

OPS AND AWD TIME AGAIN

With less flying this month there are fewer incident reports to work through and of those, thankfully, very few involve airworthiness or maintenance issues



I HAVE just sat down to begin to write this month's Safety

Spot, having completed the onerous task of sorting out the various accident reports into piles. I don't do this often enough really and I am a little ashamed of myself for my lack of tidiness in this area.

Those who know me would, I am sure, confirm that I am, when it comes to workbenches and tool boxes, absolutely fastidious. I loath, for example, being in the vicinity of a blunt chisel and line my spanners up like soldiers before commencing any maintenance work. Woe betides the recalcitrant screwdriver!

This ability with order doesn't, sadly, extend to paperwork, but it's not that I dislike being, at least some of the time, desk-bound. OK, I am not the world's best administrator – I wouldn't be in the running for an award in this department – but I am not the worst either, at least I don't think so. It's just that it's too easy to hide the stuff (paper is very flat) and pretend you've dealt with it.

Time marches on though and eventually somebody will say, 'Have you got that report?' or 'Remember that incident, blah de blah, have you compiled this and that?'

The sheepish smile gives one away of course, but one nods unconvincingly and retreats to the office to begin the feverish activity connected with finding all those very flat pieces of paper so as

not to look too stupid.

You will, I am sure, appreciate that 'sorting out' the incident sheets is quite an important event in the office of the Airworthiness Engineer.

The sorting goes something like this and starts with: OPS, no further action and AWD, investigation, that's two piles.

'OPS' is short for Operational and will include the 'pilot error' type of incident. I expect that you can imagine the sort of thing; 'During taxi, the pilot clipped the rudder of a parked aircraft, causing a great deal of embarrassment all round.' This incident would only become an Airworthiness Department (AWD) investigation if the pilot had hit the other aircraft's rudder due to some failure of the systems on board, perhaps a brake failure.

If we see a pattern developing with these 'OPS' things, we'll pass the facts over to the flyboys in the Coaching Department where they will make decisions as to how to educate the rest of us.

Jon Cooke, the PCS Chairman, might then write an article about the need to taxi at a sensible speed or ensure you're wearing those glasses when required.

It's the pile of AWD, investigations that keep me occupied for most of the time.

Truth is, of course, there's not much flying during the winter and, therefore, not that many incidents. Time to catch up on the paperwork, hence the 'sorting', ughh!



Europa: fuel system problems



THERE is an old saying in the aircraft world which concerns the actions after an engine failure after take-off (EFATO). It's 'Never Turn Back' and the saying originated, I think at least, during the First World War when aircraft were often under-powered, and pilots were short on hours and had no understanding of the importance of centre of gravity.

There are three reasons for this rule. The first is that you are very likely to be close to the ground and therefore in, or near to, ground effect where wind speed will decrease rapidly with reduction in height. Couple this to the fact that you are likely to have lost a fair amount of airspeed when the engine fails and you probably have a high nose angle, and you have a classic spin risk.

The second reason is that it is really difficult to judge distances at low level and the likelihood is you will get it wrong. This is because at low level all the angles you have got used to during normal flying will be very different and, because of the aforementioned ground effect, even if you do 'get around' the turn without spinning or hitting the ground, your landing will be downwind.

If you have an aircraft, try this as an experiment. Get to a sensible altitude, do HASELL checks, and set yourself up in the normal climb attitude at

'During a turn back you will naturally be pulling the nose up and the risk of entering a spin is really high'



This crash was caused, at least in large measure, because of an unauthorised modification to the fuel system.

PHOTO Neil France

incidents during training being observed on the UK's Tiger Moth fleet. Tests were being carried out at Boscombe Down to establish the cause, so I did a bit of research. I found out that the reason for the increase in incidents, in the end, was put down to modifications to the airframe for war use, for example bomb racks! Anti-spin strakes were added shortly after this time... a feature copied much later for another aircraft in the De Havilland family, the Chipmunk. In any case, I digress (well, it's just so interesting!).

During aviation's infancy, especially early on in WW1, spinning was not well understood. Wilfred Parke RN is credited with one of the first successful recoveries from a spin; his brush with death occurred at Larkhill camp, in the shadow of Stonehenge, in 1912. Parke recovered the Avro during military trials after spinning from about 700ft. His recovery was accidental but, by remembering what he did to recover the aircraft, other pilots were able to investigate the phenomenon. This incident paved the way for the general rule 'throttle closed, full opposite rudder, stick progressively forward'.

Many of you reading this will be accomplished at spinning and not in the least bit worried about 'doing' it. Equally, many of you will never have been in a spin and the thought of such yobbish behaviour is beyond reason. Anyway, the 'never turn back' rule is installed into the student pilot's brain at an early point in their flying career. It's a good rule. I have said many times in Safety Spot that, in the event of an engine failure (at any time) the first job is to get (or keep) the aircraft flying. Normally, this will mean, 'get the nose down' and regain the lost airspeed. After an EFATO it is normal practice to 'get the nose down and land straight ahead'; you will almost certainly fail a GFT if you try anything else.

I received a call from LAA member Bruce Morris who has had a few problems over the last year or so with the transition to his home-built Europa Tri Gear. The reason why Bruce was calling was to let me know he was compiling a report about an EFATO event that had befallen him during a training flight from Staverton... sorry, Gloucester Airport... a few days earlier. He had reported the incident to the AAIB and we had received our Initial Accident Notification from them earlier.

They had decided the incident fell into the Non-Reportable Civil category, in other words

no further action, and the form was placed in the flat pile we spoke about earlier. After chatting with Bruce, and subsequently reading his report, I felt Bruce's experiences were worth sharing, primarily because he is far from unique among our membership in that all his previous experience of aviation was at the local club flying PA28s and the like. Owning and operating an LAA aircraft is a completely different ballgame to renting a flying club training machine. Bruce had been doing that for the previous ten years, so he's no beginner, and has amassed over 300 hours in the hot seat.

I asked Bruce if he would mind telling his story and he graciously agreed, 'a lesson shared is a lesson that doesn't have to be re-learned', or something like that... Anyway, thanks Bruce for being up front about everything. Let's start at the beginning, which was actually a few months earlier, the beginning of September 09, in fact.

Bruce finally received the initial Permit for his Europa in June 2009 and started to get used to the flying characteristics of this new type. Compared to a PA28, the aircraft is very slippery and much more responsive and, after just a few hours Bruce found himself in a difficult position during a landing where he broke the undercarriage. This was a reportable accident and was investigated by the AAIB; it has produced a report which is available to read online. Just use a search engine to locate AAIB EW/G2009/09/06 if you are interested.

In short, what happened was that Bruce was caught out by the spritely nature of the Europa, especially when compared to a Cherokee. He took his eye off the ball for a few seconds (if that) and found himself airborne unexpectedly. In fact, as he explained to me, he had landed and, for some unaccountable reason, had looked inside the cockpit for something or other. When he looked outside the aircraft was in the air with a rapidly decreasing airspeed. Sounds a bit like a nightmare and goes to prove the old adage (I know, another one), 'the landing's not over until the wheels have stopped turning'!

The aircraft was duly shipped off to a repairer where the undercarriage was replaced and a new propeller fitted. This time, Bruce took the very sensible option of getting some differences training from a local instructor, and it was during one of these training sorties that disaster

normal climb speed. Check and note your altitude, then pull the power back simulating engine failure. Lower the nose and achieve a normal safe gliding speed – 1.3 Vs should be about right – and then turn through 180° maintaining the speed accurately in the turn. When you get round the turn, level the wings and check your altitude; a quick subtraction will be all that's needed to prevent you from attempting a turnback after an EFATO. And remember, that in this experiment you should have been well away from ground effect and this makes an enormous difference. Also, because you are high enough to have a good horizon, the chances are that you made an accurate turn – accurate low-level banking requires a lot of practice.

Andy Draper told me about an experiment he carried out during a flight test in a Europa at Bicester a while back. He closed the throttle on the downwind leg, set up the glide and then turned through 360°. He was amazed to find the manoeuvre cost him 600ft. While we were chatting about this, he reminded me that a turn back is almost always more than 180° as you would normally describe a tear drop pattern to get yourself lined-up with the departure runway. Chances are that during the turn you will naturally be pulling the nose up and the risk of entering a spin is really high, even in aircraft that may be reluctant to enter an intentional spin.

As an interesting aside, I came across an interesting letter from the Air Ministry to the Royal Aircraft Establishment a few weeks ago. The very formal and correct letter was written in 1942 during the Second World War and was talking about the high number of spinning accidents/



PHOTO Bruce Morris

A proud moment. After many hundreds of construction hours, Bruce poses by his aircraft. Owning an LAA aircraft requires a pilot to learn a lot of new tricks, including ops and maintenance management.

SAFETY SPOT

Europa: fuel system problems continued

struck and the engine failed, or at least nearly failed, on climb-out. Bruce was, naturally enough, the handling pilot at the time and lowered the nose preparing for a straight ahead. The instructor took over and carefully got the aircraft around a 180° turn and landed back at the airport.

In this case the instructor who, as you will imagine, has an immense amount of experience, assessed the situation. The aircraft was rattling along at something over 80kts (a fairly normal climb speed for this type), the engine was still producing a little thrust, and there was little or no wind. Mmm, from 250ft it was a brave decision to turn back by the instructor, even with a lot of time under his belt. Still, that said, a brilliant bit of flying got the pair of them back on the airport with no damage.

Bruce set about checking the aircraft to see what had gone wrong and soon found the reason for the engine stoppage. Check out the picture of the fuel filter. It's pretty much completely blocked as you can see and this was a complete surprise to Bruce as he had only cleaned the filter just before the flight. Bruce asked Conrad Beale to come over to check out the engine properly and Conrad suggested it was a false economy washing out these 'Purolator' type filters and it is better to just replace the elements. I wouldn't argue this, especially as they are only a few pence each, but it is still a mystery as to where all the rubbish came from to block the filter in the first place. My view is that the tank couldn't have been fully flushed out before use and that after the first heavy landing incident, bits and pieces became detached from inside the tank which then became trapped in the filter, eventually blocking it.

Regular readers will know we've had trouble with these 'Purolator' filters before. The CAA has published a Mandatory Permit Directive (CAA MPD 2008/004) requiring the fitment of springs to prevent the internal knurled nut from winding

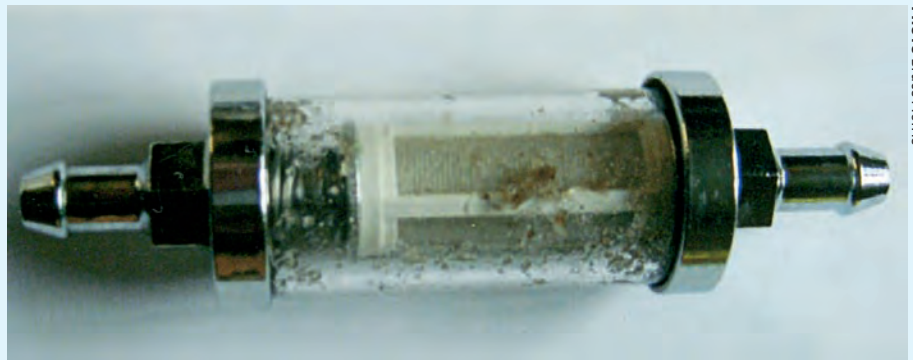


PHOTO Bruce Morris

This is a filter that has been operating for only two or three hours, possibly because rubbish in the fuel tank could have become dislodged after a previous heavy landing. If you ever see a fuel filter like this, then make sure you check the fuel system out thoroughly.

itself out through vibration and blocking the entry ports, allowing the filter element to become loose. Keen-eyed Bruce noticed the springs, when fitted, serve to reduce the flow into these filters a fair bit. I got hold of one to check. He's right, so good spot Bruce but, if you measure the various orifices and do some area sums, the input just about equals the output.

It's very important that you, as a pilot, should understand exactly how the fuel system on the aircraft you're flying works. The Europa system for example has only one fuel tank, but it is shaped

'You should understand exactly how the fuel system on the aircraft you're flying works'

like a saddle so there are effectively two separate spaces for fuel. One side is named the main tank and the other, reserve. Actually, in my view, calling a tank 'reserve' could be a little confusing as it leads one to think there is only one tank and that the valve operates in such a way as to allow one to access that 'last little drop' of fuel, rather like old motorcycle tanks used to do. This is not the case and the only difference between the tanks (other than the name) is the fact that the fuel return from the engine is fed back to the 'reserve' tank. Both outlets feed through separate filters so, in the case of Bruce's EFATO, changing

tanks would have re-established a fuel supply to the engine. Mind you, nobody in their right mind would suggest a pilot in this situation should start messing about with the fuel system, except perhaps, to turn it off (along with everything else). If you have sufficient height though, changing the tank and switching on fuel pumps might just be what the doctor ordered.

We're jointly investigating with the AAIB another nasty Europa crash that occurred back in May of last year. Initially we thought the crash occurred because of carburettor icing but it seems the accident could have been prevented had the pilot fully understood the fuel system. There were a lot of other factors, as is so often the case in this line of work, and you'll have to wait for the completion of the AAIB investigation for the whole story. One worrying factor coming to light is that the fuel system had been modified but this modification had not been cleared by our Design Department. I asked the Chief Engineer here, Francis Donaldson, whether this lack of consultation could have affected the outcome and he replied, "Yes, definitely, we would not have cleared this mod as there were obvious deficiencies in the design."

Another thought before I leave the subject of fuel filters. As the Europa system is marked as 'Main' and 'Reserve', there may be a tendency to assume you should only use the reserve as the very last resort. Wrong. It is important to exercise any system regularly, so start the engine on reserve, taxi out to the holding point, change tanks and run up the engine for your pre-take-off checks. That way you'll know both sides are working.

LAA ENGINEERING SCALE OF CHARGES

LAA Project Registration

Kit Built Aircraft	£300
Plans Built Aircraft	£50

Issue of a Permit to Test Fly

Non-LAA approved design only	£40
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Initial Permit issue

Up to 390kg	£300
391 - 499kg	£405
500kg and above	£540
Three seats and above	£600

Permit renewal

Up to 390kg	£100
391 - 499kg	£135
500kg and above	£180
Three seats and above	£200

Modification application

Prototype modification	£45
Repeat modification	£22.50

Transfer

(from CofA to Permit or CAA Permit to LAA Permit)	
Up to 499kg	£135
500 kg and above	£250
Three seats 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	£110
Microlight to Group A	£110

Latest SPARS - Issue 15, April 09



Twister: control stick failure

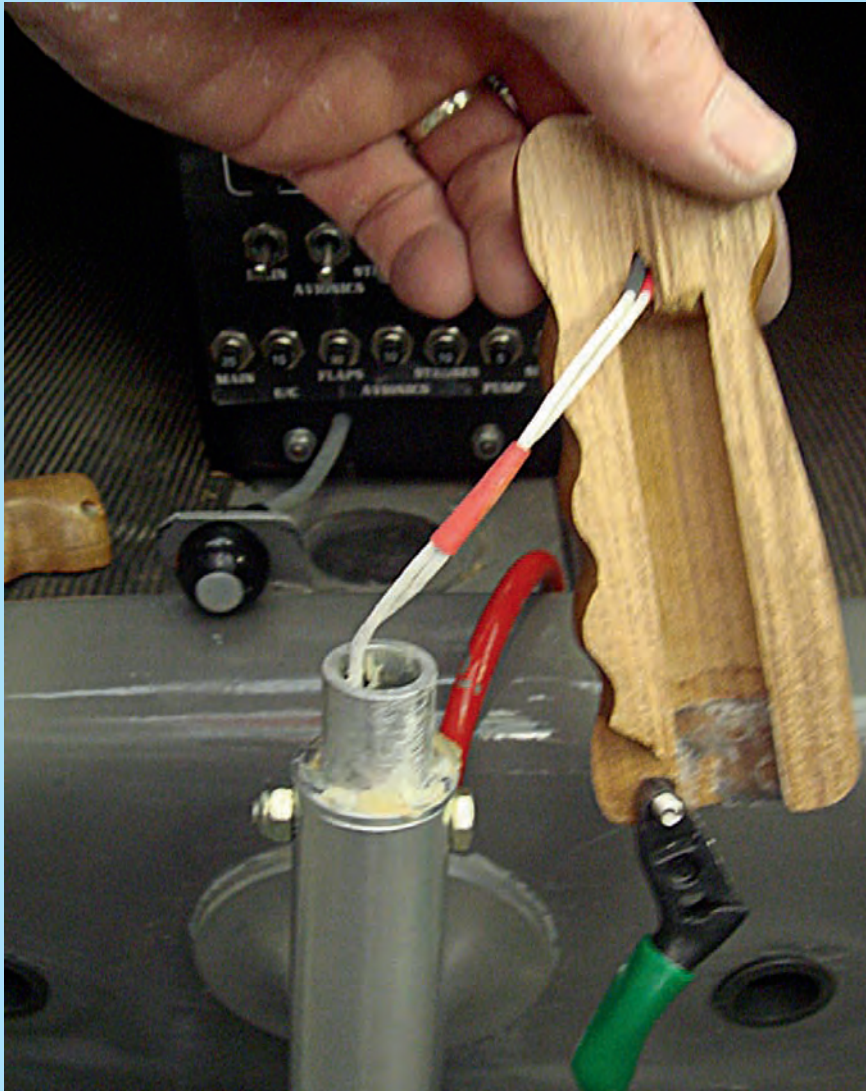


PHOTO: Tim Dews



This is the mod incorporated to spread the load a little better into the control stick.



The fact that the second stick on this RV9A wasn't secured with a bolt may have seemed like a good idea at the time; easy to remove, to make space for baggage for example. Trouble was, it fell out during the landing flare while being flown from the P2 seat.

You can see why this handgrip failed, I'm sure, and I won't go on about it. The lesson here is that a system is only as good as its weakest link – which is why it is very important to get (even the smallest) changes checked out. That's the reason for the LAA's Mod System.



IMAGINE yourself flying a high-performance aerobatic aircraft on a lovely summer's evening. You've just made a perfect high-speed pass along the runway at a height calculated to thrill. Nearing the end of the run you open up the throttle to full power, pull back gently on the stick, 30° nose up, 100, 200, 300, 400ft, full left aileron, bit of top rudder, and around the horizon goes, let her fall off into a chandelle and catch her as she lines up again with the runway... magic.

Dropping the nose, speed increasing, 130kts, level the aircraft, pull up the nose, and apply full aileron for an aileron roll. Ah, you know you've got it just right as you see your audience passing rapidly above your canopy. Life just doesn't get any better than this. Then, perhaps because life is never supposed to be that good, the control stick comes off in your hands and everything suddenly changes.

This was the story told to me by fellow LAA'er Tim Dews. Tim is an LAA Inspector who specialises in composite repairs. He's been an Inspector with the LAA since the early 1980s and runs a company called Airborne Composites. He has been specialising in Grob repairs for many years which is, perhaps, one of the reasons why he enjoys flying the Twister so much. Check out the photograph of the stick grip that failed; it was an unauthorised modification naturally, and note how it has failed along the grain. Tim explained the incident 'gave him a bit of a fright!' I'm not surprised. Tim was lucky, the remaining end sticking out of the floor was just long enough to fly the aircraft as, to use Tim's words, 'The Twister has very light controls and it was no problem landing back at the strip.'

There have been quite a few incidents like this over the years where control sticks have failed in one way or another. Two other incidents

come to mind immediately, both unfortunately causing a fair amount of damage. The first, which ended up with a nearly new Flitzer aircraft upside down at Popham in 2005, was caused by the failure of a wooden handgrip fitted to the top of the stick. The handgrip was made from turned wood and was held onto the stick using a friction fit. After a while the handgrip cracked and the friction disappeared... inevitably the handgrip came off and, because of Murphy's Law (a law we've spoken about many times now), it came off in the pilot's hands during the flare. The damage was limited to the engine bearers and the top wing as the aircraft flipped onto its back.

The other incident occurred to an RV-9A at Bicester Aerodrome the following year and was uncannily similar. In this case, the handling pilot was flying the aircraft from the right-hand seat, and, to use the words directly from the resulting AAIB report into the accident, 'Whilst initiating the landing flare the dual cockpit control stick became disconnected from the flying control system and the aircraft pitched nose down. It impacted the grass runway damaging the nose landing gear, propeller and engine mountings and cowling.'

Luckily, in both cases there were no significant injuries, but there was a fair amount of work required to get these aircraft airworthy again.

Now, I can hear a little voice saying, 'Help, help, please sort me out.' It's coming from that pile of white stuff that's been languishing in the corner of my desk... back to it then. Fair Winds.