

## GETTING GOING

Time to write Safety Spot! Sometimes it's hard to get started; but my reason to linger isn't the same as a pilot holding back on that first test flight...



**SOMETIMES one of the hardest things to do is 'get going'. Starting Safety Spot is a good example of where I suffer from this reticence phenomenon.**

I know I am not alone in this affliction. For instance, I have just got off the telephone to a member asking us to extend his Permit Flight Release Certificate (PFRC) so that he can test fly his aircraft. The PFRC by the way, is the document that authorises flights on aircraft that do not have valid Certificates of Validity for their Permits to Fly. In this case, the chap needs to do his initial flight test as it is a new machine, a life-changing moment if ever there was one.

He has been trying to get this flight test done now for ages, but the weather has been a bit against him (a PFRC only lasts a month) for the last couple of months. Anyway, he tells me that today looks good and he's 'ready to go' but, and you've guessed it, he just doesn't seem to be able to get going. He explained that actually there has been numerous occasions where he could have test flown the aircraft, but there was always that final thing to do.

In my case, the reasons why I find it difficult to get going vary; I suppose that this is true for us all. In our budding test pilot's case I think that it is likely that, after years of dedicated building, with almost every waking moment thinking

about the construction of his dream machine, he's just milking the moment. I don't blame him; I would too, and I wish him well.

Now that I've got started and I've shaken off my disinclination towards mating-up with the keyboard for a few hours, what have I got to share with you from this month's Safety Spot platter? The first item is a fairly straightforward engine failure that didn't get into last month's Safety Spot due to lack of available space. I include it now because it demonstrates the importance of the very close inspection of every item on an aircraft occasionally, if the inspection is not called up in the aircraft's Maintenance Schedule.

## Van's RV6A: oil pipe failure

BACK in September I received an AAIB Initial Accident Notification. Nothing unusual about that, you might say. True, if you could measure the micro-saccade activity of my eyes, you would see the same pattern each time I look at one of these AAIB IAN sheets. One... type. Two... was anybody hurt? In this event the two chaps involved, both LAA'ers (and Van's enthusiasts) were uninjured, so my heart rate went back down a notch.

Third box on the form... what happened? Pan call to Aberdeen to say, "No oil pressure and engine failure, landed in field." Assessment... non-reportable.

OK, this report can wait until later! Something worried me about it though, so I decided to give the owner a ring. He said that the aircraft was undamaged and that he had pulled off a great field landing so, as

*'Something worried me about this report, so I decided to give the owner a ring'*

always, "Well done John, good job."

John Wheeler, the P1 and owner of the aircraft wrote me a report (which I always appreciate) which went something like this:

"The aircraft departed its home base of Perth earlier in the day for a flight of just under one hour to Peterhead, to attend a barbecue. Departure from Peterhead routing back to Perth was recorded at 14.25, using runway 28. Engine checks were carried out prior to departure. Some three or four minutes later, a request was made to Aberdeen Radar for clearance to enter the zone. I reported my altitude as 1,400ft on the QNH as I was

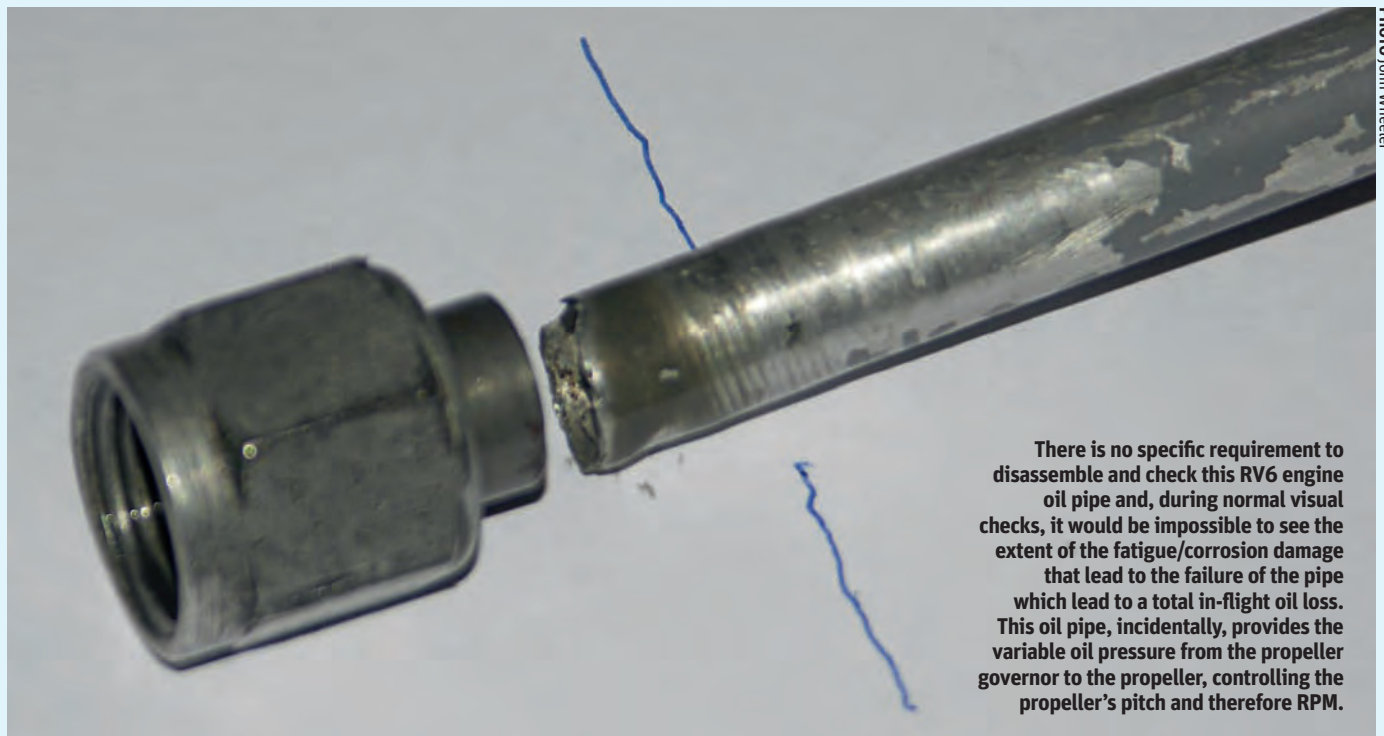


PHOTO John Wheeler

There is no specific requirement to disassemble and check this RV6 engine oil pipe and, during normal visual checks, it would be impossible to see the extent of the fatigue/corrosion damage that lead to the failure of the pipe which lead to a total in-flight oil loss. This oil pipe, incidentally, provides the variable oil pressure from the propeller governor to the propeller, controlling the propeller's pitch and therefore RPM.



expecting a clearance of that order via the VFR lanes. While waiting for a reply from ATC, the engine rpm, which I had set to 2,450, suddenly surged to about 2,900. My immediate reaction was to pull the power and the propeller pitch back, but pitch control was having no effect and a scan of the oil pressure confirmed it was reading zero.

"I declared an emergency on the Aberdeen frequency, notifying them of a total loss of oil pressure and my intention to try and nurse the plane back to Longside. Aberdeen notified the emergency services. In the course of the next couple of minutes or so, we covered about three miles but lost about 600ft, finishing up at about 900ft on the QNH, about 800ft agl. Not seriously expecting to make the field, we were already scanning for out-landing options. About this time, the engine started to produce 'death rattle' noises, followed about five seconds later by a total stoppage. We were now a glider!

"Our position was mid-way between two sets of HV pylons set at 90 degrees to our northerly track and about one mile apart. On our left and parallel to us, was a field of about 800 yards, slightly undulating and sloping to the south. It was also occupied by a sizeable herd of cows, fortunately most of them off to the west side of the field. I made an immediate gentle left turn, having to pick up my port wing with heavy aileron, due to a cross-wind gust and threaded my way through the cows. Initial touchdown was at a point about 40% into the field, on the mains. This was followed by a couple of short hops over undulations before settling into a fairly smooth run-out, with most of the braking coming from the short(ish) damp grass.

"Cellphone photographs later confirmed the track to be pretty straight, with most of the load being taken on the mains and the lower extremity of the rudder! On coming to rest and ensuring that passenger and pilot were unharmed, systems were switched off and isolated and both parties quickly exited the aircraft, taking the fire extinguisher with them, though fortunately there was no fire and no fuel spillage. It was later confirmed that the tanks

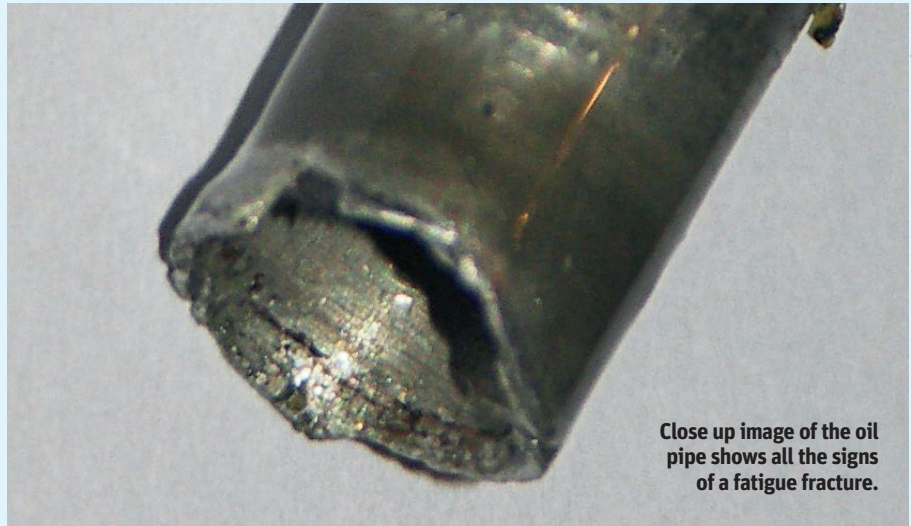


PHOTO John Wheeler

Close up image of the oil pipe shows all the signs of a fatigue fracture.

contained around 90 litres of fuel between them. Help quickly arrived from Longside, being assisted in pinpointing us by an over-flying local, and they quickly surrounded the aircraft to avoid damage by the cows.

"John Wheeler was despatched to Longside for a 'cuppa' and to watch for signs of delayed shock kicking in. None occurred. About 20 minutes after arriving at Longside, police arrived to carry out a breath test on the pilot at the behest of the AAIB, the latter presumably notified by Aberdeen ATC. Needless to say the result was clear!

"Work began straight away to remove the wings and prepare the RV for transportation back to Perth. This task was completed the following evening (Sunday) and the aircraft recovered to Longside on a farmer's low-loader trailer, with immense support from local flyers and handymen. The journey to Perth was completed the following Friday, using a professional carrier from Aberdeen.

"Following arrival in Perth, the upper engine cowl was removed to determine the source of the leak. It was evident that the oil pressure

control line from the prop governor had fractured immediately outboard of the fitting thus resulting in the loss of pressure to the prop and the sudden increase in rpm. This would account also for the total loss of engine oil."

This looks to me like a fatigue failure. The pipe is made of some kind of alloy, not sure what, and it's probably pretty old. The end fitting is a compression type and therefore the material is running at quite a high pre-stress and, fitted directly to the engine, will be in an area of vibration and subjected to continual changes in temperature.

In other words, even though the actual loadings taken by the pipe, generated principally by the oil pressure, are quite low, the material that makes up the pipe would be working quite hard. I think that I would be tempted to take these 'permanent' pipes to bits now and again to take a close look at the area around the flare. John did well to get the aircraft down in one piece after loosing all his oil, but things could have ended up very differently.

## Maintenance schedules

ONE of the problems we are starting to grapple with here at HQ is the management of the maintenance process on our aircraft. If you think about it, it's quite a challenge trying to put together a maintenance regime that accommodates the needs of such a disparate fleet. LAA Engineering is up to the job but, because this is an extremely complicated challenge, we're not rushing into anything.

In the Certified light aircraft world, that is aircraft that operate under a full Certificate of Airworthiness, each aircraft will operate under a maintenance schedule agreed by the CAA at the time of the aircraft's initial approval. Normally, this will be the schedule laid out by the aircraft's manufacturer, but sometimes they may specify an 'off the shelf' schedule like LAMS (Light Aircraft Maintenance Schedule). Some commercial operations, or complex aircraft, may require specific schedules.

Because all our aircraft are essentially classed as individuals it would, at first sight appear obvious to all, just to adopt the LAMS schedule. It's a good schedule but doesn't work very well for very low usage aircraft; and many of our aircraft do less (sometimes far less) than 50 hours per year. It may be that an aircraft would take three years to get to the first 100-hour check, and three years is a long time, for example, between removing, cleaning, checking, and re-greasing wheel bearings,

*'LAMS is a good schedule but doesn't work very well for very low usage aircraft'*

a task normally carried out at the 100-hour annual check.

In my earliest days in aviation, I was a member of a local gliding club where maintenance was very well managed. Every year, each of the club's gliders was de-rigged and fully serviced in the workshop... no argument, everything came off, flying control surfaces, wheels and brakes, pulleys and fairleads, normally even the tow release was sent off for refurbishment. In other words, each season started off with fully overhauled gliders, and most of the members got involved.

Doing it like this was good in a number of ways, and it gave non-engineering types the chance to see how the mechanics of the machine worked under the watchful eye of experienced inspectors and engineers. This was an excellent learning experience for all concerned and ensured that nothing was overlooked.

## EV-97: in-flight canopy failure

HERE is a question: "What am I talking about?" Clue 1: For those of you who follow such things, 2009 was a good year but spoilt by the British weather. Clue 2: I often see these when out walking my dog late in the evening. Er, OK, I'm not very good at quizzes either. The answer is, of course, shooting stars. Or, rather more correctly, meteors. Why, you may ask, should I be interested in such

trivia? Well, last year's passing of the comet Swift Tuttle raised a few eyebrows both here at the LAA and in the offices of the UK AAIB. Here's why.

A pilot, who is an extremely experienced instructor, was flying her EV-97 back to her home airfield after a trip visiting friends. The trip was uneventful up to the point when the canopy exploded. Things then got a little

hairly because the pilot's face was cut quite badly but, demonstrating some excellent airmanship, the pilot got the aircraft back down into a field without any further damage.

Take a look at the pictures and you'll see what I mean. When the chaps from the AAIB and Cosmik got there they couldn't understand what had caused the initial canopy failure or the very localised impact marks around the airframe... especially the wings. Francis Donaldson, the LAA Chief Engineer, had read the paper before coming to work and had noted that Swift Tuttle was passing through the Earth's atmosphere at the very moment of the canopy failure. Bearing in mind that Swift Tuttle only visits us once every 130 years this, if it was the cause, ranks as very bad luck indeed.

After consideration though, no evidence of meteorites were found and it looks like an unfortunate bird hit the canopy which shattered. In the general turbulence created when the canopy disintegrated, a tie-down, you know the sort of thing, a metal screw coupled to a short length of rope, flew out the cockpit but remained attached by the rope (temporarily) to the aircraft. This would (well, may) be the cause of the damage to the wing skins. I spoke to the AAIB about the incident and they confirmed that there was no evidence, or remains of, a bird. I wanted to take a look but the wing skins mysterious vanished... was it the men from the Ministry?



PHOTO Nigel Beal

What could it have been that broke this EV-97 Canopy? Speculation continues as to the cause – and aliens haven't been completely ruled out.

This picture shows the strange damage found on the wing; again, we're not completely sure what caused this damage. The most likely scenario is that the metal tie down came out of the cockpit when the canopy failed but, for a short time, was held back by the tie down rope before being lost.



PHOTO Nigel Beal



# Taylor Monoplane: cylinder head failure

SOMETIMES when I receive a field report about problems affecting one of our aircraft, I know that if I am to have any chance of getting to the bottom of the story, I am going to have to put on my Sherlock Holmes hat, get out the magnifying glass from my top drawer, and ask Ken where I put my cape.

In the case of this puzzle, first reported to me back in November last year, it started fairly straightforwardly with a report from the owner of a Taylor Monoplane describing what happened. I should say that this aircraft had taken quite a few years (and two builders) to get into the air, having been first started in 1973. Sometime in 1974, a new Volkswagen type 126A industrial engine was purchased from the manufacturer and somewhere along the line the cylinder heads were machined to take a second set of plugs.

As is sometimes the case, the aircraft project was sold unfinished to a new builder who completed the machine in 2009. That's 25 years from conception to birth. The chap who completed the aircraft flew it successfully for about 10 hours and then sold the aircraft to another chap who, in turn, flew the aircraft for another 10 hours but, finding the aircraft difficult to start, sold the aircraft to Jeff Llewellyn. I will let Jeff take up the story:

"Having purchased the aircraft, I arranged with the previous owner to leave it in his hangar until I could arrange hangarage closer to home. I was unable to visit the aircraft again until October 2009, when I attempted to start the engine. There is no starter fitted, so the propeller must be turned manually, and I was unable to start the engine.

"When questioned, the previous owner had said that he felt that the engine had become progressively more difficult to start, but put this down to his inability to acquire the correct technique. I had no tools with me to investigate the problem so returned home. I contacted the previous owner who kindly provided a list of possible causes of the engine's reluctance to start."

It's a strange fact that all engines have their foibles when it comes to starting: some won't start unless they are hot, others won't start if they are hot. I think that it's true to say that

*'It's a strange fact  
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it takes quite a while to develop the kind of relationship with an engine that means she'll start first time, every time, for you. In this case Jeff was very much on a first date... let's see what happened next.

"I returned to the aircraft with a colleague who is familiar with the VW engine. Together, we checked through the fuel and ignition systems and also removed the top spark plugs for examination. I rather wish that we had removed the lower spark plugs as well!

"Further attempts to start the engine were successful, almost certainly because my colleague employed the correct technique and a strong right arm. I warmed up the engine and conducted static power runs to a maximum of 2,800rpm. Magneto checks showed no observable difference in rpm although when the right-hand magneto was switched off the engine tachometer fell to zero indicating that the instrument takeoff is associated with that magneto. Oil pressure at idle indicated 30psi and at 2,800rpm, 35psi.

"I shut the engine down and, after a short wait, requested my colleague to restart the engine to check the warm start. As the engine fired, a loud 'bang' was heard and the engine was observed to be running on three cylinders.

"Investigation after shutdown revealed the

This is the plug that decided to leave the cylinder head on a 1600 VW fitted to Jeff's Taylor Monoplane. The full history of this unapproved modification was discovered only after some extensive detective work. All work done to an aircraft should be reported in the log books.



PHOTO Jeff Llewellyn



PHOTO left Llewellyn



This picture shows one of the other badly converted heads off the VW 1600 as fitted. The aircraft, fitted with this engine, had flown for 20 hours before losing one of its lower spark plugs... fortunately on the ground. I am not going to labour the point, but this conversion is asking for trouble. Apart from anything else, the thin area of metal protruding into the gas flow will heat up and probably act as a glow plug causing all sorts of pre-ignition problems.

lower spark plug from number two cylinder had departed the engine. The plug, still attached to its steel insert, was found some distance from the aircraft. Bearing in mind that the engine, including its cylinder heads, was alleged to be new, I was very surprised to see the condition of the plug and that a steel insert had been used in an aluminium alloy head with no apparent means of mechanically locking the two together.”

You can see from the accompanying photographs what has happened. For some reason, a steel sleeve was manufactured to accept the extra spark plugs required for

*‘I checked through the aircraft’s records and could find no mention of this conversion’*

aircraft use. I checked through the aircraft’s records here and could find no mention of this conversion. In fact, I couldn’t say that I liked the look of it at all. It turned out, after wearing out a fair amount of shoe leather, that

the original threads cut into the heads during the original conversion had stripped and another set of heads had been fitted. These heads had previously stripped and the owner took the heads to an engineering firm that specialised in hotting up motorcycle engines. The owner remembers his dad doing the job years ago as a favour for a mate of a mate – you know the sort of thing.

In any event, it was fairly lucky for the owner that he wasn’t on his first flight in the aircraft... a loud bang wouldn’t have been good then, would it?

*Fair Winds.*

## 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

### 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

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