

CHECK, CHECK AND CHECK AGAIN

An insight into the day-to-day operations of LAA inspectors, both in the office and in the air, plus Jabiru failures update.



In his role as Airworthiness Engineer for the Light Aircraft Association Malcolm McBride is on the front line when it comes to the safety of our Permit to Fly fleet.

Accident, component malfunction or failure reports as well as problems associated with general 'wear and tear', reported by LAA Field

Inspectors and members, all pass across his desk. Malcolm's role is managing the LAA's safety response. Often this might just be a word of advice to an owner and a note in the aircraft's record file but, at times, his actions may lead to the issue of a Mandatory Permit Directive (MPD) requiring specific action. Here, in Safety Spot,

Malcolm discusses the various 'events' occurring within the LAA fleet. Forewarned is Forearmed and never is that more true than in the continued safe operation of an aircraft. Knowledge of the misfortunes of others serves well to prevent a re-occurrence. And remember, the latest SPARS are in issue 15, April 2009.

The perils of test flights

PICTURE this: me sitting at my desk here at Turweston Aerodrome, looking out of the window, sucking the end of a pencil, looking up at a complicated (and very confused) sky thinking, "well, that's that then, holiday over".

Fortunately, I'm not a depressive sort of a chap but, as I sit here after a great holiday in Turkey, I'm struggling a bit. My mood's been improved a little by the antics of the solitary duck on the LAA pond which has, with a great flourish, just missed her footing whilst shifting position on the inoperative fountain head in the middle of the pond and gone head first into the water. Ken's missed his chance again. His plan is to turn on the fountain whilst the duck snoozes on its favourite perch... What a rotter.

Since my return from the Levant I've been busy catching up with correspondence and generally trying to get my head around things here at HQ. We've all been busy this week with the test flight programme on the Zenair CH 601 XL. Francis Donaldson, the Chief Engineer, has been flying the aircraft cautiously 'around the envelope' to establish whether the modifications incorporated have eliminated the potential for flutter warned about by the manufacturer.

I've been adjusting this and that, Nigel Bamber, the Stress Engineer, has been wiring up the various accelerometers to the data-logger and downloading results after each test. Everything's looking good at the time of writing but poor weather has put the brakes on any further testing, for the next few days at least. I hope to be able to let you all know about this interesting story in next month's Safety Spot when all the testing has been completed and the various reports written.

Being the responsible engineer during a flight test programme can be worrying at times. It's important to make sure that all the Ts are crossed and the Is dotted. When doing the pre-flight, for example, it is vital that one doesn't get into the habit of assuming that because it was checked before the last flight it will be ok for the next.

I treat each flight as a fresh start, regardless of the pressure being applied by flying types to 'get on with it'. I've never been a great advocate of running changes because it's ever so easy to miss something out during the checks. One is always



PHOTO www.airteamimages.com

The earlier HD and UL Zodiacs have not been affected by the XL's troubles

mindful of the fact that test flights are, by their very nature, more risky than a local jolly.

Over the last couple of years I can recall a number of problems that have shown themselves during a test flight, especially initial test flights. Regular readers will remember the various propellers that have 'let go'; just recently, and, without checking, I can remember a Spitfire Mk. 26 losing a prop on an initial test flight and an X-Air Hawk losing a prop, if I remember correctly, just after landing following an initial test flight.

We're just coming to the end of our investigations with regard to the prop that left the Speed Twin a month or so ago, also during a flight test. Earlier this week, and still under initial investigation, the first flight of a Pietyenpol Aircamper was cut short by what looks like the seizure of the propeller reduction gear.

Thanks to a good bit of flying, and no doubt a fair slice of luck, the Pietyenpol ended up in a field without damage.

This cannot be said for the accident reported just this morning concerning another Mk.26 Spitfire during initial airtest. Early reports suggest an engine problem which led to a field landing, for some reason only one of the gear legs was dropped and the aircraft's wingtip hit the ground.

This accident has only just been reported so the investigation is in its early days, but reports suggest that this aircraft has been destroyed. As I understand it, the pilot was struggling a bit because of smoke filling the cockpit during the event. Scary. It sounds like he did very well to get the aircraft down roughly straight and level and was therefore able to walk away from the accident. Twenty minutes of flying after over three years building time is a heartbreakingly small amount of air time.

In all the incidents I've mentioned above – and these are just the ones that come to mind – nobody was hurt, which is of course a blessing.

Interestingly, of those incidents that have been fully investigated there was a different headline cause but human factors sit high on the list of contributing factors.

The Spitfire's propeller departure was caused by the incorrect fitment of the attaching bolts by the owner/builder which was not picked up by the inspector. The X-Air propeller was lost because of the incorrect fitment of the propeller bolts and the fitment of an unapproved propeller spacer, also not picked up by the inspector. You will have to wait for the full story about the rest, as I say, they are still under investigation.



How things stack up

I KNOW Francis writes in the Engineering section on the issue of needing to establish a sensible maintenance schedule, relevant to type, amongst the machines we operate – Permit aircraft. I don't need to go over this subject again here, except to remind owners of Permit to Fly aircraft that they have the ultimate responsibility to ensure the airworthiness of their aircraft.

This is a different kind of responsibility than many flyers will be used to. Often whether you check something or not will be up to you and sometimes it may be easier to turn a blind eye to a potential problem but, with aircraft maintenance, it's never sensible to take the easy option. Patently an aircraft needs to be maintained in tip-top condition.

Naturally, the LAA inspectors are there to help and are appointed because of their extensive inspection experience but – and here's the rub – if you don't tell them about something you're worrying about, how are they expected to know about it?

With regard to accident causes, it is interesting to note that it is only very rarely that an accident has only one single cause, ie. eliminate any single factor and the accident wouldn't have occurred. That's why it is important to deal with the problems you're aware of. It may reduce the overall impact of the failure you're not aware of.

I've just come off the phone with a member telling me about an accident that occurred with his aircraft some weeks ago. He reported the event in the normal way but, for all sorts of reasons, this was the first that I had heard about it. Holidays, when they happen, change routines and things can get overlooked.

Here then is the first ALERT – lack of communication.

In this discussion I use the word ALERT just

to flag-up a point of concern. It doesn't matter about the specific whats and wheres about this particular accident by the way. It's enough to say that the investigation into the official cause is underway and that the pilot is now fully recovered after medical treatment, but the aircraft is a write-off.

As I had no knowledge of this event, I asked the caller to re-report the accident in general terms. He explained that the Air Accidents Investigations Branch (AAIB) had completed its initial investigation and the aircraft had now been moved from the accident site. This answered my first concern which was 'had this incident been reported to the appropriate authority', in this case the AAIB. Answer – yes.

My next check was had they reported the incident to us. A quick look at the Initial Accident Notification file answered this question. Answer - Yes. Naturally, I would normally be in the loop for this sort of thing and, because of the summer break, I was missed out.

So the first ALERT focussed on us, or at least our system of promulgating info. This is not a flippant point, aircraft are often owned by syndicates or groups, and it is vital that maintenance/defect/concerns information is promulgated effectively around the various pilots. The Royal Air Force used a system of signing an aircraft in or out (the form 700). It wasn't a bad idea.

The caller, an experienced pilot, explained in

'LAA inspectors are appointed because of their extensive inspection experience'

some detail the events that led up to the fateful incident; I hope you will see what I mean in my earlier comments that an accident is rarely caused by a single factor.

The pilot did his usual pre-take off checks, lined up with the runway, weather was good, and on the climb-out the engine lost power and eventually failed. The aircraft crashed about one kilometre from the airfield. The pilot suffered some head cuts, was 'banged about a bit' and was taken to hospital.

Subsequent engineering examination of the engine revealed that one magneto was probably not working and that the plugs (which were firing) had been working in a very rich environment. The general view was that the engine suffered a 'rich cut' after take off.

As I expect most of you know, on most horizontally opposed aircraft engines it is normal practice to wire the plugs so that one magneto will supply the top of one cylinder bank and the bottom of the other. Investigation of plug colour indicated which mag wasn't working, further checks couldn't find any problem with the magnetos or their supporting electrical circuitry.

I asked the caller whether there was anything in the aircraft's history that indicated a rich mixture being a problem. "For example, had you noticed big mag drops or anything like that?" The caller explained that a few weeks earlier he had noticed very rough running when checking the mags at full power. He had removed and cleaned the plugs and the engine subsequently ran fine. He explained that this engine was fitted with an Ellison floatless carburettor and not an injection system.

Second ALERT – history of rough running likely caused by an over-rich mixture at full power.

I asked, naturally rather gently, whether the pilot could have taken off with only one magneto live. The caller explained that as far as he was aware the pilot was very thorough with his checks normally. I asked whether there was anything unusual about this flight and the caller said that he didn't think so, except that this was the first time the pilot had flown with a noise cancelling headset'.

Third ALERT – substantial changes to the pilot's operating environment.

I have no doubt at all that, as the facts emerge, other factors will come to light. Some of these factors will be engineering orientated, some not. In other words, the ingredients in the make-up of an accident or incident can be many and varied... a pinch of this or that will make all the difference.

In the above example, it looks like the mixture was set too rich on the Ellison carburettor for full power settings. Ellison carbs are a bit prone to this and it's a difficult thing to diagnose without some considerable effort. It is possible – and remember this investigation has only just begun – the pilot didn't recognise the sound changes during the magneto check because of the change in headset and took off with only one magneto functioning. Because the mixture was over-rich the engine wasn't able to function well on only one set of plugs, lost power and eventually, probably in quite quick order, the engine failed. The rest, as they say, is now history.



PHOTO Malcolm McBride

The relationship between the Inspector and the client must be completely professional. In this photograph the LAA Chief Inspector, Ken Craigie (Right) discusses with LAA Design Engineer, Andy Draper (Left) the serviceability of this Lycoming Engine

Jabiru control failures update

ABOUT this time last year, the LAA received a very scary report of a failure of the elevator control system during the takeoff, after maintenance, on a Jabiru 450 UL. In January of this year we received another report which was very similar. You can read my report about this in the February edition of Safety Spot, which, if you haven't discovered yet, is available on the web. Just go to the LAA website, click on Engineering and check out the Safety Spot features on the right hand side of the page.

In this incident the pilot had to abort a takeoff as the "nose of the aircraft rose in the normal way as the aircraft was rotated and then settled back on the runway". The pilot, who was a very experienced chap, elected to close the throttle and land ahead. He just managed to stop the aircraft at the far end of the runway and no damage was done to the aircraft. It was found that the clamp holding the outer portion of the Teleflex-like push/pull cable had come

loose and all elevator drive had been lost. This was definitely a narrow escape – had this happened a few moments later the results would undoubtedly have been very unpleasant.

After a thorough investigation, a series of inspection failures were uncovered. It was found that the clamp itself had been assembled incorrectly during the aircraft's build and this fact had not been noticed during subsequent checks. There were a number of factors that mitigated here. One was that the clamp itself is very difficult to see and that when it is assembled it is almost impossible to ascertain whether the locating lug on the clamp is correctly fitted into the groove in the cable outer. If the lug missed the groove then the only thing holding the outer in place would be friction.

At the time the LAA put out a web alert and wrote to owners warning them to check their control cables. As is the way of these things, it

wasn't long before a similar event happened, this time during the control check before takeoff.

We got in touch with the Jabiru factory in Australia and they agreed that both the failures seen in the UK were a result of poor inspection techniques. We agreed that it would be a good idea if the factory produced a Service Bulletin requiring regular checks on these control components and offering advice about what the inspector/pilot should be looking for during a pre-flight or other maintenance inspection.

The Jabiru factory has now done exactly this and all owners should be aware of this document. The LAA, with regard to its longer term responsibilities, is deciding whether to require compliance with this inspection by issuing an Airworthiness Information Leaflet (AIL) or asking the CAA to issue a Mandatory Permit Directive (MPD). (The Jabiru document can be downloaded from the LAA website as JSB 027-1 if you are interested.)

This was an example of a primary control system that had been incorrectly assembled and failed during the aircraft's operation. It is, of course, totally unacceptable that something like this could be missed. But – and I'm not inventing excuses for people – it's fairly easy to understand how this could happen when one considers that this type of push-pull cable is an unusual method of operating a primary control. Most aero engineers will have grown up with more conventional cable operated systems.

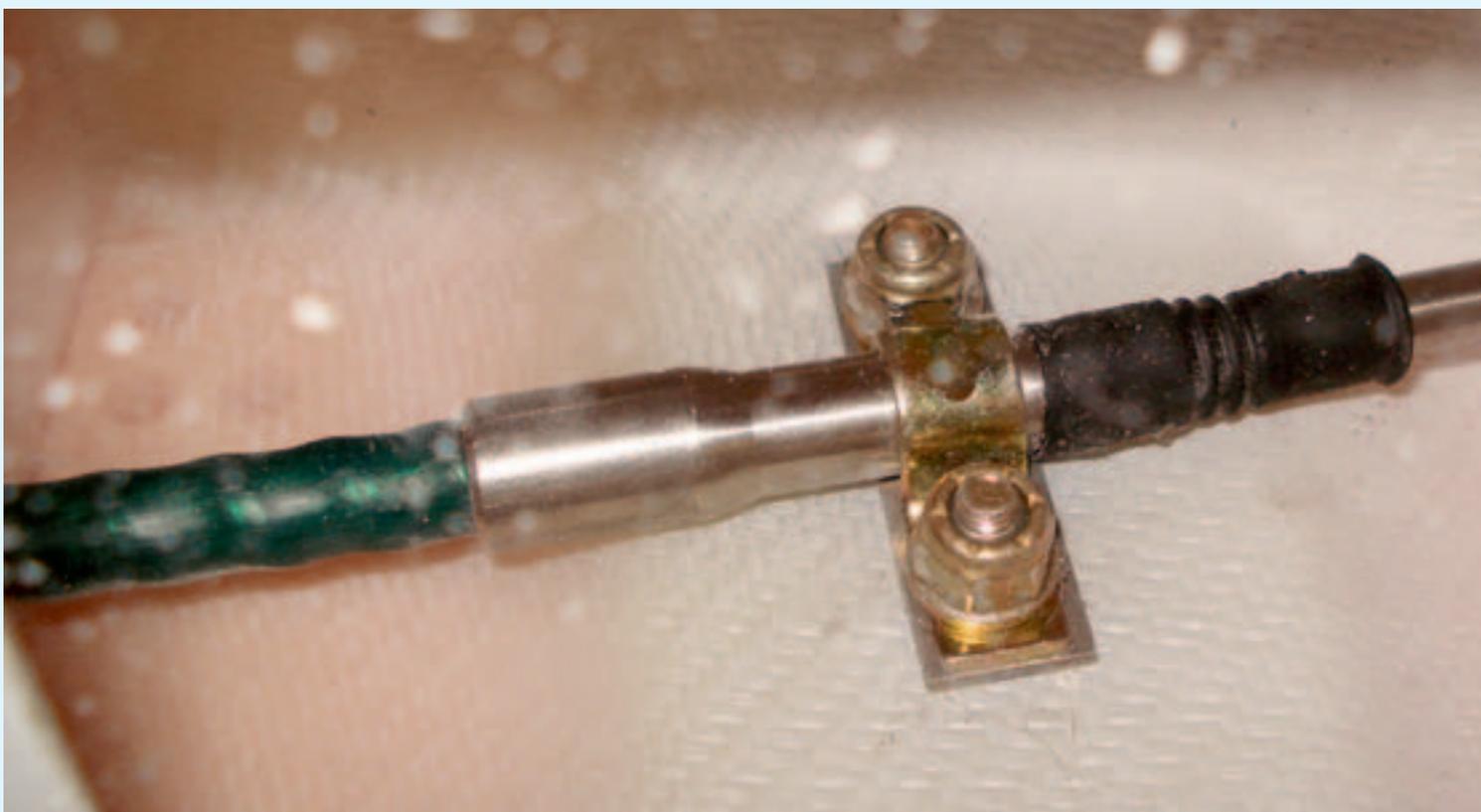
In an aileron circuit, for example, there will be two drive cables, a couple of bellcranks complete with push rods and a balance cable which is assembled in such a way as to provide



Clamps correctly assembled with the 'tang's' in place and the clamp fitting snugly around the body of the cable



Clamps incorrectly assembled, the locking 'tang's' are misaligned and the clamp is not fitting properly around the body of cable





A correctly fitted elevator clamp – very difficult to inspect requiring a torch and mirror. A failure here could lead to loss of control of the aircraft

a control loop, the tension in the system being reacted by the bellcrank bearings. In a Teleflex type of control cable it's still a closed loop system but the balance side of the system is replaced by the cable outer and the forces involved are reacted by the cable clamps.

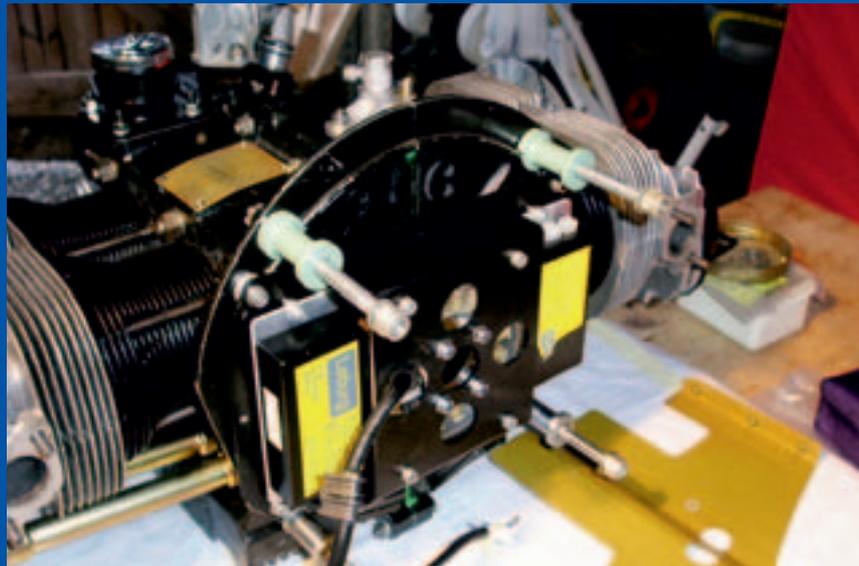
Well, that's about it for this month. I feel a bit guilty for ranting on about the need to keep such a close eye on things but the reality is things can go wrong, and sometimes they can go very wrong. There can be no doubt that it is a lot cheaper to learn from other people's mistakes than to end up with a broken aircraft oneself, or even worse.

As a slight aside, if you operate with (or were thinking about fitting) a Leburg ignition system then I'm sure that you will be pleased to learn that David's Mickleburgh son, Henry has taken on service and supply responsibility. Take the time to read the info box about it.

Until next time then, Fair Winds.



Aileron clamp correctly fitted can easily be seen for inspection. Note the important rubber 'gaiter'. We've had reports of cables freezing up because of water ingress when these seals are damaged



Thanks to his son Henry and LAA members, David Mickleburgh's Leburg legacy will live on

New lease of life for Leburg ignition

WORDS & PHOTOGRAPHY Henry Mickleburgh

MANY of you will be aware of the tragic death of David Mickleburgh in February this year, shortly after takeoff in his own designed and built plane, the Leburg 107 Sparrow. Numerous flyers have expressed their sadness and condolences at our loss, for which we, the family, are hugely grateful.

Dad was the inventor of the Leburg Ignition system which replaced and improved upon the original mechanically driven magneto ignition system for VW and other four-cylinder engines.

Typically for my Dad, the Leburg system came about from his solution to a low tech, high maintenance and cumbersome system on his own emerging aircraft.

The Leburg system is a very neat solution that should continue to be available to the light aviation community. Many flyers have expressed their admiration of the Leburg system and offered assistance to ensure its continuity. In particular I must thank Ian Wasey, who has spent days meeting me at various places around

the country. He explained the system in detail and facilitated the interrogation of Mike Clark's aircraft.

With this assistance, the LAA and an electronics guru, I now have a good understanding of the Leburg system, an almost complete supply chain, and plans to re-supply the system. I intend to update the website, revise the build manual (with direct PDF access), post a short installation video and provide far more detail and examples of the various aircraft with previously installed systems. I would appreciate any info and photos of any installed systems to assist me in this.

Whilst the original build manual covers installation procedures, the system is dependent upon the quality of installation, so any method of demonstrating the best examples seems to be a pragmatic way forward.

My priority in the short-term has been the resolution of any part-installed systems to ensure that aircraft on the ground are back in action. Again, with Ian Wasey's assistance,

we have managed to get one plane working perfectly.

Once any current installations are resolved, a number of complete controllers will be built and tested to provide a suitable complement of spares for existing owners. I envisage that new controllers and other parts of the entire system, including the non-electronic hardware, will be available for new installations towards the end of September 2009.

Whilst this has been a real learning curve for me, the assistance and generosity of the guys I've met has been remarkable and I aim to ensure that Dad's contribution to the light aircraft community continues for years to come with as little interruption as possible.

Until the website has been relaunched, please contact me, Henry Mickleburgh, on 01638 731996 or at henry.mickleburgh@adeptmanagement.com for any Leburg enquiries. Again, any information of photographs of previously installed systems will be greatly appreciated.