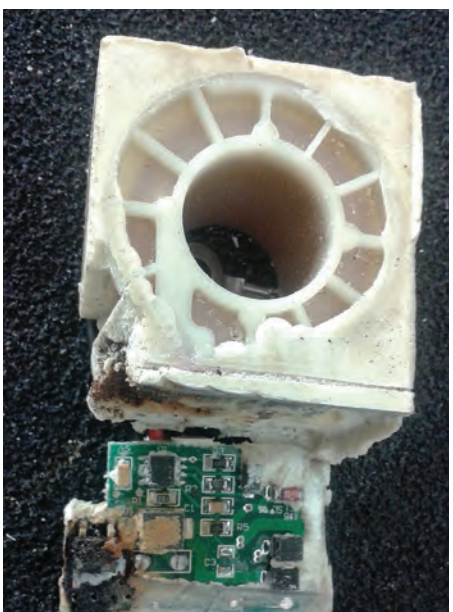
(Above) **A consistent fuel pressure in an aircraft's fuel system has always been important, perhaps more so today for those using motor fuels which have a higher vapour pressure, to avoid the dreaded vapour lock. Many of you will recognise this relatively low-output Facet fuel pump – they were supplied as standard for Van's aircraft in the 1990s. These simple electrical piston pumps were designed to offer a back-up, just in case the engine-driven pump fails, and current advice suggests that these back-ups should be switched on during operations below 1,000ft.** *(Photo: Richard Parker)*

Just before Christmas last year, Richard decided it was time to give his aircraft a bit of a shakedown. He doesn't like the aircraft being on the ground for too long and sets himself a target to fly it at least every two weeks. He keeps his aircraft at Staverton – or in these market driven times should I say Gloucester – airport and it was from there he intended to depart for a local flight one morning.

After obtaining taxi clearance, he taxied to the hold for runway 27 and conducted the usual power checks, which showed that the engine and all the instrumentation was working as it should. Powering down after a check of the magnetos, he started his pre-flight check and, as normal, he checked his fuel pressure ›

(Above) **When aircraft electrical engineer and LAA'er Richard Parker switched on the electrical stand-by fuel pump fitted to his Van's RV-6, as part of his pre-take-off actions, he was surprised to find that he could soon no longer see anything, as the cockpit had filled with a "black, acrid smoke". Needless to say, he shut the aircraft down straight away and exited as quickly as possible. The reason for the smoke was tracked down to the expanded foam 'potting' compound getting too hot because of a PCB failure. This picture shows the bare bones of his failed pump and, as you can see, the shuttle piston, which contains a non-return-valve (NRV), is forced against a spring by an electro-magnet, while the inevitable electronic timing system is 'potted' in foam *(at centre in the picture).*** *(Photo: Richard*

(Below) **It's clear that the source of the heat which caused the fuel pump to change its role to a 'smoke generator' lay in the failure of the electronic timing mechanism. We're waiting to hear back from the manufacturers of the pump but aren't holding our breath for a response. During previous tests this pump had a running current of about 3.2 amps, while the identical replacement pump, supplied by Facet, draws only 1.2 amps so it may be that this failed pump has been living with a problem for some time.**
(Photo: Richard Parker)



then switched on the electrical back-up pump. Expecting to see the usual slight pressure rise on the gauge, letting him know that the electric pump was indeed working, he was surprised that the gauge was no longer visible. The cockpit had filled with a very dark and rather pungent-smelling smoke.

Naturally, Richard immediately shut down the engine, tried to alert the tower as to his predicament and then left the aircraft – all in pretty short order. As it turned out, nobody in the tower picked up his frenzied call for help – later it was thought that a pilot flying in the downwind had over-spoken the PAN call. In any event, somebody spotted the smoke billowing from the cockpit but by the time the firemen got there it had cleared, and the aircraft was towed back to the hangar.

Richard is an aviation electrical specialist, though he didn't need to be in order to work out that the electrical fuel pump had failed in some sort of catastrophic way. He soon had the pump out of the aircraft and in bits on his workbench – you can see the pictures he took showing what has happened.

Richard explained to us that the amount of smoke produced by the burning PCP components and the scorched foam appeared completely disproportionate to the volume of smoke evidenced. I wrote to the manufacturers of the pump asking them whether they had any idea what may have gone wrong but, as of writing, they haven't responded.

Richard pointed out that, during an earlier test, his pump was drawing 3.2 amps, which he thought rather a lot for such a low-power device. He's now received his new pump, which draws just over 1 amp. He came to the conclusion is that the old pump was in some way defective.

This is the first report like this that we've received and I have no doubt that there are many hundreds of pumps like this one currently in service in LAA aircraft. Consequently, I'm not proposing that we should be overly worried as a result of this single pump failure. However, the lesson might be that if you discover an electrical device is using more energy than it should, then there could be something wrong. And that's good reason enough for the matter to be investigated.

ALPI PIONEER 300: UNDERCARRIAGE ISSUES INVESTIGATED

In our last issue, LAA'er Roger Andrews wrote a really interesting article (*Wheels Up!*, p44, February 2017) about how he coped with an undercarriage system failure on his Alpi Pioneer 300. Roger's article generated a few comments from other pilots, as do most operational incident-related tales.

Hindsight is a wonderful gift, nevertheless, there are a few lessons from this particular incident that I'd like to share. Roger wrote the piece, naturally, from his perspective as the pilot in charge and he did a really good job of dealing with this unexpected in-flight emergency. After all, any accident that you walk away from is just a minor upset in the stream of life. As it turned out, he made such a good job of landing the broken aircraft that the repair costs are very low.

However, we've been looking at this particular undercarriage failure from a rather more engineering-related viewpoint because, as has been recently pointed out to us by the Air Accidents Investigations Branch (AAIB), there appears to be a cluster of Pioneer-related undercarriage 'issues'. Naturally, that prompted the question "do we need to look into this?"

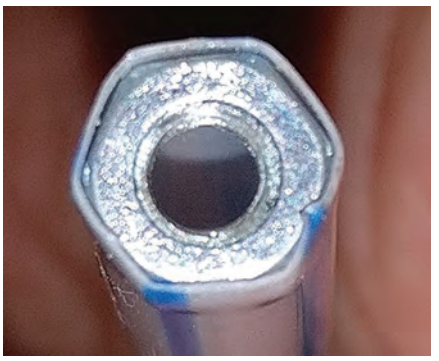
There's quite a bit going on at the moment with Alpi aircraft. A new UK agent has been appointed by the Italian manufacturer, namely the Earls Colne-based Socata TB series refurbishment specialist, Cavendish Aviation. Their new 'Alpi' man, Matt Phillips, is just organising the purchase of a new demonstrator aircraft that they'll build as a kit. Cavendish has big plans for the Pioneer and, although it's all a bit hush-hush at the moment, it's looking likely that there may be a couple of new models from the Alpi stable on the horizon. At this moment in time, there are basically three types of Pioneer available to kit build; the Pioneer P200 microlight; the P300, a two-seater and the P400, the four-seat variant. The LAA database shows that we have 68 Pioneer aircraft on our 'books', over 50 of these are the sporty two-seat P300s.

Whenever we get a report of an incident, one of our tasks is to try to tease-out from our records whether it can be related to another that's taken place in the past – in other words, is there a trend developing? The three, all very

A STRAW-BASED TOOL FOR HARD-TO-ACCESS PLACES

Here's a good idea sent in by LAA'er Peter Turner, who writes: ***Hi Malcolm, I'm sure you see no end of these 'bright ideas' so I thought I would add this one to the list. Problem: mounting steel cutting template for cutting an aperture for a new 8.33 radio. This required using 3mm bolts with nuts to be fitted behind the panel in a 150mm recess, out of reach. The attached tool proved very effective – it held the nut, located the bolt, and provided a 'universal joint' for easier use.***

What a good idea, thanks Peter!
(Photo: Peter Turner)



(Above) **In 2010 Alpi introduced a spring bias to the over-centre mechanical undercarriage lock on all P300 aircraft. Alpi issued a Bulletin (SB 2010-02) to let owners without springs know that they springs were retrofitable – in fact, the company recommended their fitment. LAA Engineering has issued an Airworthiness Leaflet requiring all P300 aircraft to be fitted with these bias springs at (or before) their next undercarriage retraction check.** *(Photo: Alpi Aircraft)*

recent incidents that raised the eyebrows of the AAIB investigator relate to a failure of the undercarriage in some way or another, so further examination is very definitely necessary.

Yours truly's first job is to take an historical look back through the accident statistics involving Pioneer undercarriages. Since the type's inception, in 2005, there have been fourteen incidents in total, with eleven involving the P300 and the remainder the P400.

The P300 and the P400 essentially have the same undercarriage system design, although naturally that of the P400 is mechanically rather beefier, to take the extra weight. Looking more closely at the individual reports, four of the fourteen involve operational events, either heavy landing or runway departures on landing. The other ten all involve an unexpected mechanical failure, normally related to either incorrect undercarriage adjustment or abnormal position light indication.

The LAA last looked at this type's higher than expected undercarriage failure situation back in 2010, when it became clear that the single, green 'down and locked' light wasn't sufficient to let the pilot know what was actually going on with each gear leg. The original design took the information that the undercarriage was down from a single microswitch located at the electrical motor powering the gear movement – a power failure to the motor meant that the indication lamps would also fail.

The LAA issued an AIL requiring that a factory-supplied 'three greens' kit be installed before the next Permit renewal inspection. This kit ensured that each light only illuminated when the undercarriage was mechanically locked down, as the light was controlled by a microswitch at each undercarriage over-centre strut. The other feature of this kit was that it requires a separate power supply, so a failure in the motor circuit wouldn't disable the indication system.

Another issue with the Pioneer's undercarriage mechanism is that, unlike most retraction mechanisms, each of the three legs are mechanically connected

(Above) **Putting aside pilot error, there are two primary reasons why retractable undercarriages fail on small sports aircraft. The first is a mechanical failure somewhere in the leg, or its associated supporting structure, while the second is that the system becomes out of adjustment. The out-of-adjustment issue is discussed in the main feature – this picture is an example of a mechanical failure. A failure like this can be because of repeated overload – for example, operations off very rough airstrips or the result of a single heavy landing. In either case, the way to avoid a complete failure is to spot the first signs – in other words, regular inspections. This crack, travelling quietly round the weld, spotted by an inspector during a post-heavy landing check, is a good case in point. If the aircraft had continued operating, the leg would have failed completely, a much more expensive repair exercise.** *(Photo: Gary Masters)*

together. This is because 'up and down' movement is afforded by a single electrical motor working through a rather clever gearbox. The rotational force is converted to a pull-or-push movement via three Acme-threaded drive rods – one for each undercarriage leg. Aircraft engineers used to setting up retractable undercarriage systems immediately saw the problem – if one undercarriage leg became slightly out of adjustment for any reason, the others would also be affected.

A further issue was that the Acme thread itself is rather coarse, so a small rotational adjustment made a big difference at the operating end. Alpi has now redesigned these drive rods, so finer adjustment of individual over-centre struts can be made. In addition to this, Alpi has also introduced a spring to the over-centre strut so that it's much less likely to fail, even if it does go slightly out of adjustment.

It should be remembered that the Alpi Pioneer is principally an aircraft made of wood, though the 'mechanics' of the undercarriage retraction system are metal. Wooden aircraft are very prone to dimensional changes due to shifts in the local environment, especially humidity, while water doesn't affect the size of metals, except when they corrode!

Checking the undercarriage is especially important during the first few hours of the ›

(Photo: Toby Wilcox)

(Above) **Correct adjustment of the length of the screw jack on the Alpi Pioneer operating rod is essential to ensure that the over-centre strut goes fully over-centre when the undercarriage is lowered. One problem is the adjustment of this rod has been rather too coarse. The length of the rod is changed by removing the attaching bolt and rotating the shaft through 180°, one way or another. This picture shows the original design, on the left, and the later improvement. Notice that the minimum adjustment is now afforded by turning the shaft through 90°, halving the length of the increase or decrease.** *(Photo: Toby Wilcox)*

(Above) **Here we show the general arrangement of the Pioneer P300 main undercarriage. This type of drag-link suspension is effective for absorbing impact loads applied roughly perpendicular to the lower swinging arm, but less so for those applied directly upwards. The geometry of this type of arrangement means it's especially important that the shock absorber is functioning correctly and not over-pressured. When we tested this leg, we found that shock-absorption wasn't that good during a drop test but was good with a fore and aft-loading case. Note the position of the brake disk attachment bolts, as discussed in the main feature.** *(Photo: Malcolm McBride)*

(Above) **This picture shows the P300's undercarriage in its 'jammed' position. The pilot, LAA'er Roger Andrews, wrote-up the tale for the February edition of *LA*. At the time of writing the story, Roger was convinced he'd hit an obstacle – perhaps just a big undulation in the ground – during the take-off run. However, further investigation has revealed other issues with this leg which may have contributed to the failure.** *(Photo: Roger Andrews)*

(Above) **We showed this shock strut, from the P300 which suffered undercarriage impact damage during take-off, to Alpi Aviation's Corrado Rousilon. He immediately exclaimed that the reason for the wheel jamming – if it did – was that the head of the bolt attaching the brake disc had wound itself out and contacted the side of the shock-strut! Take a look at the tell-tale marks in the picture and you'll see what Corrado means. We may never know whether this undercarriage failed because of a structure failure of some sort or ground impact – perhaps it was a combination of both.** *(Photo: Malcolm McBride)*

aircraft's life, this is due to the inevitable settlage, both in the metal joints of the mechanism and the wooden superstructure.

The point of these descriptions is to remind both owners and inspectors of the Pioneer undercarriage system that it needs very regular inspections, to ensure it remains correctly adjusted, and this must include a retraction check. With regard to this latter point, the LAA has asked Alpi to design a removable jack pad to allow ordinary hangar-type jacks to be used to get the aircraft off the ground, so that the system can be checked more regularly, and the company has promised to look at this as an option.

So, what of our three recent failures? Well, between them, they sum-up not just the issues surrounding the Pioneer undercarriage system, but also the wider points affecting us all, especially at this time of year, when we're all thinking about dusting off our machines to go flying. So, to take the incidents in order:

The first incident involved a new Pioneer P400 during its test-flight period. Briefly, the nose gear green light failed to come on when the undercarriage was selected down, the pilot cycled the system but it wouldn't illuminate. The Pioneer has a mechanical wind-down capability via a crank that's permanently installed in the undercarriage drive gearbox. The pilot managed to get 'half a turn' on that, and although the green lamp still wouldn't come on, it did look like the nose undercarriage was fully down. The pilot alerted the fire crew on the ground and conducted a perfect flapless landing, but the nose undercarriage failed when it contacted the ground.

Looking through his log-books, the pilot noted that the aircraft had flown about 14.5 hours thus far during testing and, counting up, he'd completed 34 landings. The lesson here is that it would have been sensible to get the aircraft up on jacks after, say, ten landings, to ensure that the undercarriage remained correctly adjusted. As a wider point, the first few hours of an aircraft's life are critical to its eventual longevity and thorough inspections before every test flight must be the order of the day.

The second incident, as discussed earlier, relates to the main undercarriage leg failure suffered by our February issue feature writer, Roger Andrews. As you'll likely remember if you read the story, Roger thought that he hit a bump during take-off, although everything appeared normal until he tried to lower the undercarriage at his destination. Roger, in his report, relates what happened next:

On reaching our destination, Bidford gliding site, the gear was selected down but we only got green lights from the nose and left leg. We continued the approach while we made an attempt at recycling but the circuit breaker tripped so we went around.

A manual retraction was carried out and the Circuit Breaker (CB) was reset for conformation, but the blue (electric motor operating light) was illuminated. The CB was then tripped again and a manual lowering carried out. As the power supply for the green lights comes from the same supply as the motor, the CB was then reset for conformation of leg positions with the same result as previously.

Having diverted to Wellesbourne, they did a fly-by of the Tower. Roger continues:

They confirmed that we did not have a normal gear configuration so we retracted the gear and requested another fly by because there are no positive indications, in the cockpit, that the gear is retracted.

On this occasion they reported that the starboard leg was abnormal. The leg was extended but the wheel was offset by 45°. The port leg was also reported to be extended.

As you can see from the pictures and accompanying text, there's some question over the reason for this undercarriage leg failure. Certainly, when it was inspected closely, the leg contained a pre-existing crack, which probably didn't help with the survival of the leg when it hit the bump. However, the big lesson here is that the undercarriage green lights were incorrectly wired, in so far as a failure in the gear motor circuit meant that undercarriage indication would also be lost.

Failure three? Well, this was another nose undercarriage failure but, happily, in this case we'll put it down to a start of season PIO (Pilot Induced Oscillation) during the previous take off (and perhaps the landing). Earlier in this feature I've mentioned the very real need to carry out a check flight when you haven't flown for a while so I shan't labour that point any further…

Meanwhile, I notice that I've run out of space and time so, with all this lack of recent practice in my mind I'll (rather more carefully than normal) wobble my way home on the Triumph. See you next time, and until then, fair winds. ■

(Left) **We stripped the undercarriage leg of the P300 which suffered a main undercarriage leg failure *(shown far left)*. During a close check of the fracture face, we found that the leg appears to have been failed for some time, as can be seen by the embedded corrosion *(shown in close-up, at right)*.** *(Photo: Malcolm McBride)*

(Left) **Even though I spent quite a few years looking into the reasons why an aircraft incident or accident occurs, and I should be quite used to pictures like this, my shoulders still drop when confronted with this type of sad spectacle. After all, it'll be a very expensive business to get this aircraft airworthy again. It's clear that the nose undercarriage suffered a sudden failure and that the propeller was rotating when it hit the ground.** *(Photo: Andrew Dayani)*

(Above) **This picture shows the nose undercarriage leg's connection with the nosewheel fork assembly. Close inspection revealed that the two front bolts have been torn out of their attaching threads because of pure overload which, in turn, allowed the fork to rotate rearwards, ripping the rear bolts through the attachment. This is the first time we've seen a failure of this kind in the UK from the Pioneer fleet. However, overload failures like this do normally suggest a high nosewheel impact, perhaps by inadvertent 'wheelbarrowing'.** *(Photo: Al Greensmith)*

(Above) **This picture of the firewall of the P300 which suffered a sudden nosewheel failure shows clearly that the over-centre system *(shown centre-right)* was intact at the moment of failure. Note that the firewall has been pushed rearwards due to the force applied when the leg failed.** *(Photo: Al Greensmith)*

LAA ENGINEERING CHARGES – PLEASE NOTE NEW FEES HAVE APPLIED SINCE 1 APRIL 2015

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**
Modification application	
Prototype modification	minimum £60
Repeat modification	minimum £30

Transfer	
(from CofA to Permit or CAA Permit to LAA Permit)	
Up to 450kg	£150
451-999kg	£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

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