So You Want to **Fly a Gyro?**

Flying one isn't as simple as you may have been led to believe. In fact, its multi-stage takeoff requires some serious flying nous.

You can call it an autogyro, a gyrocopter, a gyroplane, or a gyro. Pronunciation aside, it's classed as a microlight, and there are key responsibilities for both pilot and aircraft owner.

The name 'autogyro' is derived from the use of an unpowered rotor to create lift. It's spun by the aerodynamic force created by air moving through the rotor disc.

Forward momentum comes from an engine-driven propeller, which, in most models, also powers a starter motor to get the rotor spinning pre-takeoff. As the rotor generates no thrust, there's no need for a tail rotor to provide counter thrust.

Making a further comparison, in a helicopter, the collective alters the pitch of the blades, but in the gyro, the angle of the disc formed by the blades is tilted to generate lift.

Gyros tend to have a poor reputation resulting from their past, when the designs were generally basic with low centre of gravity issues, a lack of horizontal stabilisers, control stick lag, and the fact that pilots taught themselves how to fly – a number adopting a 'quad bike' type mentality.

But times, they are a changin'.

In the last 10 to 20 years, the gyro has evolved to become a more stable and forgiving machine.

As a Pilot

If you're considering flying one, speak to as many pilots and maintainers as you can, before committing to a particular model and instructor. This will help you to make informed decisions.

Part 149 Organisations

Gyro pilots must hold a pilot certificate issued by a Part 149 (recreational) organisation, and a medical declaration issued by a general practitioner.

In addition to pilot certification, two Part 149 organisations, Recreational Aircraft Association of New Zealand (RAANZ) and Sport Aviation Corp (SAC), provide flight instruction and advice. The New Zealand Autogyro Association is also a good starting point. Check out their web site at www.autogyro.org.nz.

Tauranga-based Solo Wings' owner, Colin Alexander, is a gyro instructor, and LAME.

"We've found many pilots wanting to fly gyros are not cross-overs from other aviation sectors. They don't have much in the way of prior experience, so they need serious training.

"Having reference books, for example, Phil Harwood's publications, are essential for training, as is following a structured training syllabus," says Colin.

Elton Haakma, Chief Flying Instructor of Gyrate New Zealand, says many of Gyrate's students are new to aviation – in their 50s and 60s.

"They're successful business people who've always wanted to fly, and finally have a bit of time and money to give it a go.

"Training currency is a key issue, especially the frequency of training. Most of our students fit their training around a full-time job. So being busy people, a good number have trouble finding time to memorise checklists, study for exams, and practise their radio calls.

"Because of those irregular training schedules, and the peculiarity of the gyro, it often takes twenty or more hours to go solo, as the student needs to consolidate those skills. There can be a lot of movement in the yaw, roll, and pitch axis on takeoff and the landing flare. To head and track straight involves a bit of cross controlling. If I had a dollar for every time I said right foot, left stick, I'd be a rich man," says Elton.

But like all other sectors of aviation, continual learning is the prerequisite of success. After you're flying solo, it's always worth doing some refresher training.

"Even after just a couple of months of going off on their own, I'll start to notice little bad habits creeping into their standard operating procedures. Imagine a couple of years!" says Elton.

Photo courtesy of Mike Scoon.

Rotor Management

The gyro involves a fairly complicated multi-stage takeoff procedure. See *Gyro Takeoff Profile* diagram below.

The controls, however, are quite simple, says Bruce Anderson, Director of Gyrate NZ.

"The tricky part is getting your rotor management sorted when you are ground manoeuvring, and this is peculiar to gyros. Leading to the takeoff, the rotors need to be spooled up smartly, to avoid blade sailing. And subsequently, for a smooth departure, they need to reach a higher RPM in the takeoff roll."

Every make of gyro has a particular speed at which the rotor disc becomes centrifugally taut, says Mike Ross, New Zealand Autogyro Secretary/Treasurer.

"You really need to read the pilot operating handbook to fully understand and comply with what that speed is.

"Also, if you run into any issues on takeoff, just pull the power back and stop. Some pilots get into a panic if they, for example, get three quarters of the way down the runway and are still on the ground, even though their speed would normally see them airborne. They'll panic, pull back, the disc will bite the air hard, and the gyro will flip over on to its back," says Mike.

Technical Flying Skills

"What I'd like to get across," says Elton, "is that flying a gyrocopter is more like flying a fixed wing aircraft than a helicopter.

"When airborne, it feels easy and relaxed. That's because at height, it can slow down to zero airspeed without stalling or spinning out of control."

Forced landings without power involve a much simpler process than that for a fixed wing or helicopter. The gyro doesn't need to lower any collective to enter autorotation – it's already in it. It just needs an area the size of a tennis court to land.

"Recreational gyro pilots tend to be flying lower and slower than many aircraft," says Bruce Anderson, "so be extra vigilant about rising terrain, maintaining minimum heights, and exit plans.

"As soon as you've lost that minimum height, then you've lost the chance of recovery should something go wrong.

Bruce also dissuades pilots from trying to emulate what they see on YouTube.

"Mustering and demonstration flying takes a heap of skill, and whilst most modern gyros are pretty nimble, like all aircraft they're only as good as the flight control directions they are given.

"For those who have flown fixed-wing, their training has been all about avoiding the stall. The gyro's slow descent takes a little getting used to for some pilots.

"Given that, plus that we are typically travelling at slower speeds – 60 to 80 knots – and can be overtaken by faster aircraft, there is real benefit in broadcasting accurate position reports that local pilots understand," says Bruce.

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Gyro Takeoff Profile

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Weather Considerations

With New Zealand's varied weather conditions, it pays to reduce your speed whenever encountering turbulence. Keep the disc loaded and avoid zero-G pushovers.

"Gyros, in fact," says Bruce Anderson, "can handle turbulence more comfortably than any fixed wing due to high rotor speed and small blade surface area."

As an Owner

As the gyro is classed as a microlight, it has to be registered with the CAA, and changes of ownership must be notified. One seater gyros are registered as Class 1 microlights, and two seaters are registered as Class 2, which also require a flight permit due to the additional duty of care associated with carrying a passenger.

The first question to ask yourself is whether your gyrocopter is airworthy. To make it *legally* airworthy, your gyro needs to be well maintained, with the correct documentation.

Maintenance

Gyro owners can perform their own routine maintenance – both a good and bad thing.

Bruce cautions that with flexibility comes added responsibility.

"We enjoy the more relaxed New Zealand microlight rules, but it's up to us to maintain our own high standard within those boundaries, both mechanically and personally. This isn't your car or tractor, so don't be lazy and think you'll get onto it later."

Solo Wings' Colin Alexander witnesses pilot maintenance shortfalls on a daily basis.

"A lot of people go flying, blissfully unaware that their maintenance is overdue.

"Details that are often missed are the aircraft's annual inspection, and the finite life of certain components, such as the engine rubber components, teeter bolt and bearings, engine, and rotors.

"If pilots are doing their own maintenance," continues Colin, "do they actually have the competence to do it? An engineer will often notice maintenance issues that an untrained eye won't."

Rule 103.105 *Documents to be carried* outlines flight permit responsibilities.

"You need to carry the flight permit in the aircraft. The inspection sticker on the aircraft is purely a revalidation of the permit.

"The permit must also be representative of the current state of the aircraft. A modification made without approval, contravenes the flight permit conditions. Modification approval can either be sought from a Part 149 organisation's technical officer, or the CAA," says Colin.

Airworthiness Directives

Class 2 microlight owners are required to keep logbooks for the aircraft, engine, and propeller, and must also comply with Airworthiness Directives (ADs). ADs for gyros are issued under the Microlight heading on the CAA web site.

See www.caa.govt.nz, "Airworthiness Directives > Microlight" and come to grips with the system. You can also subscribe to the CAA email notification service for "Airworthiness Directives", and "Airworthiness Issues", to keep up to date.

Also subscribe to, and regularly check, the manufacturer's service bulletins. It's important to make sure the aircraft remains compliant with all manufacturer requirements.

Microlight Owners Seminar

On 9 November 2017, the CAA is hosting a seminar to try to help microlight pilots gain more knowledge in a number of areas, including:

- certification and flight manuals
- maintenance and inspection requirements
- construction and endurance testing
- flight instruction
- airspace and minimum heights
- weather and operating limitations, and
- accidents and investigations.

See the CAA web site for more information. ■

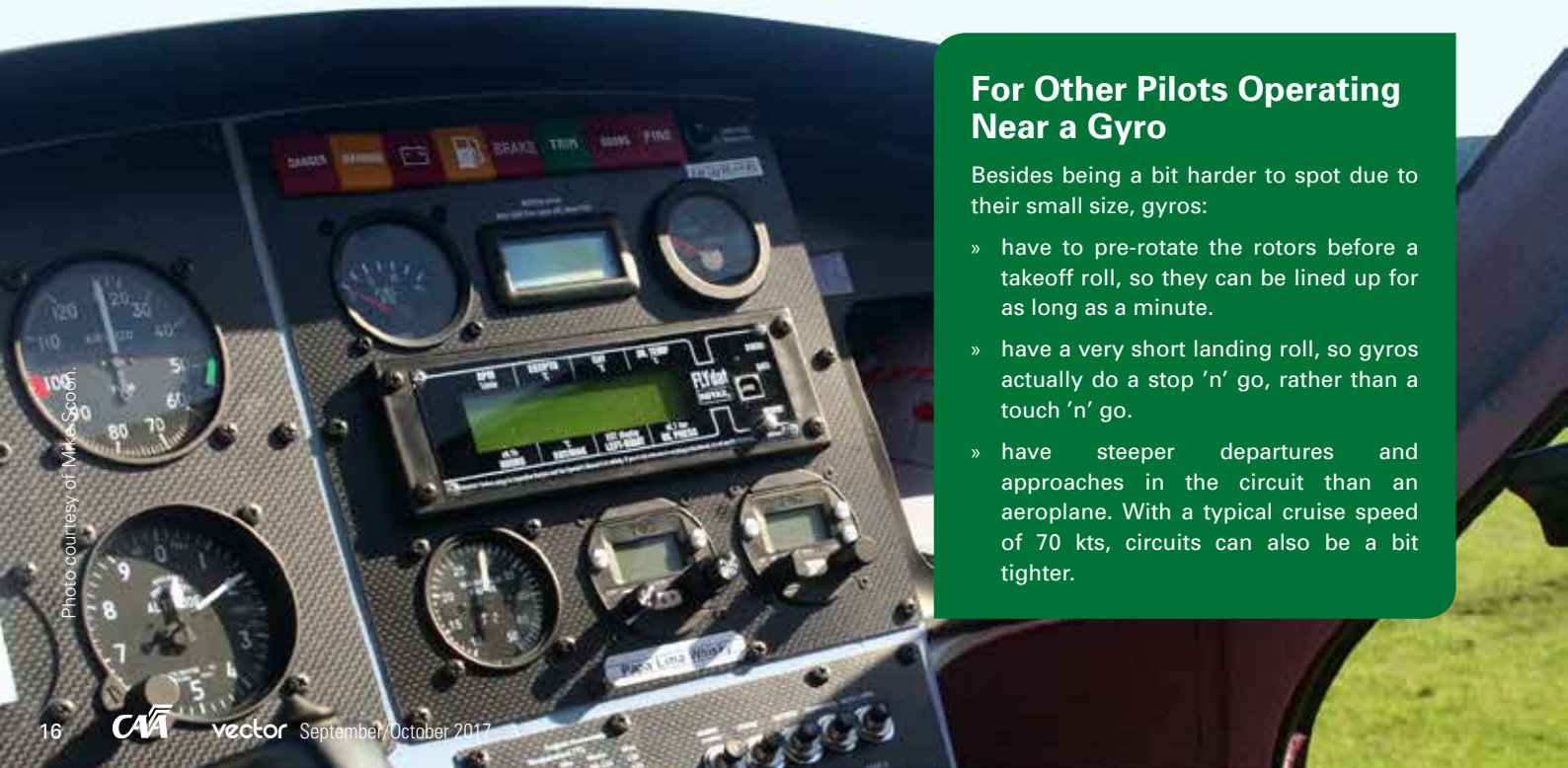

Photo courtesy of Mike Spoon.

For Other Pilots Operating Near a Gyro

Besides being a bit harder to spot due to their small size, gyros:

- have to pre-rotate the rotors before a takeoff roll, so they can be lined up for as long as a minute.
- have a very short landing roll, so gyros actually do a stop 'n' go, rather than a touch 'n' go.
- have steeper departures and approaches in the circuit than an aeroplane. With a typical cruise speed of 70 kts, circuits can also be a bit tighter.