KEEPING A LID ON MY BLOOD PRESSURE

Medical before-flight check, logbooks alert, finding the less than obvious... and dealing with reluctant undercarriages.... all in a month's work

With **Malcolm McBride**
Airworthiness Engineer

Good day to you, and welcome to this 'fireworks' edition of Safety Spot. I hope that you, and those that are close to you, are all in a good enough shape to still think that life is pretty wonderful. Just lately, mine has been a little too frenetic for comfort, a situation exacerbated by an enforced wee holiday in Cornwall – a present from a well-meaning (but misguided) relative – and a number of events here at Turweston and, of course, the LAA AGM, from where I've just returned.

I'm not going to complain, especially as my foray into 'Poldark country' turned out to be a fabulous adventure, but I am wondering what my blood pressure is going to be like first thing Monday morning when I present myself for the annual medical, especially as I'll be rushing about to get things done here at Turweston so that I can get to London for the LAA's 70th dinner party.

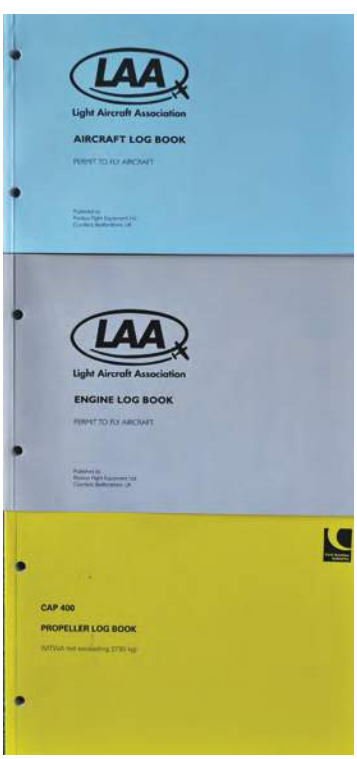
Whilst we're on the subject of medicals, well done to the CAA for listening and taking quick action regarding the over-abundant reasons for not being able to self–declare one's fitness for aircraft in the last iteration of the application form. The original intention, which seemed to have got lost in the post, was that a private pilot's minimum personal fitness level should be the same as that required for an ordinary motor car licence: a concept the CAA has now put firmly back on track.

One of the (many) good things about working at LAA Engineering's HQ here at Turweston aerodrome is that one's tasks tend to be very varied, such is life I suppose in a small team. So, when our CEO, Steve Slater, asked whether I would be able to look after the 'sound & Light' for an evening talk given by a WWII Lancaster ace here at the Turweston conference centre, I happily agreed. I'm really glad I did as it was a really inspiring talk. This picture shows Rusty Waughman taking a question, one of many, from a member of the Oxford LAA Strut. *(Photo: Malcolm McBride)*

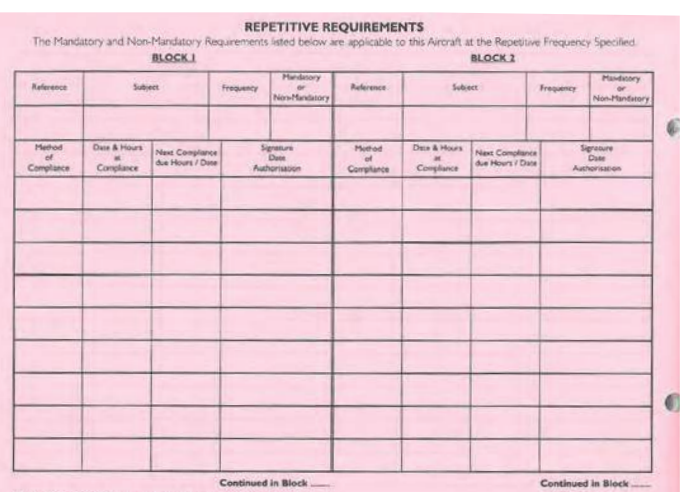
Mind you, just because you don't have 'big brother' checking you out, it doesn't mean that you should ever consider flying an aircraft if you're not in feeling in fine fettle. Part of everybody's pre-flight check should be a personal health audit so once you've had your walk-round and made sure all is in order with the aircraft, ask yourself whether you're actually OK to captain your flying machine. A person's physical and mental state (a continually variable set of functions in my case) has a great effect on performance levels, especially if you need to act quickly in a difficult situation. If you're not feeling well, don't risk it, you'll probably feel better tomorrow.

I recently had the pleasure of listening to Rusty Waughman DFC at a recent LAA Oxford Strut event held here at the LAA Conference centre, plus a very enjoyable second helping at the AGM as he gave a talk about his career in the RAF as a Lancaster Bomber pilot during WWII. Both talks were fabulous and thought provoking.

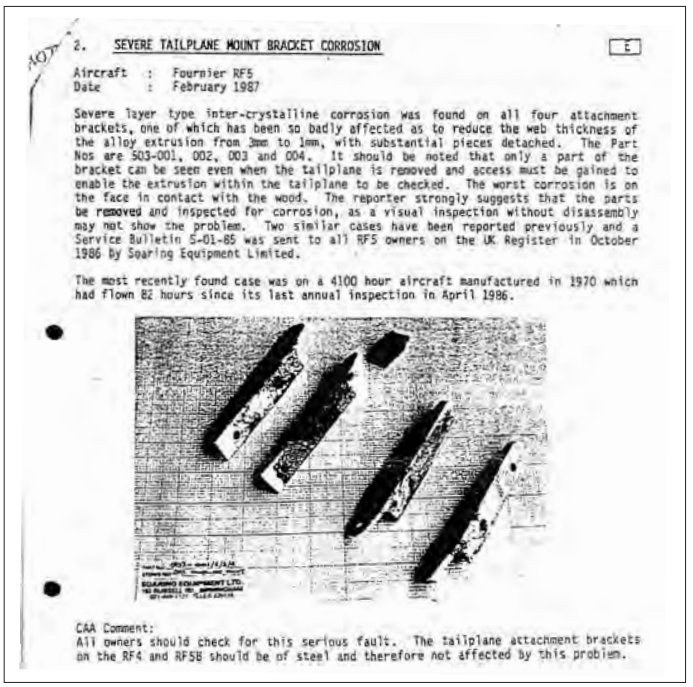
Whilst we're skimming across matters



(Left) **A 'full house' of aircraft logbooks as supplied to members from the LAA online shop for their aircraft, the engine and airframe log books have been especially designed to accommodate the sign-out requirements of an LAA administered Permit aircraft. As you can see, each individual logbook is hole-punched and, for a small extra cost, a fancy binder can be purchased so that you can keep them all neatly in one place. It's very easy to get sloppy when it comes to keeping logs up to date so don't get tempted into lazy-bones bad practice. As far as log books are concerned the airframe, engine and, if appropriate, propeller are treated as separate items.** *(Photo: Malcolm McBride)*



(Above) **One of the most important areas in both the engine and airframe log books is the Repetitive Requirements or, in the trade, 'pink pages'. This is an area where an operator should list inspections that fall outside the normal scope of an annual maintenance regime; a good example of this might be an inspection advised (or required) by a Service Bulletin, Service Letter or, in the case of an LAA Permit aircraft, an Airworthiness Information Leaflet (AIL) or Mandatory Permit Directive.** *(Photo: LAA Library)*



2. SEVERE TAILPLANE MOUNT BRACKET CORROSION [E]

Aircraft : Fournier RF5
Date : February 1987

Severe layer type inter-crystalline corrosion was found on all four attachment brackets, one of which has been so badly affected as to reduce the web thickness of the alloy extrusion from 3mm to 1mm, with substantial pieces detached. The Part Nos are 503-001, 002, 003 and 004. It should be noted that only a part of the bracket can be seen even when the tailplane is removed and access must be gained to enable the extrusion within the tailplane to be checked. The worst corrosion is on the face in contact with the wood. The reporter strongly suggests that the parts be removed and inspected for corrosion, as a visual inspection without disassembly may not show the problem. Two similar cases have been reported previously and a Service Bulletin S-01-85 was sent to all RF5 owners on the UK Register in October 1986 by Soaring Equipment Limited.

The most recently found case was on a 4100 hour aircraft manufactured in 1970 which had flown 82 hours since its last annual inspection in April 1986.

CAA Comment:
All owners should check for this serious fault. The tailplane attachment brackets on the RF4 and RF5B should be of steel and therefore not affected by this problem.

(Above) **Because aircraft have very long lives and, often, many owners, important safety information can get mislaid. Here is a good example of a technical issue highlighted in February 1987 by GASCo concerning corrosion worries in the tailplane mounting brackets of some Fournier RF-5 aircraft. This rather unofficial alert mentions a Service Bulletin (S-01-85) which was mandated by an Airworthiness Directive from the CAA (AD85-207). Because the LAA enjoys the company of 10 RF-5s on its books, though only four are currently flying, we're actively collating all historical technical information on this type.** *(Photo GASCo)*

(Above) **LAA Inspector David Bland sent us this picture showing a tailplane bracket he's recently removed from an RF-5 under repair in his workshop. I hope that you can see just how relevant the earlier (1985) safety bulletins were. Corrosion like this on any aircraft fitting is totally unacceptable not just because of the strength reduction due to material loss but also that corrosion pits formed act as 'stress concentrators' which will lead to cracking.** *(Photo David Bland)*

(Left) **The RF-5 tailplane mount in situ. It is essential that regular inspections are made on metal fittings for corrosion and, whilst complete removal may not be necessary on an annual basis, an aircraft's Tailored Maintenance Schedule should include a point where brackets like this are removed for a close look.** *(Photo David Bland)*

medical, Rusty told a tale of one time when one of his crew flew when he was ill, and the rest of the crew wished he hadn't. Briefly, in the morning before an evening raid, the crew member told Rusty that he'd been feeling rough all night with an upset tummy. Rusty explained that he should stand-down but, for fear of being branded with the awful stigma of LMF (lack of moral fibre) if he didn't go with his team, he persuaded Rusty to let him go on the mission.

Rusty explained that, in an unpressurised Lancaster you didn't need an altimeter to tell how high you were. "At 8,000 feet your tummy started to rumble as a matter of course. At 10,000 feet...". Well, I'll leave this to your imagination. I won't go into the details of this rather messy mission, you'll need to attend one of Rusty's talks to hear the finer points, but suffice to say that the performance of this particular crew member wasn't good, especially after the inevitable effects on his bowels occurred following a climb through 20,000ft, perhaps as predicted by Boyle's Law.

Like I suggested earlier, if you don't feel well, don't fly. Under these new self-declaration rules the responsibility in deciding whether you're fit enough to fly firmly rests with you.

UPKEEP OF LOGBOOKS

You will also note, in you scan of the pictures, that I've added a couple to remind us of the very great need to keep accurate logbook records of any maintenance activity surrounding your aircraft. We've had a few examples recently, quite a few actually, where new owners have had to put their hands in their pockets to have repeat strip inspections of their aircraft because previous log keeping was so poorly carried out and the original results hadn't been recorded.

As an organisation, the LAA is working hard behind the scenes to provide each aircraft type with a database of all previously known maintenance issues. As many of these issues go back 50 or so years, well before the electronic 'information' era, you'll appreciate that this is not quite as straightforward a task as it might first appear.

As we work towards a point where each LAA aircraft will be maintained under its own Tailored Maintenance Schedule (TMS), information about 'other people's problems' will be a vital asset to the owner in the TMS's creation.

To make this easier, the LAA is working towards a position where each aircraft type will have its own Type Acceptance Data Sheet (TADS) which will offer useful and essential maintenance management information through a locally managed library link to each of the documents listed. Some aircraft already have a TADS. To see whether yours does, take a look at the Engineering section in the database; look for 'Aircraft Datasheets' under 'Data Library'.

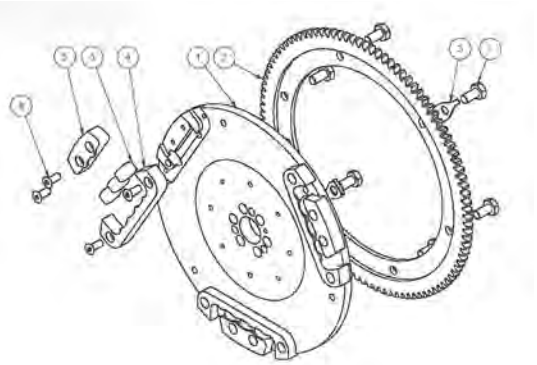
When we roll this system out more formally, hopefully next year, we'll be looking for your help to populate this information resource. As you can see from the photo, LAA Inspector Dave Bland is putting together a list of the various maintenance bulletins published for the Fournier RF-5 so very well done to him for that. His picture shows that the issues of corrosion between aluminium brackets and wooden structures is as real today as it was when the aircraft were first built.

JABIRU 2200 ENGINE – STARTER RING ATTACHMENT

I have always been taught that there is a distinct difference between maintenance and inspection activities. One, maintenance, is about doing and the other, inspection, is about checking. Naturally, as an aircraft owner, you'll probably see yourself as the managing director, chief cook and bottle washer to boot. But it is important, when you're looking after your aircraft, to understand the differences in the roles - and play each role appropriately when needed. A pre-flight check, for example and fairly obviously, is an inspection activity. Changing an oil filter is a maintenance activity, but making sure that the job has been done correctly requires the expertise of an inspector, so if you're changing the oil filter and then signing the aircraft out as fit for flight, you'll need to wear two hats.

Most aircraft maintenance organisations these days recognise these different roles and, quite often, the role of inspector is held by various individuals within the company's personnel structure. Often, if you own and maintain your own aircraft, the line between doing and checking can become blurred. If you do a job, naturally do it as well as you can but, after the job has been completed, change hats. With your inspector's hat firmly in place, try hard to pick out any fault in the job - perhaps the other you, with a different hat on, could have made a neater job of that wire-locking. Is it good enough or will you demand better from your alter ego.

Being self-critical is an essential element in being a successful pilot and aircraft owner/ maintenance engineer. What we all do ›



(Above) **A good example of a problem discovered during a 50-hour inspection on his Jabiru SP 430 microlight aircraft that would, had the component failed, most likely caused an in-flight emergency. You can see that connection between the starter ring gear and the flywheel has become loose and, because it's been moving about, has worn the connecting bolts nearly to the point of failure. Naturally the owner, LAAer Chris Pratt, pulled the assembly and replaced all the bolts. This is the first time we've had this problem reported to us. Chris noted that there was no sign of a thread locking compound having been used, though the Jabiru agent tells us that this component should have been locked using Loctite 620.** *(Photo Jabiru/Chris Pratt)*

is difficult and, without being too dramatic, often dangerous. Aviation in general bites the individual who accepts a sloppy approach.

I was very impressed when I spoke to LAA member and Jabiru microlight owner Chris Pratt the other day. Chris emailed me a couple of photos of a bolt that he'd just removed from the starter ring gear of his 2200 Jabiru engine. It was obvious that Chris had picked up a problem that was rapidly moving towards a complete failure of a structural element in his engine. Namely, the starter ring gear was very close to falling off the flywheel because the attachment bolts had all worked loose. It wasn't a completely obvious spot but it was found because he put his inspector's hat on and looked carefully at every connection and component on his engine – whether or not a specific inspection had been called up in the maintenance manual. I don't think that I've seen this failure previously, so I gave the Jabiru specialists a call to see whether they'd heard of this disconnect happening before. They confirmed that they hadn't.

Chris has operated his Jabiru now for the last 17 years and, as he pointed out, it's a very early example of what's turned out to be a fantastic little engine – and the early engines do have their issues. Chris' positive experience, over nearly 600 hours with this engine has a lot to do, in my view, with his fastidious attitude towards inspections, so I asked him to list some of the extra things he looks at during his 50-hour inspection. Here's his list:

1 Warm engine pressure differential check on each cylinder. I now have the last seven years' compression data on this engine.

2 Removal of silencer muffler to inspect all welds - slight crack in one weld found this year and repaired by Airweld.

3 Removal of the alternator stator 'star' to check the security of the flywheel to crankshaft bolts.

4 Cold engine torque check of cylinder head bolts and tappet clearance.

5 Remove distributor caps to check rotor security/condition and examine caps for cracks - both found to have hairline cracks last year and replaced.

6 All propeller bolts torque checked - Bellville washers fitted.

7 Thoroughly clean/degrease the engine.

8 Oil filter cut open and filter paper examined for metal.

Well done to Chris for this spot and thanks for taking the time to let us know about it, a problem shared...

It looks like this failure occurred because the original assembler of the engine didn't use a thread-lock when fitting the bolts and that, not surprisingly as this failing would be very difficult to spot, this omission wasn't spotted by an inspector before the engine was released to service. If you own a Jabiru engine then next time you have the cowls off, get your inspector's hat on and take a close look at your flywheel/starter ring gear bolts, just in case. Whilst you're at it, test yourself and have a good look around the rest of the engine; see if you can find a problem. I bet you do!

(Above) **I couldn't resist putting this picture of LAAer Dave Bishop's Kit Built Mk.26 Spitfire. You can see that the aircraft is on its approach to land, flaps and gear fully down. Dave has yet to fly the aircraft solo and his attempts to do so have been rather thwarted by technical issues post-build. The most recent problem involved bent undercarriage legs, caused during a 'gentle' ground-loop, is discussed in the accompanying text.** *(Photo: Barrie Jay)*

MK.26 SPITFIRE – UNDERCARRIAGE RETRACTION ISSUES

Certainly, one of the most impressive kit aircraft operating in the LAA fleet must be the Mk.26 Spitfire, but I've not met anybody who wouldn't agree that the aircraft itself is a complex build and, though not described as difficult to fly by those lucky enough to have flown the type, they are 'challenging' on the ground as would be expected with a taildragger with a narrow track undercarriage and not brilliant brakes.

This tale follows LAAer Dave Bishop's absolute determination to first build, then fly his own Mk.26. It's been a difficult build, taking nearly ten years to get the aircraft into the air, but the aircraft, as you'll read, is back in the workshop, probably for the winter, so that necessary improvements to the undercarriage can be made.

Regular readers of the excellent Light Aviation feature, Project News, may remember that this build was described in a four-part feature length story in the February 2015 through May 2015 editions of the mag; if you missed it search out your old copies, it's a great read. The Mk.26 wasn't Dave's first build, he was one of the first to put together a Europa Monowheel which he still regularly flies. His wife wouldn't let him build another aircraft in the living room so for this build he had to rent a workshop. I cannot say that I blame her, ten years peering around aircraft paraphernalia to watch your favourite TV programme might strain any relationship!

I have no doubt that the owner himself could, and might even yet, write a book about his experiences getting (and keeping) his aircraft into the air, sadly, in the small space available to me we'll only be able to skim across the surface. I am heartily impressed with Dave's attitude though, when something's gone wrong, and it inevitably will do during an aircraft build, there were no tantrums, he just got on and fixed the problem even when the issues weren't of his own making.

Dave first started building his kit in 2005 and, after nine years in the workshop, the aircraft flew from Lee on Solent in the careful hands of test pilot Chris Thompson. It was during these first September 2014 flights that this aircraft first crossed my continuing airworthiness 'radar' as, unexpectedly, during a high-speed run, the

imitation 'Spitfire' aerial broke away from the top of its fuselage mounting. This minor incident was soon fixed and test flying continued with the aircraft finally receiving its full Permit to Fly in June 2015 - more of less ten years after the start of the project.

As I've explained, the Spitfire wasn't Dave's first aircraft build ahd he's flown about 350 hours in the Europa but, even though mates of his reckoned that he'd be OK flying the Spit with, to quote, "all that wheelbarrow experience", David, quite sensibly decided to get some tailwheel training. He's been competent on the Chipmunk and the Cub for some time now and has recently completed VP propeller 'differences' training at Thruxton, so he's 'good to go' as one might say on the other side of the pond.

Regular readers will remember that we've had a few problems with the Mk.26 landing gear. Back in 2015 there was quite a dramatic wheels-up landing made at Leicester (Sibson) aerodrome by LAAer Andrew Thomas. This aircraft is back flying again now after some quite extensive repairs but, to cut to the chase, the reason for this failure was put down to a faulty electrical microswitch coupled with a slightly bent main gear leg.

But the very worrying issue was that the pilot, when faced with failing undercarriage system, couldn't lower the undercarriage because the emergency drop mechanism didn't work. You can read the full story of this event in the pilot's own words in the September 2015 Safety Spot which, as I'm sure you will know, is available online from the LAA website (just look for 'Alerts', then 'Safety Spot'). Incidentally, the AAIB's report into this incident, which like all AAIB reports makes interesting reading, is also online (look for EW/G2015/07/16).

Because of the failure of this emergency drop system, we wrote to all our Mk.26 Spitfire owners asking them to check their emergency drop systems before they next flew. Dave received his letter just as he was preparing himself to fly his aircraft for the very first time. He got his aircraft up on jacks and found that his emergency drop system didn't work either, so no first solo for him, at least until he could get the gear to work properly.

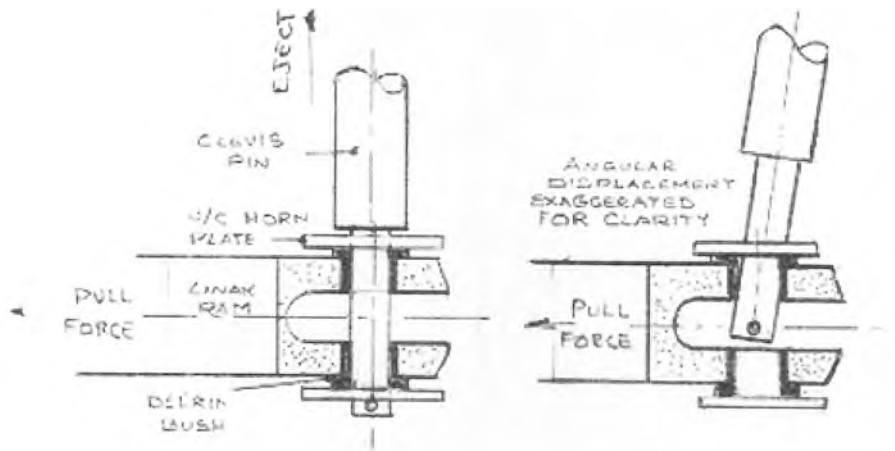
Dave began an investigation and wrote a report explaining the problems he found after carrying out a detailed examination:

This investigation was carried out in response to a request from the LAA to do checks following the "wheels up" landing of G-CENI in 2015. The aircraft had suffered an electrical malfunction of the undercarriage micro switches, and the emergency under carriage release system had failed to deploy.

As a starting point, my aircraft was jacked up, the port leg was raised about 45° and the emergency release handle was pulled. This functioned but Chris Thompson, who was assisting, had to make three really hard tugs on the cable to get the safety pin clip to release. Once this had happened, the spring-loaded clevis pin fired, and the undercarriage fell on to cushions so, apart from the large effort required to pull the safety pins out, all ok.

The same test was repeated with a leg angle of 80° and the pin again fired satisfactorily, though Chris was still not happy about the amount of effort required to release the safety pin. The leg was then raised to the fully up position and the test repeated. This time the pin did not fire when the emergency drop mechanism was operated.

(Left) **A worm's eye view of the post ground loop Mk.26 undercarriage leg in the fully retracted position; note the different clearance between the tyre and the wheel cut-out front and rear.** *(Photo Dave Bishop)*



(Above) **Dave, a very competent detail engineer, noticed that the undercarriage emergency drop mechanism wasn't working well and decided to investigate why. Here is a sketch showing one of the reasons why the release pin, which connects the electrical motor drive unit to the leg itself, became jammed halfway out during an emergency drop test: the material in the bush (which Dave thinks is Delrin) isn't strong enough to resist the side loads in the pin created when the pin is halfway out. Dave discussed this with our Design department and it was agreed that the Delrin bush could be replaced with a stiffer bush made from phosphor bronze.** *(Photo Dave Bishop)*

(Left) **Dave's new bush as fitted to the actuator with the connection pin in place.** *(Photo Dave Bishop)*

The build manual states that "some energetic manoeuvres may be needed" to release the wheel, but no amount of lifting the wheel upwards by hand would get the pin to fire, so I have to conclude that if my aircraft had been faced with the same predicament as G-CENI, the outcome would very likely have been the same.

What was apparent at this stage was that the wheel was retracting to a point where the tyre was only just clear of the inside wing skin, so there was no upward backlash available to overcome the considerable residual friction in the clevis pin. Furthermore, I had adjusted my wheel aprons to very slightly contact the under skin of the wing with soft tadpole rubber to try to prevent airflow tearing the doors open.

So began a very detailed examination of the undercarriage emergency drop system on this type. We discovered that there were three reasons, either singly or in pairs, why this mechanism didn't work. The first was that the safety pins, the primary release system operated by the pilot, were far too stiff for the pilot to safely be able to operate in flight; this pin was modified to make it easier to pull out.

The second reason, one not uncommon with electro mechanical undercarriages on small light aircraft, is that the mechanism is very sensitive to mis-rigging. In the case of the aircraft that had to do a wheels-up, it was later found that the main gear legs were rigged so that the locks were under too high a load when the undercarriage was in the fully up position, so high that the release pins wouldn't slide.

The third reason, found by David, was that the nylon bush, fitted to some but not all the UK machines, was distorting when the ›

pin was half out; the pictures show David's fix.

After much fixing and adjusting, David had got his undercarriage working perfectly both in normal operation and in the emergency drop situation - sounds like there's no reason why he shouldn't take to the skies. Duly, a test flight was made with Chris at the controls in the front seat and Dave, as observer, squashed into the back; though the emergency drop wasn't tested in the air the undercarriage was cycled a few times at different speeds and worked perfectly. Dave picks up the tale:

On return to the hard Runway 23 at Lee on Solent, an unexpectedly strong cross-wind had developed. Chris put the aircraft down neatly but, as the roll-out continued he found it increasingly difficult to prevent a left curving turn developing, even with right brake applied.

Eventually, a controlled exit left departure occurred at slow speed onto the adjoining grass. There was a small bump as we transited the tarmac/grass intersect, but this was nothing like landing on a bumpy grass runway. The engine remained running and we stopped in about two lengths.

The Tower called asking if we were ok or needed assistance, but we were able to taxi, return to the hangar and put the aircraft to bed.

For all sorts of reasons Dave wasn't able to get down to the aircraft for a few weeks so when he finally managed to get to his aircraft he decided to do a bit of 'hanger flying' to make sure that he was fully up-to-speed 'systems-wise' before taking to the air.

Dave continues:

I jacked the aircraft to work through a simulated first flight routine: instruments, seat belts, dummy start-up, take off, climb out, U/C retract and propeller set.

"Up Undercarriage" was selected both sides after my imaginary take-off and as the gear motored up I was just thinking about setting the propeller for a cruise-climb. Then I heard an awful graunching noise which came from both wings and the undercarriage electrical circuit breakers "popped".

Once I'd got out of the cockpit I found that the radial tread groove in the tyre had caught on the wheel-well skin at the forward edge of the undercarriage bay and the wing skin had "pinged" into the tyre groove. Selecting U/C Down and resetting the breaker didn't work, selection simply popped the breaker again. In fact, to free both legs I needed the assistance of a couple of friends.

There is no doubt in my mind that I was extremely fortunate not to have found myself on my first solo flight with an emergency with two stuck-up wheels. Alternatively, Chris could easily have been re-positioning the aircraft to Goodwood for me as planned, or with me as passenger, and walked straight into this one!

Clearly, the ground-loop that Chris and David suffered had bent both the undercarriage legs. David iss right, had he flown the aircraft like this he would have ended up having to land his machine wheels-up: not the sort of end to a first flight you'd really wish on anybody. I think that everybody agrees that these early Mk.26 legs are marginal strength-wise, so David has set about designing a modified leg from stronger material. I noticed that his Mod application came in just a couple of days ago so, well done to him.

Lessons learnt. Mm, a few which I hope you've picked up, but to précis: check retractable undercarriage systems regularly, both visually on the ground and operationally on jacks. Aircraft structures, especially new aircraft, settle slightly after manufacture and with undercarriage mechanisms like the ones we see on many sports aircraft type, basically lever operated electro mechanical systems, it doesn't take much movement for them to go out of adjustment. I like the idea of hangar rehearsal; personally, in the days when I needed to learn checklists by heart, I preferred the bath where I could visualise a flight.

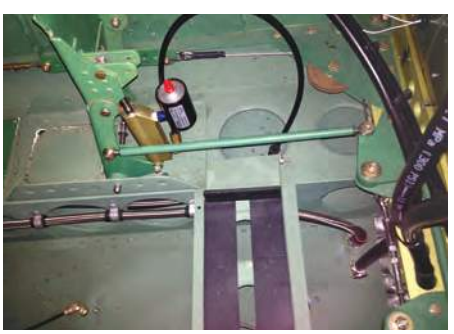
Certainly the biggest thing to learn, perhaps by a country mile, is that if ever you suffer an unexpected runway departure (ground loop!) or a heavy landing then, before you fly next, check the aircraft out thoroughly. You never know what you might have broken or bent.

EUROFOX – UNDERCARRIAGE FAILURE

So, as we very nearly reach our *Safety Spot* word limit, I just have to let you know about a rather well-publicised incident a couple of weekends ago at the Dorset Gliding Club's site near Wareham. Essentially what happened was that, during a normal take-off, towing a glider, the starboard undercarriage leg, after hitting a small bump, became partially disconnected from the airframe, ending up hanging vertically downwards from its centre-fuselage connection. The pilot was not aware that the outer leg attachment had failed until alerted by radio by the rather surprised pilot of the glider he was aero-towing.

The undercarriage leg itself is a composite construction which, as you can see from the attached photos, is attached to the fuselage via a bracket at the centre of the fuselage and a rubber filled clamp. The bolt that failed, as you can see, primarily due to fatigue, was the forward clamping bolt.

The LAA has been working with the manufacturers to understand why this failure



(Left) **The modified position for the brake actuator and the new connection rod on the port rudder pedal. You can see that the connection to the rudder pedal has been moved much closer to the pedal which, though reducing 'throw' increased the relative force transmitted to the actuator itself. This is a very neat solution to the issues of poor braking and system overstress during braking, but it does have the disadvantage that the ability to easily adjust the rudder pedals has been lost … though it would be easy to change the length of the drive rods to suit an individual leg length.** *(Photo Gary Cotterell)*

(Left) **One problem that has been noted by Mk. 26 Spitfire owners is that the differential brake control is not brilliant. Inspectors have noticed that during toe brake operation the cables to the rudder are being stretched giving the system a sloppy feel. Also, the loads in the rudder cables, increased because of braking force, has caused damage, in some cases, to the rudder and attaching structure. LAA inspector and Mk. 26 owner Gary Cotterell has been working with us to improve the directional control aspects of this brilliant aircraft. Here's part of the mod which is in the final stages of the LAA's approval process. You can see that the rudder's control loop has been closed by the introduction of a mechanical link between the rudder pedals. Other small changes have included the strengthening of the rudder attachment itself and some geometry changes to the brake pedals.** *(Photo Gary Cotterell)*

(Above) **Dave's Mk. 26 was an early kit and contained the original undercarriage leg design. Because of subsequent weight increases and, it has to be said, problems with these early legs due to bending, Dave is drawing up an improved (strengthened) design. As well as some local reinforcement the new leg will be made from a stronger steel that has a better resistance to creep than the original stainless material used. Dave is working with our Design Department through the LAA's Mod system to get this change approved.** *(Photo Dave Bishop)*

has occurred and what can be done to prevent further occurrences. Regular readers will know that we've seen this clamp-bolt fail before, though in every one of the other cases the leg itself has remained in place. The LAA issued an Airworthiness Alert about the issue back in March 2015, letting owners and inspectors know that Eurofox had issued a Service Bulletin describing how this connection should be correctly tightened.

At that time, it was felt that the reason for the failure of the bolt was due to over-tightening. The manufacturer had designed the attachment such that this clamp bolt should only just be nipped-up. We've had a bit of a re-think about this and, along with the manufacturer, are in the process of designing a change that should improve the fatigue characteristics of this connection. The bulletin, which should be published towards the end of October 2016, will also life these bolts.

The LAA has 47 Eurofox aircraft in its fleet and, over the last few years, the type has demonstrated itself to be a very reliable and safe aircraft. Of the 47 machines, 14 of these aircraft have been operated regularly as tug aircraft in gliding clubs, and they're proving to be a reliable workhorse in this role. What we particularly don't want to see is an undercarriage failure during a take-off which puts the tug skidding along the ground with an airborne glider up its tail.

I spoke to the tugmaster at Dorset GC and, whilst discussing this incident, he let me know that he was very impressed by the way the Safety Management System, put in place by the new CFI, had worked so well. As you can see from the rather sad photo of the Eurofox on only two of its three wheels, the fire engines were in attendance before the aircraft landed. What you can't see from the photo was that there was also an ambulance and, importantly, the area was cleared of all spectators before the aircraft was cleared to land. Yes, the pilot did a good job of getting the aircraft back down safely and credit to him for that, but operating an aircraft safely requires a team effort and, in this case where there was an unexpected failure, the whole of the team pulled together really well. So well that, to use the phrase from an old TV advert, a drama wasn't made of a crisis!

Well done to this club for having a Safety Management plan in place during flying ops, and well done for implementing it. Fair winds. ■

(Above) **The fracture face of the failed bolt that led to the undercarriage failure on the Dorset Gliding Club's Eurofox tug. The corrosion, which clearly shows that this bolt has been failing over time, follows the beach lines indicative of a failure due to fatigue. To allow for movement of the leg during normal operation the leg is held in a rubber plate held within a clamp. We think that, especially when the aircraft is operating on rough ground, that the fore and aft loads are causing the leg to twist slightly; this in-turn, loads-up then unloads the forward locator bolt causing fatigue and eventual failure.** *(Photo Dave Piercy)*

(Left) **Here's a picture taken by LAAer Dave Piercy of the Dorset Gliding Club's 'tug' after a landing with only one serviceable undercarriage leg. Though Dave is the tug-master at DGC he wasn't actually flying the aircraft at the time, that honour went to tug pilot Tim Ambler and well done to him for getting the aircraft back down on the ground without damage and, most importantly, without injury.** *(Photo Dave Piercy)*

(Left) **How the main undercarriage is attached to the fuselage on the Eurofox aircraft. You can see that if the bolt (arrowed) fails, freeing the clamping strip, the leg is then free to rotate around the centre fuselage connection bolt and will hang down vertically. Previous failures of this bolt have been noted after landing or during maintenance checks and it's a pre-flight inspection requirement to check this bolt before flight. The LAA is, at the time of writing, working-up a Bulletin with the aircraft's manufacturer requiring this connection to have a bush fitted so that the bolt can be pre-tensioned. This will mean that it will be less prone to fatigue failures; added to this these bolts will be lifed.** *(Photo Roger Cornwell)*

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	
Up to 450kg	**£155**
451-999kg	**£200**
1.000kg and above	**£230**
Modification application	
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
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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