FLYING IN THE FACE OF GRAVITY

The universal association with Red Bull Sports is that it's the real-life equivalent to a guild of superheroes, their sponsorships reserved for an elite few who are pushing the boundaries of human capabilities. Red Bull Aerobatics Pilot Patrick Davidson is one such super-human firmly rooted on South African soil (when he's not hurtling through the sky).

/ BY LAUREN ENDRODY /

SITTING DOWN FOR my Zoom chat with Patrick Davidson, one wouldn't think he spends much of his time upside down in an aircraft travelling at speeds and pulling off manoeuvres that can only be likened to the way UFOs travel in sci-fi movies. I'm not sure what such a person would typically look like, but Patrick simply seems like your average down-to-earth guy from Port Elizabeth who enjoys a good braai on weekends.

WINGS BEFORE WHEELS

What makes Patrick the ideal candidate to have become the daring sky-runner he is today, however, lies beneath the surface – in his genes. His father was an SA Unlimited aerobatics champion – Unlimited being the highest skill-level in aerobatics, one step above Advanced, and one below absolutely insane. Before most kids his age had even mounted their first bicycle, Patrick was strapped into the co-pilot seat of one of his dad's planes, jetting around with him from the age of five. He also got his pilot's license before his driver's, without a moment wasted – the day he turned 17; 'The youngest that you're legally allowed to do it.'

BEYOND THE COCKPIT

It's clear that Patrick and his dad take their flying seriously – and if they're not flying aeroplanes, they're buying and selling them. They usually have anywhere between 10 and 20 aeroplanes at their hangar in Seaview, PE. Some are for sale, others not – for example, the Harvard in which Patrick did his license and the 1929 Gipsy Tiger Moth that belonged to his grandfather. Although the majority of Patrick's time is taken up by his demolition earth-moving business, he tries to squeeze in a flight or two on weekends and mornings before work. Having a plane does come in handy sometimes, though: 'I fly my family around; I fly for the business. I go to sites all over the country and sometimes I take the clients with me – as an "added benefit".'

RED BULL GIVES WINGS INDEED

'Before Red Bull, I never did air races but other [aerobatics] events and competitions,' Patrick says, but he really wanted to try his hand at air racing. So an acquaintance at the time, Greg Ritz, put him in touch with local Red Bull Athlete Manager Josh Enslin. It just so happened that, not only was Red Bull looking to fill the void left by the passing of former SA Air Race pilot Glen Dell, but Josh already had a meeting lined up with Red Bull's international representatives. He presented a video CV of Patrick to them – 'And eight to ten days later, I had an invitation to a training camp at Red Bull Air Race,' says Patrick. In addition to securing himself an entry into the Air Race that day, he also landed himself a full aerobatics sponsorship. 'Since then, Greg's become my manager and good friend,' he adds. Today, Patrick has two Air Race seasons under his belt, in 2018 and 2019, making up a total of 11 races in countries all over the world including Russia, Hungary, Japan, France, Austria and the US.

TRAINING AND GEAR

To prepare for competitions and races, Patrick enjoys keeping fit with the help of mountain biking, but, he says, 'Leading up to an event, I actually stop training,' to avoid injury. So, his mountain bike is replaced with a spinning bike. And, not surprisingly, 'Time in the saddle. There's no replacement for that.' However, training for air races is different from that of aerobatics competitions. Although the Air Race requires less preparation than competition aerobatics, it's harder to train for because, 'The aeroplane that I have is completely different to the one I fly for the race,' Patrick says. Not to mention the fact that there's no way for him to replicate the Air Race course. 'If I had to do what we did at the races, I'd probably end up in jail. You're operating six or seven metres off the ground, and you're in the middle of the city and you don't have any pylons. So to try and do that here is virtually impossible.' All he can do is keep his G-fitness up, train his reflexes, and get his body and neck warmed up.

The average strength of the G-forces in air racing and aerobatics is around 10. That's four Gs stronger than the roller coaster that holds the record for the highest amount of Gs in the world – the Tower of Terror at Gold Reef City. As Patrick explains, 'G is mass × acceleration, so if you're carrying 100 kg and you start pulling 10 G, that's 1 000 kg on top of your 100 kg pushing down on you in your seat.' So Patrick tries to keep his weight at an optimal level.

Pilots don't typically wear G-suits in aerobatics and air racing because they can be cumbersome and add to their weight.

THE HISTORY OF AEROBATICS

Aerobatics originated in WWI when fighter pilots realised that being able to pull off rapid, unexpected manoeuvres in their aircraft gave them an advantage in evading enemy aeroplanes. Pilots began developing an arsenal of aerobatic moves and, in late 1916, a systematic teaching of aerobatics techniques began to emerge. Following the war, these pilots capitalised on their acquired skills by participating in air shows and stunt-flying exhibitions. In 1934, the first World Cup of aerobatics was held in Paris, with six participating European countries. In 1960, competition aerobatics became organised on a global level with the establishment of the International Aerobatics Commission and the first real World Aerobatics Championship was held in the Czech Republic that same year.

Travelling at a speed of around 450 km/h and as low as 10 m from the ground, you want to be as comfortable and agile as possible, not only for flying, but also for when things go wrong and you have to make a swift escape. Patrick says, in an emergency, they're trained to do a 'zoom climb' to try and get as high as possible and buy some time to release their seat belt, pop the canopy, jump out, and deploy their parachute, all in a matter of seconds – no explosive ejection here. 'The plane doesn't have any airbags but we wear a helmet – that should help for something. Plan A is don't crash.'

Pilots wear fire-retardant flight suits, boots, and Nomex underwear, and their helmets have a quick release for the parachute. Patrick's personal choice of footwear is Alpinestars motor racing boots with flat soles for optimal feel on the pedals, 'because any little movement on the rudder pedals creates movement on the tail, and essentially creates drag, which makes you slower,' he says.

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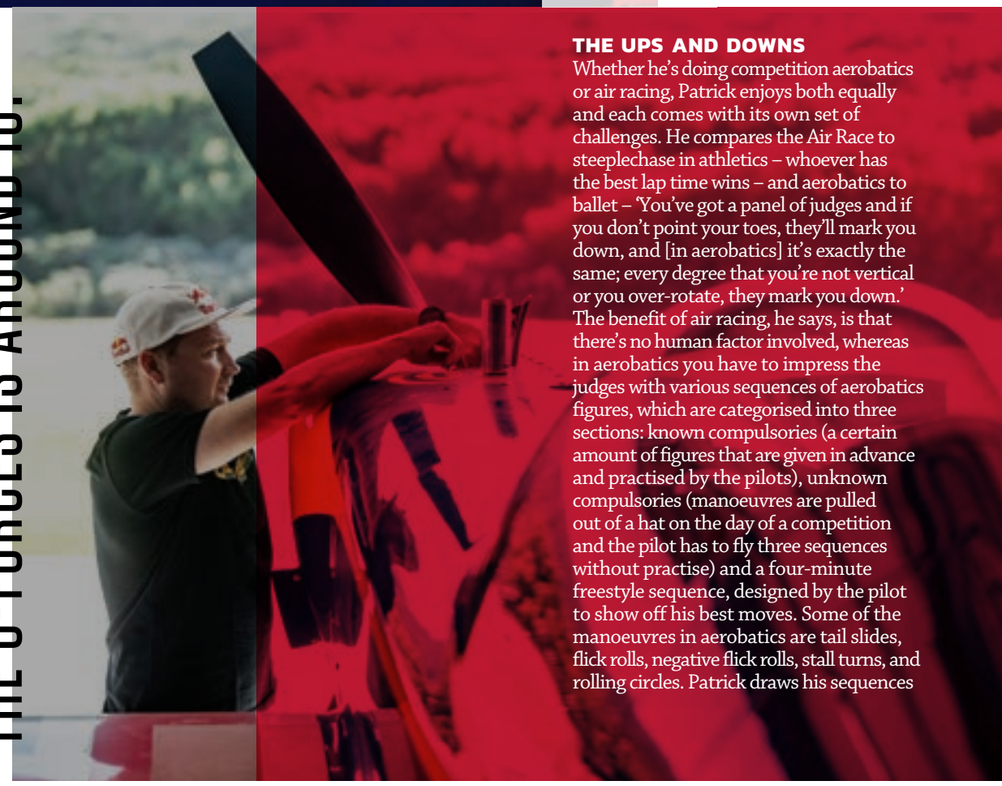


THE UPS AND DOWNS

Whether he's doing competition aerobatics or air racing, Patrick enjoys both equally and each comes with its own set of challenges. He compares the Air Race to steeplechase in athletics – whoever has the best lap time wins – and aerobatics to ballet – 'You've got a panel of judges and if you don't point your toes, they'll mark you down, and [in aerobatics] it's exactly the same; every degree that you're not vertical or you over-rotate, they mark you down.' The benefit of air racing, he says, is that there's no human factor involved, whereas in aerobatics you have to impress the judges with various sequences of aerobatics figures, which are categorised into three sections: known compulsories (a certain amount of figures that are given in advance and practised by the pilots), unknown compulsories (manoeuvres are pulled out of a hat on the day of a competition and the pilot has to fly three sequences without practise) and a four-minute freestyle sequence, designed by the pilot to show off his best moves. Some of the manoeuvres in aerobatics are tail slides, flick rolls, negative flick rolls, stall turns, and rolling circles. Patrick draws his sequences

by hand and sticks them on his dashboard as a reference during flight. He says you can't really memorise them because there's so much happening almost at once. You're upside down and right way up, rolling at a rate of 500 degrees per second – it's very easy to get disorientated.

In the Air Race, on the other hand, although it's less mentally taxing, other factors come into play. 'They monitor everything from the G-forces to the entry speed through the first gate, measured in ground speed, so you've got to take the wind into consideration,' Patrick says. Since it's a televised event with an audience who has paid to be there, the show goes on, no matter the weather conditions – the pilots simply have to tough it out. 'With the Air Race, we've flown in pouring rain conditions, gale force winds. If the plane is 90 degrees, like with a kite surfer, the whole wing becomes a kite, so it pushes you and as you rotate straight to get the wings level to go through [the pylons], the picture doesn't look good. If you have a big cross wind, you have a lot of pylon hits,' Patrick says.

THE TECHNICAL STUFF

What the planes are made of:
Although many planes such as the Russian-built Sukhoi mostly consisted of titanium, the more modern aerobatics planes are predominantly made of carbon composite. That's because it's more economical and bendable, so planes can more effectively withstand the forces they're exposed to, resulting in a longer lifespan. Earlier planes were made of timber and fabric, but they needed a lot of maintenance and had an expiry date.

How they're reinforced:
According to Patrick, the real strength of the plane lies in the wings and internal structure and not so much the fuselage, as one might be inclined to believe. The fuselage has a tubular frame with carbon panels or fabric, or both, whereas the wings are one piece of solid carbon composite with a spar, which fits into a recess in the fuselage. However, he adds, 'The aircraft which I fly, the GameBird, is in fact the only modern-day unlimited aerobatic machine that uses a two-piece wing with a male-female sliding-box section and a fully moulded composite fuselage. This makes it much stronger and it has better longevity than any other design on the market today.'

What's in the cockpit:
Patrick says there's 'no air con', only two little vents that can be opened or closed and adjusted in the direction in which you need airflow but, in air-racing conditions, they're usually closed to eliminate drag. The altitude, engine temperature and pressure constantly needs to be monitored during flight, but Patrick says his state-of-the-art GameBird does all of that for him on a computer screen that shows 'everything from artificial horizon to everything that can be controlled from there, so I don't need to look down; I just focus on the screen. It gives you warnings if there are oil pressure issues, oil temperature issues', and so forth.

Necessary inspections:
Patrick does all the inspections himself. He checks that the fuel doesn't have any water in it and changes his oil every 25 hours because the engine works so hard. He inspects the engine mountings after every couple of flights, too, 'because they really take a hiding'. Finally, he checks that all the nuts and bolts are in position as well as for 'hangar rash' – whether the plane suffered any damage while in the hangar, because, 'if the structural integrity is compromised, it can be catastrophic'. **PM**

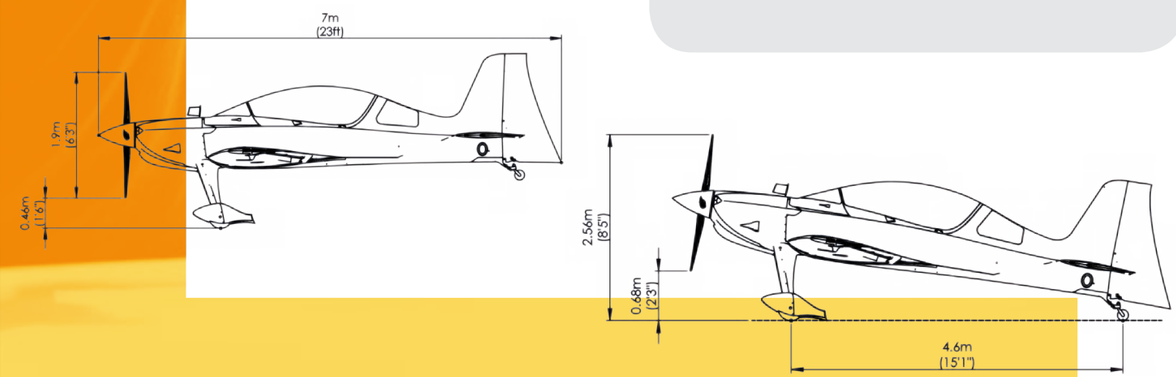
QUICK QUESTIONS:

POPULAR MECHANICS: Favourite manoeuvre?
PATRICK DAVIDSON: I have a move I call the 'pancake', which is really fun and looks really sick from the outside. The end result, from a pilot's perspective, is reasonably predictable so it allows me to do it at a lower altitude for the spectators.

PM: What are the first steps to becoming an aerobatics pilot?
PD: My best advice to any up-and-coming aviator is if you want it badly enough, you will find a way to make it happen! A good first step would be to pay a visit to your local flying club and arrange an introductory flight … and see if it blows your hair back.

PM: What's next for you?
PD: 2021 holds promise for a completely new international race series called the World Championship Air Race, which I hope to be involved with. At this stage, the European Unlimited Champs have been confirmed for 2021 as well as two aerobatic events in the USA with Game Composites, which I plan to attend if COVID lets me! On the local scene, we are still waiting for the 2021 air show calendar to be released, and in my spare time Red Bull and I have some really awesome athlete projects we are working on, so, fortunately, I will be nice and busy with lots of flying next year!

PHOTOGRAPHY: ADOBE STOCK IMAGE, COURTESY IMAGES



Illustrations: The full carbon-fibre composite GB1 GameBird was designed by aerobatics champion Philipp Steinbach to be the best aerobatics and touring aeroplane in the world.

THE STRENGTH LIES IN THE WINGS AND INTERNAL STUCTURE.