



SAFETY

Nothing like a good gurgle

John Teesdale on why we have to go through the same procedure every time with a four-stroke Rotax

A VERY well known and experienced instructor told me about an incident at his airfield recently where he had to intervene when he saw an unsafe practice taking place.

A pilot had given the job of gurgling the engine to his passenger, who was spinning the prop by hand as if he was trying to start the engine! To make things worse, he was leaning into the prop arc at the same time.

The instructor, who recently had faulty magneto switches on his own Eurostar (a common problem on them) was concerned that if there was a faulty mag switch, the prop could be live, the engine might fire and the innocent passenger could be injured. He stopped the passenger and advised the pilot to do his own gurgling.

I recalled another Eurostar firing up when the engine was being gurgled, so I thought I'd look into the

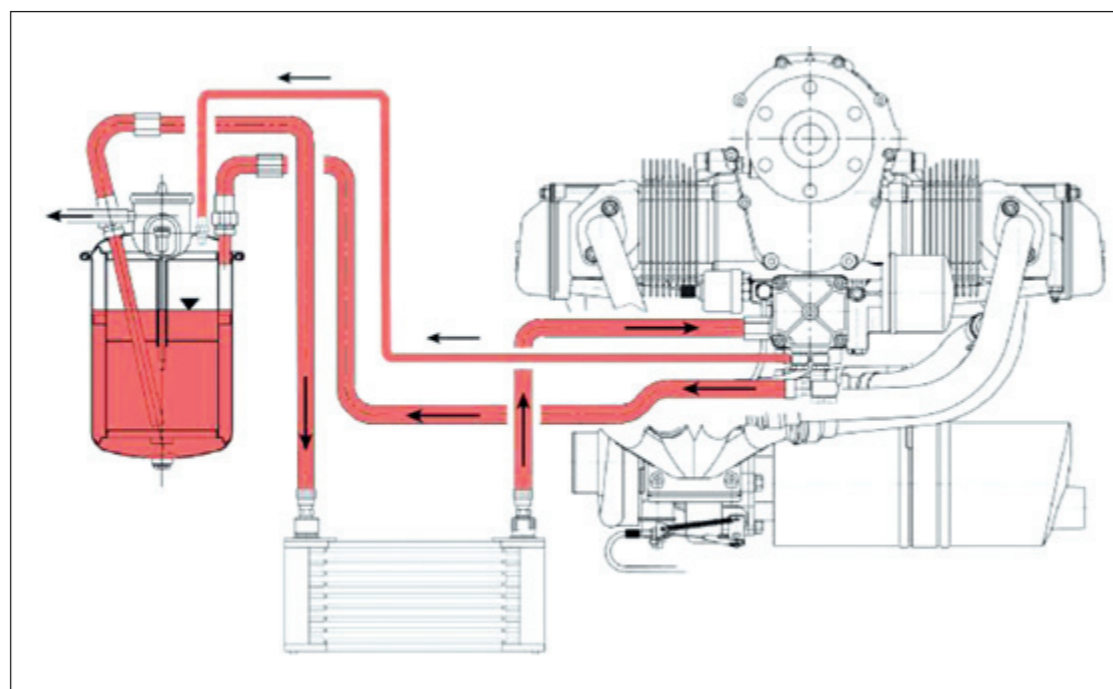
whole Rotax mags and gurgling thing to see if there was a safer way to do it.

I fly light aircraft too, and when I was under instruction, it was always stressed that you should never turn a propeller by hand unless you really have to, and if you do, always regard it as "live" even if the mags are off.

How does it work, then?

I've done some research, talked to a number of experts, learned some things myself and found that there is a good deal of misunderstanding about magneto and oil systems. Knowledge enhances safety, so I hope you'll read on.

Firstly, there are large differences between the Lycoming or Continental engines with separate magnetos and direct-drive propellers that you find in light aircraft, and the Rotax system, which has electronic



Why we need to gurgle: typical oil installation on a Rotax 912

“ The magneto system on a four-stroke Rotax won't produce enough energy to make a spark unless the engine is turned in excess of 300rpm



Even Antonov owners have to clear the cylinders

ignition and a gearbox between the engine and the prop.

The magnetos on light aircraft are designed to produce a big spark in the engine at very low rpm. This, coupled with a direct-drive propeller which is easy to turn, makes hand-swinging the propeller to start the engine relatively easy. Indeed, it is commonplace to hand-start engines.

It's always safer with two people, one on the prop and one sitting in the aircraft with his hands on the throttle and mag switches, but with training it can be safely done by a solo pilot.

The magneto system on a four-stroke Rotax, I have learned, won't produce enough energy to make a spark unless the engine is turned in excess of 300rpm. This, coupled with the fact that you are turning the engine via a gearbox when you turn the propeller, means it is highly unlikely that you will be able to create a spark unless you really spin it over very fast – like the passenger mentioned at the beginning of this feature.

Check those switches before you shut down!

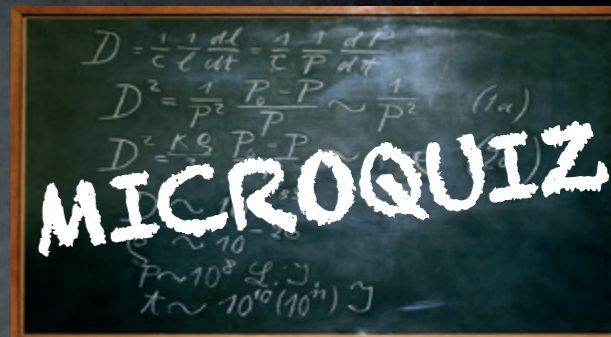
The common thing between the two systems is the function of the magneto switches. They work by connecting the magneto to earth, thus killing the spark. Any fault in the switch or the wire connecting it to earth, including a bad earth contact, will cause the magneto to be live.

That's why you should always check each switch is working before you shut down the engine. It doesn't have to be done at high rpm; idle will do. Just throw one switch and you should observe and hear a drop in rpm. Put it back to "on" and try the other. Both OK? You can switch off now in the knowledge that your prop is not live.

Gurgling – why?

Now just a mention about why we are turning the propeller to gurgle the engine in the first place.

Oil is supplied to the engine from a remote oil tank. A pump on the engine sucks the oil from the tank and then pressure feeds it to the bearings in the engine. After the oil has circulated around the bear- ▷



- 1 What is the maximum total weight authorised for a single-seat landplane equipped with an airframe-mounted total recovery parachute system in the microlight category?
 - a 450kg
 - b 472.5kg
 - c 315kg
- 2 In order to qualify as an amateur-built microlight, the owner must assemble at least...
 - a 30% of the aircraft
 - b 51% of the aircraft
 - c 0% of the aircraft
- 3 A pilot may only carry passengers if they have completed three takeoffs and landings in the last...
 - a 30 days
 - b 60 days
 - c 90 days
- 4 All flights as Pilot in Command or Pilot Under Training must be logged and kept for a minimum of...
 - a two years
 - b six years
 - c 10 years
- 5 Which aircraft has right of way over the other?
 - a An airship has right of way over a balloon
 - b A balloon has right of way over an airship
 - c A flying machine has right of way over a glider
- 6 When two aircraft are approaching head on in flight, each aircraft...
 - a turns right
 - b turns left
 - c must climb or descend
- 7 An aircraft may overtake another on either side.
 - a True
 - b False
 - c True only if it is a glider
- 8 Class F Airspace is...
 - a found around most major airports in the UK
 - b found only around the London TMA
 - c not currently allocated in the UK
- 9 When two aircraft are approaching head on while taxiing,
 - a each turns right
 - b each turns left
 - c both aircraft must stop
- 10 A fixed-wing aircraft operating VFR below 3000ft AMSL at a speed less than 140kt requires a minimum in-flight forward visibility of...
 - a 1.5km
 - b 3km
 - c 5km

MF's quizmaster Lawrence Bell is the developer of QuizAero, the online ground school for microlight student pilots, quizaero.co.uk.

Answers overleaf



SAFETY



John Teesdale shows how not to do it

“ You checked those switches were working before you shut down and you checked they were off before you turned the prop by hand, didn't you?

ings in the engine, it drops into the bottom of the crankcase.

During every compression cycle, a small amount of air escapes past the piston rings into the crankcase. This pressurises the crankcase very slightly. The pressure in the crankcase pushes the oil in the bottom of the crankcase back to the oil tank.

When the last bit of oil is pushed out of the crankcase, air follows it out, which makes the distinctive Rotax “burp” (a bit like getting to the end of a drink when using a straw).

That's what's known as gurgling the engine. The gurgle noise can only be heard with the oil tank cap removed.

Unfortunately, most aircraft installations, I have learned, have the oil tank installed too high or too low. This means that when the engine is standing for some time, the oil either drains from the engine to the tank (too low) or worse, from the tank to the engine (too high).

Either way, the indicated level on the dipstick will be false, so the oil must be purged around the system to indicate the true level.

The best way to do this is by turning the prop very slowly (and if possible pause at each compression point). By pausing, you will allow the air you have compressed in the cylinder to leak past the piston rings into the crankcase, and in turn this will push the oil out.

By turning the prop slowly and pausing, you should achieve the gurgle with much less effort. There is also less chance of making a spark. But you checked those switches were working before you shut down and you checked they were off before you turned the prop by hand, didn't you?

You should now be able to gurgle your engine con-

fidently in the knowledge you have taken the correct steps to ensure safety.

The aircraft in the picture on the previous page is an Antonov An-2, which has a large radial engine. After standing for some time, oil can collect in the lower cylinders, and starting the engine could cause the oil to “hydraulic lock” and damage to the engine, so before starting, the prop must be turned to purge the oil in a similar way to the Rotax.

The chaps in the picture are walking round and round in a circle, each taking his turn to rotate one blade. The same dangers are lurking, though, and if those mags are on or faulty, they're in for an almighty shock.

Safe flying. □

• With thanks to Conrad Beale and Skydrive for the oil system information and images.

MICROQUIZ answers

- 1c 315kg
- 2b 51% of the aircraft
- 3c 90 days
- 4a Two years
- 5b A balloon has right of way over an airship
- 6a Turns right
- 7c True only if it is a glider
- 8c Not currently allocated in the UK
- 9a Each turns right
- 10a 1.5km

BMAA SAFETY ALERTS

Exhausts and exploding parachutes

By Chief Technical Officer Ben Syson

CKT replacement exhausts are now available for BMAA Eurostars, both the Team Eurostar and SL variants.

This is not a factory modification, but a BMAA “series” major modification, so each example requires its own approval.

This is a fairly straightforward paperwork exercise. Contact the technical office for details.

Safety Alert BMAA Ref: BSA-1906-0006

Category: Airworthiness

For: Operators of aircraft with BPRS fitted / BMAA Inspectors

Title: MPD 2019-005 now effective

Description: MPD: updated placarding requirements for all aircraft fitted with a Ballistic Parachute Recovery System (BPRS). Available on CAA website (Google MPD-2019-005). See BMAA TIL 063 for more details. The BMAA has had placard packs produced for aircraft fitted with a BPRS to comply with these new requirements. They're available from the BMAA online shop. □

Training Tip

HERE at MF Global HQ, we're not ones to rest on our laurels, and are constantly looking at ways to improve the world's most fabulous flying magazine.

Well, certainly the best one called *Microlight Flying*.

One of the suggestions from new BMAA Marketing Manager Amanda Lord's survey of instructors was a monthly training tip for students, so we asked the association's training and safety supremo, John Teesdale, to get cracking.

John, obviously a man of action, came back immediately with his first one:

“Don't crash – it's dangerous and expensive. There, that was easy.”

Splendid. He has promised to go into more detail with future tips, but in the meantime, we kick off *Training Tips* next month with Lawrence Bell on how to grease that landing every time, whether you're a student or the editor, who uses the “fling it at the runway and hope for the best” method. □

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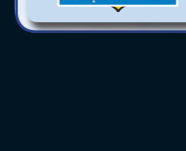
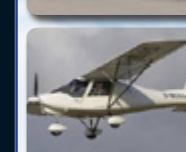
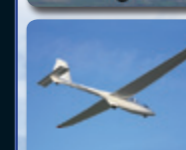
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