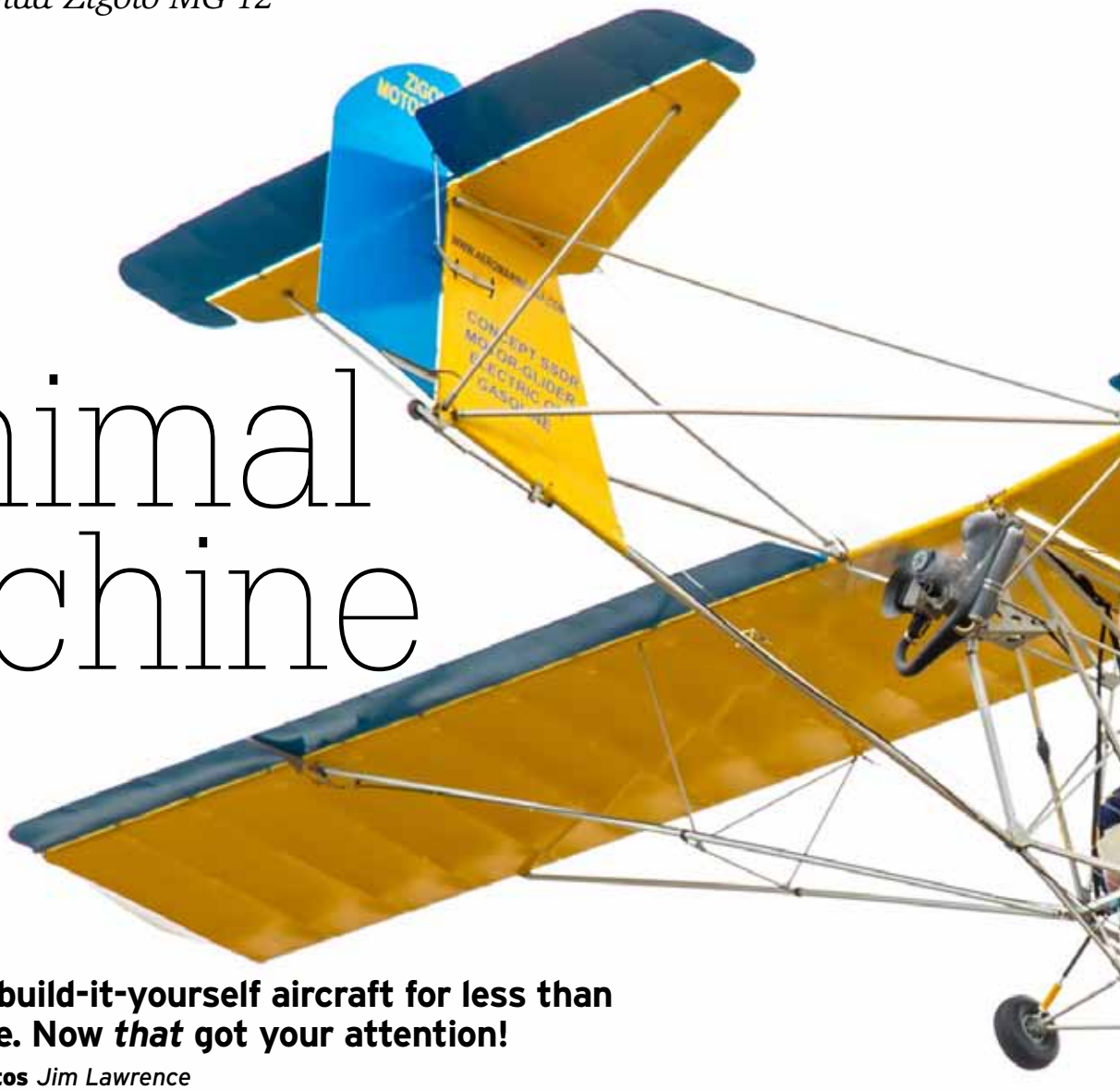
Minimal Machine



An unregulated, build-it-yourself aircraft for less than £8,000 complete. Now *that* got your attention!

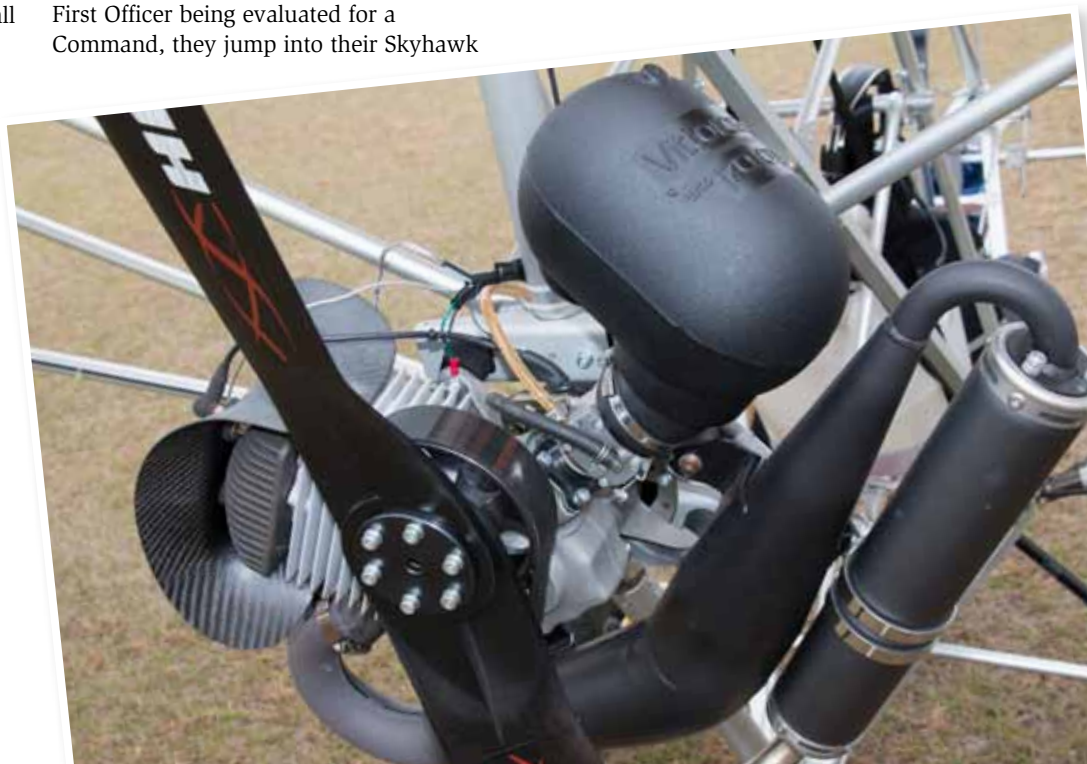
Words *Dave Unwin* **Photos** *Jim Lawrence*

"So what's in the next issue then Dave?" I was asked recently at the gliding club bar. I showed my esteemed colleagues a picture of the machine and explained that it was called Zigolo (a small Italian bird) not Gigolo, and is a Single-Seat Deregulated (SSDR) aircraft.

"De-regulated eh?" Observed a veteran instructor, "so does that mean you can buy one of these contraptions, then just go and fly?" "Just go and die you mean," guffawed a tug pilot.

"Well, that observation just shows a fundamental failure to grasp the facts," I grinned, "I know some of you old pelicans think that the introduction of the SSDR class could revolutionise suicide, but you still need a licence!"

Flying for fun means many things to many people – and is highly subjective. Some pilots fly a 172 as if it were a 727. They love to read every possible Notam and then check their fuel, weight and balance, and the weather at their destination and at least two alternates, with the thoroughness of a Constellation captain about to leave London for New York into the teeth of a gale. Then, having reviewed the V-speeds and emergency procedures with the diligence of a Senior First Officer being evaluated for a Command, they jump into their Skyhawk and hop over the hill. Now, I fully accept the irrefutable truth of 'the six Ps' and agree that there can be a certain smug satisfaction about concluding a flight that was both well planned and perfectly



executed.

However, I wouldn't describe it as fun – not the sort of fun that induces a grin as wide as a wingspan anyway. And for many of us, the principal reason we fly is for fun. Not to go anywhere but up, nor for any other reason than that the sky is always waiting, but never impatient. Unfortunately this very pure idea became tainted along the way, as the Austers, Champs and Cubs of our forefathers were replaced by efficient but banal 1960s spamcans. And as the fun diminished the costs rose in proportion!

One of the original ideas behind the whole US Light Sport Aircraft concept was affordability, but with some aircraft now costing north of $200K that particular principle seems to have been forgotten. Consequently, when Aeromarine's Chip Erwin told me at the 2014 Sebring LSA Expo that he was bringing a new aircraft to market that required minimal assembly yet cost $16,000 or less, including the motor and a parachute rescue system... well, you can bet I was interested. Called the Zigolo, this super-lightweight motorglider is designed to meet SSDR rules, while also being extremely competitively priced. A 'classic' kit (including engine and BRS) is only $14,500 (£8,000 in the UK) while the Almost-Ready-To-Fly version (which – it is claimed – can be assembled in an afternoon) is $16,000. Build time for the classic kit is claimed as 100 hours.

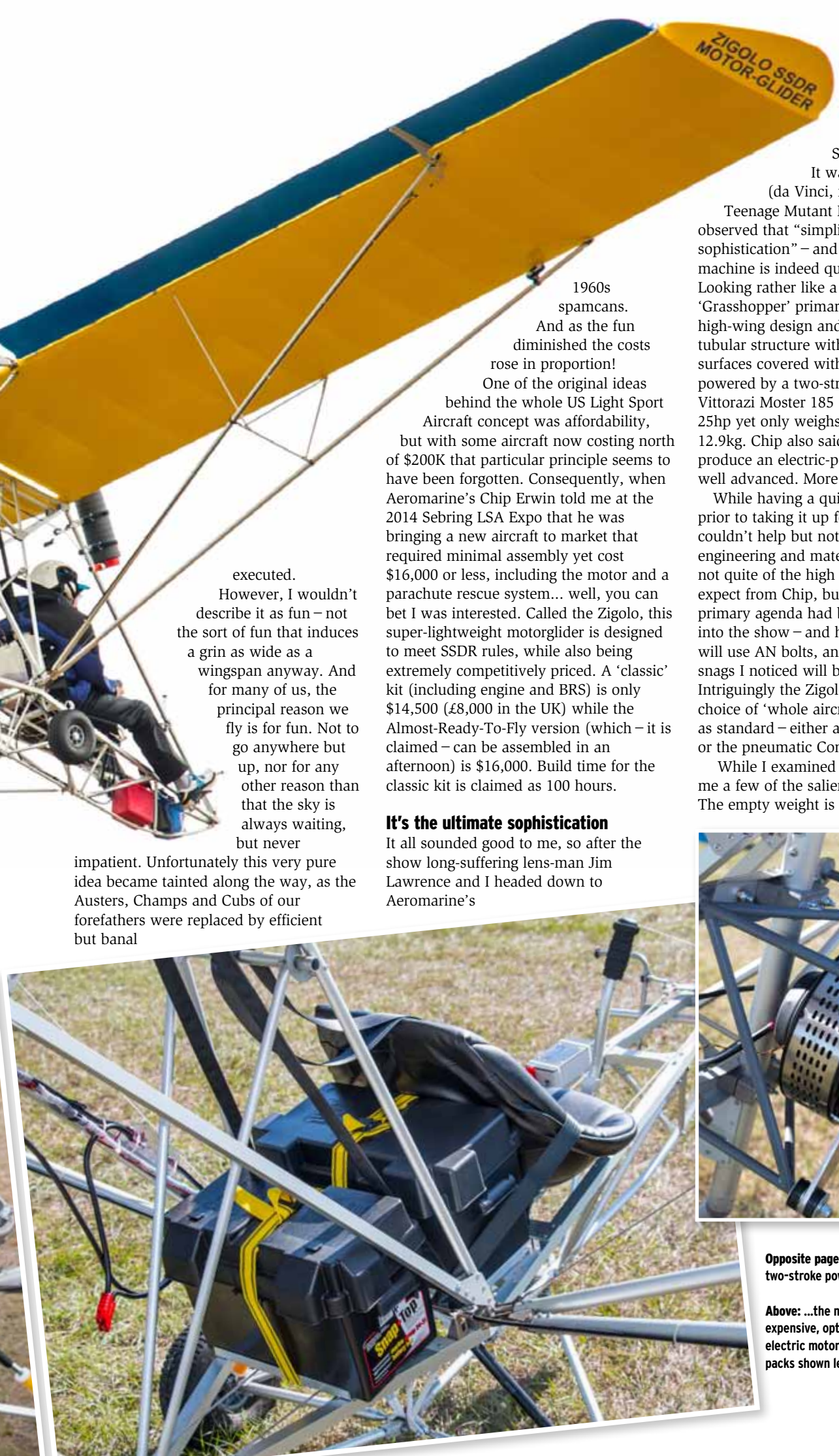
It's the ultimate sophistication

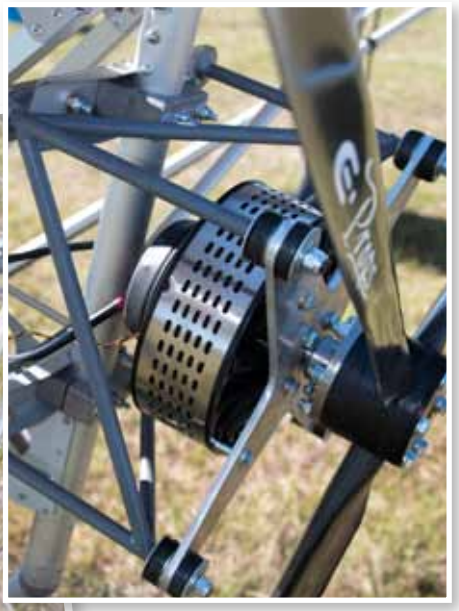
It all sounded good to me, so after the show long-suffering lens-man Jim Lawrence and I headed down to Aeromarine's South Lakeland base.

It was the great Leonardo (da Vinci, not di Caprio, nor a Teenage Mutant Ninja Turtle) who observed that "simplicity is the ultimate sophistication" – and this seemingly simple machine is indeed quite sophisticated. Looking rather like a 1950s Slingsby T.38 'Grasshopper' primary glider, it is a high-wing design and features a traditional tubular structure with the wings and tail surfaces covered with fabric. It is currently powered by a two-stroke single cylinder Vittorazi Moster 185 engine that produces 25hp yet only weighs a very impressive 12.9kg. Chip also said that plans to produce an electric-powered version are well advanced. More on this later.

While having a quick poke around it prior to taking it up for a quick flip, I couldn't help but notice that some of the engineering and materials were perhaps not quite of the high standard I've come to expect from Chip, but in his defence his primary agenda had been to fly an aircraft into the show – and he did. Production kits will use AN bolts, and the other minor snags I noticed will be addressed. Intriguingly the Zigolo is offered with a choice of 'whole aircraft recovery systems' as standard – either a rocket-propelled BRS or the pneumatic Comelli system.

While I examined the aircraft Chip gave me a few of the salient facts and figures. The empty weight is 102kg and the





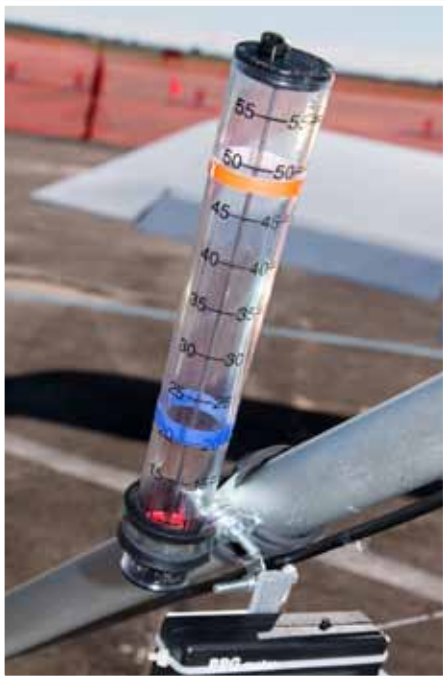
Opposite page: while air-cooled, two-stroke power is standard...

Above: ...the more 'eco-friendly', if expensive, option of a saucepan-sized electric motor is available (dual battery packs shown left)

Below: the undercarriage gives rising-rate, fully damped springing through the ingenious combination of gas struts and polyurethane blocks

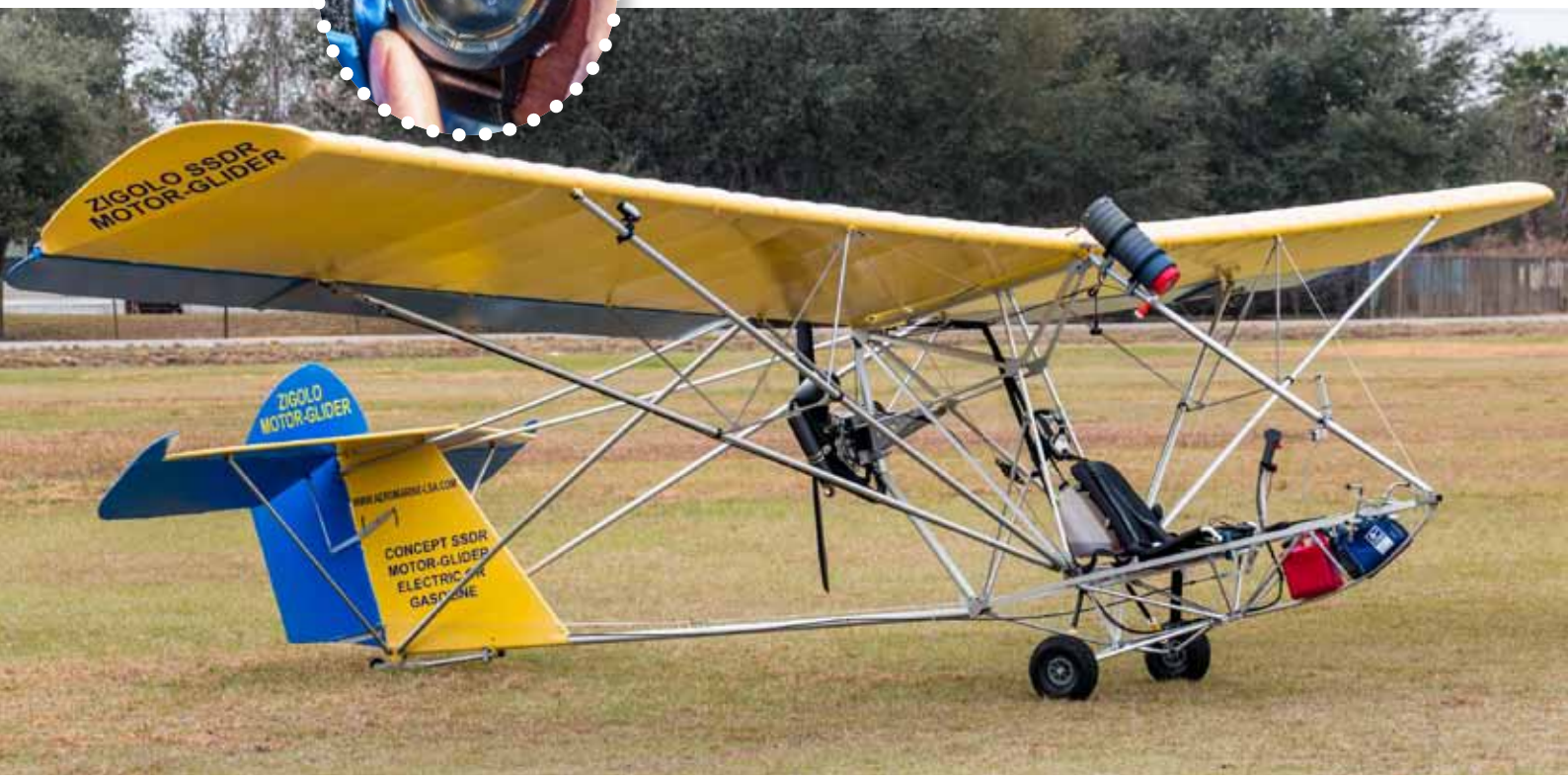
Right: airspeed indicator has one moving part and is about as simple and stone-reliable as you can get

Far right: if all else fails, the ballistic recovery parachute is there to bring man and machine back to Earth with a bit of a thump – but intact



From left: very basic engine monitoring unit nonetheless provides cylinder head and exhaust gas temps, 'Hobbs time' and RPM – those who simply cannot fly without GPS are advised to use something like the wrist-mounted Garmin (inset); and detail of the teleflex push/pull cable aileron control, showing adjustable position and gearing

Below: veteran glider pilots could be excused for thinking the 1940s Dagling primary trainer has been reborn. The metal-frame Zigolo is, however, better triangulated and more of a 3D job



CHIP CHAT

Having enjoyed my introduction to the SSDR concept, I sat down with Chip for a chat. This included an overview of his involvement with the Zigolo and a discussion of the proposed electric version (which is the variant that particularly piques my interest). It soon became apparent that a viable electric Zigolo isn't just idle Chip-chat, but very much a work in progress, as he now has more than ten hours in it. He said that "my impressions are that electric is really cool. I was initially slow to pick up on this technology, preferring to let others develop aircraft and systems. Good thing too, as the technology was a bit crude and is only just now getting sorted. Indeed," he continued, "I am still not yet convinced that electric power is viable for larger GA aircraft. Ultra-light aircraft make the perfect test-beds as they require so much less power to stay airborne. And no one cares about slow cruise speed when you are not going anywhere, so one can conserve amps and fly slow. For a machine like the Zigolo, electric is the way to go, being basically maintenance free, odourless, clean, and quiet. Especially quiet. I don't like flying at 500 feet with any aircraft, and especially a two-stroke. But now I enjoy it a lot. Now that I know something about electric power and what is coming in new technology I am convinced of its viability. I am now refining my system integration for optimization on endurance, performance and prop noise (the only real noise left to reduce). I plan to offer a fully finished (some assembly required) ultralight motor-glider with 45 minutes' endurance and rescue parachute all for under $25k with deliveries later this year. I am on track to meet those targets."

MAUW 220. It's 5.5m long, 1.3m tall and has a wingspan of 11.1m. The power loading is11.8kg/kW and the wing loading of 13.9kg/sq m. It stalls at 19kt and has a Vne of 50. Claimed cruising speed is 36kt while burning 6lit/hr, and with the motor off the minimum sink rate is 276fpm at 24kt and the best glide a claimed 11:1 at 28. Anyway, that's enough facts and figures: is this thing as much fun to fly as it looks? Only one way to find out – fly it!

Unfortunately the weather could've been kinder; the wind is reassuringly light, but the visibility being best described as 'gloopy'. However, as both Jim and I are scheduled to leave Florida imminently and the weather is forecast to deteriorate I decide to give it a go. With a rather ill-fitting helmet on my head I feel a bit like Toad of Toad Hall, but rather than *Wind in the Willows* it's going to be more a case of *Wind in the Wires*!

Strapping it on

Having strapped on the Zigolo (well, that's what it feels like) I examine the instruments and controls. As you'd expect these are an object display in minimalism, being a single LCD unit for rpm, CHT, EGT and engine run time, plus a very simple ASI. Also of note is the throttle which is – in my aeronautical experience – unique, being a trigger on the stick. While I'm not sure how well this arrangement is going to work with an internal combustion engine, it's clearly perfect for an electric aircraft – it very much resembles a Scalextric controller!

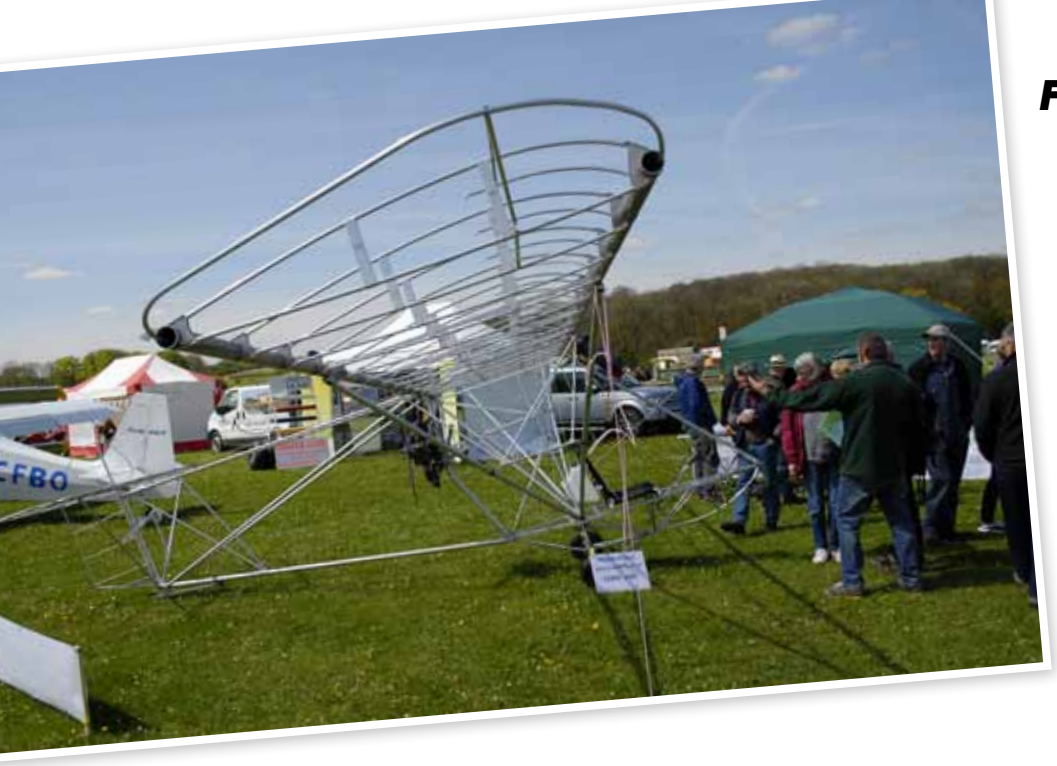
Chip gives the pull-start an energetic tug and the little motor bursts into life. With his parting words ringing in my ears ("no stalls, spins or high-speed stuff – we haven't had a chance to expand the envelope yet") I trundle cautiously towards the runway. Why cautiously? Well – as I'd expected – taxying out soon revealed that with the combination of three wheels, no brakes and a fixed tailwheel (a castoring unit is in design) manoeuvring on the ground is somewhat challenging. However, I soon realise that – contrary to what you might expect – what was required was for this machine to be taxied boldly, as the only way to do a 180 is stick full forward, squeeze the trigger briefly (to blip the engine and thus raise the tail), full rudder and deftly pirouette around while blipping the engine to keep the tail up! I even tried leaning out to one side, on the grounds that my not-inconsiderable bulk would increase the rolling resistance on that side. Chip wasn't convinced, but he's a lot lighter than me! Even with the tail down the field of view is incredible – there's no need to zig-zag in a Zigolo.

As I often fly several different types (and sometimes different classes) of flying machines in a day I have developed my own generic SEP checklist, which takes the form of an unwritten 'flow check' around the cockpit. Sitting on the end of the runway with the motor idling behind my head I have the distinct feeling that I've forgotten something, but one more check convinces me that I haven't, so I resolutely tighten my harness and chin strap, aim down the runway and – quite literally – pull the trigger! The engine buzzes busily and we start to move. As the speed begins to increase time seems to slow. This is the only example of the type in the entire US of A – and Chip is showing considerable (and probably unfounded) faith in letting me fly it. Gently press the stick forward and the tail rises obediently. The acceleration is pretty good, and gets better once the tiny tailwheel is off the ground and the angle of attack reduced. I can sense that the wing is starting to take

I tighten my harness, aim down the runway and – literally – pull the trigger!

SSDR – THE STORY SO FAR!

Rule-making for Single-Seat Deregulated aircraft is – as far as I can tell – still a 'work in progress'. Initially, an aircraft in the SSDR class was considered to be a microlight-type aircraft that did not require a permit to fly, any associated design investigation, or indeed any formal flight testing. It was considered (in what I assume to be a variation of 'assumed risk') that the onus was entirely on the owner/pilot to establish that the aircraft was in a fit state to fly. This definition has since changed to encompass any single-seat aircraft with an **empty weight not exceeding 115kg** and a **MAUW of no more than 300kg**. The empty weight **wing loading** must be **no more than 10kg per square metre**, while it must **stall at less than 35kt**. The pilot needs to hold a valid and appropriate **microlight licence**, while the aircraft needs to be registered with the CAA and to display its registration in the correct fashion. The aircraft can only be operated in the Private category and flown in **Day/VFR** conditions.



100 hours' work: Sprite's first Zigolo, as seen in May at Popham (price displayed is for airframe only)

the weight and apply just a hint of back pressure. The uneven jolting of the wheels suddenly ceases, and as the Zigolo slides into the sky I immediately see the attraction of this curious contraption. The field of view is exceptional, the aircraft feels surprisingly stable and it's just... well – fun!

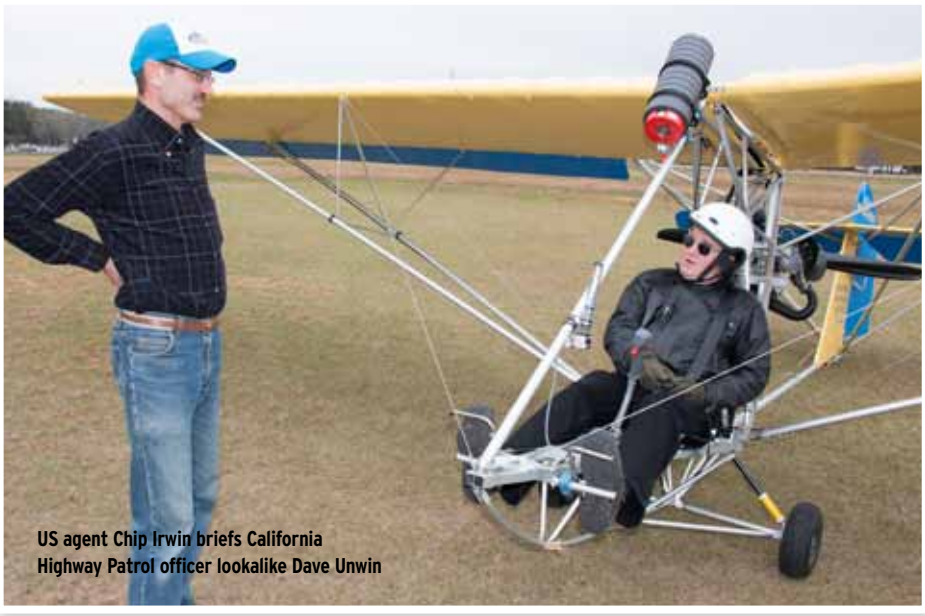
followed by an examination of the flight profiles for range and endurance, and concluding with a series of circuits. However, as I know this is the only Zigolo in the country and it has only a few hours on it I content myself with buzzing up and down the runway for Jim Lawrence's camera and making lots of takeoffs and

I content myself with buzzing up and down the runway... This is tremendous sport

At this juncture we must, with regret, depart from the typical format of a *Pilot* flight test. Usually, I would climb to a safe altitude for a general handling check, before moving on to examine both the high and low speed sides of the speed envelope. Then it would be a qualitative assessment of the control and stability

landings. This is tremendous sport. I soon adjust to the rather curious throttle and, while it's just not possible to assess the stick-free stability, the controls seem light, powerful and reasonably well-harmonised.

Landing is easy, although it must be borne in mind that lightweight/high-drag aircraft have very little inertia and tend to bleed energy very rapidly. The best tactic seems to keep just a little power on, well into the flare. I found the Zigolo perfectly straightforward to fly – although of course



US agent Chip Irwin briefs California Highway Patrol officer lookalike Dave Unwin

SPECIFICATION

ZIGOLO MG 12 £8,389 (KIT INC ENGINE)

DIMENSIONS

Length	5.5m
Height	1.3m
Wingspan	11.6m
Wing area	15.8sqm

WEIGHTS AND LOADINGS

Empty weight (inc BRS)	102kg
Max all-up weight	220kg
Useful load	118kg
Wing loading	73.2kg/m2
Power loading	11.8kg/kW
Fuel capacity	11 litres

PERFORMANCE

Vne	50kt
Cruise	36kt
Stall	19kt
Climb rate	400fpm
Best glide	11:1 @ 28kt
Min sink	275fpm @24kt
Take off (to 50ft)	180m
Land (over 50ft)	120m

ENGINE AND PROPELLER

Vittorazi Moster 185 single cylinder air-cooled two-stroke, producing 25hp (18.6kW) at 7,800rpm and turning a Helix two-blade fixed pitch propeller via a Poly V belt with a reduction drive ratio of 2.7:1

(Optional Electravia GMPE 102 DC motor, producing 26hp (19kW) and turning an E-Prop three-blade ground-adjustable propeller.)

MANUFACTURER

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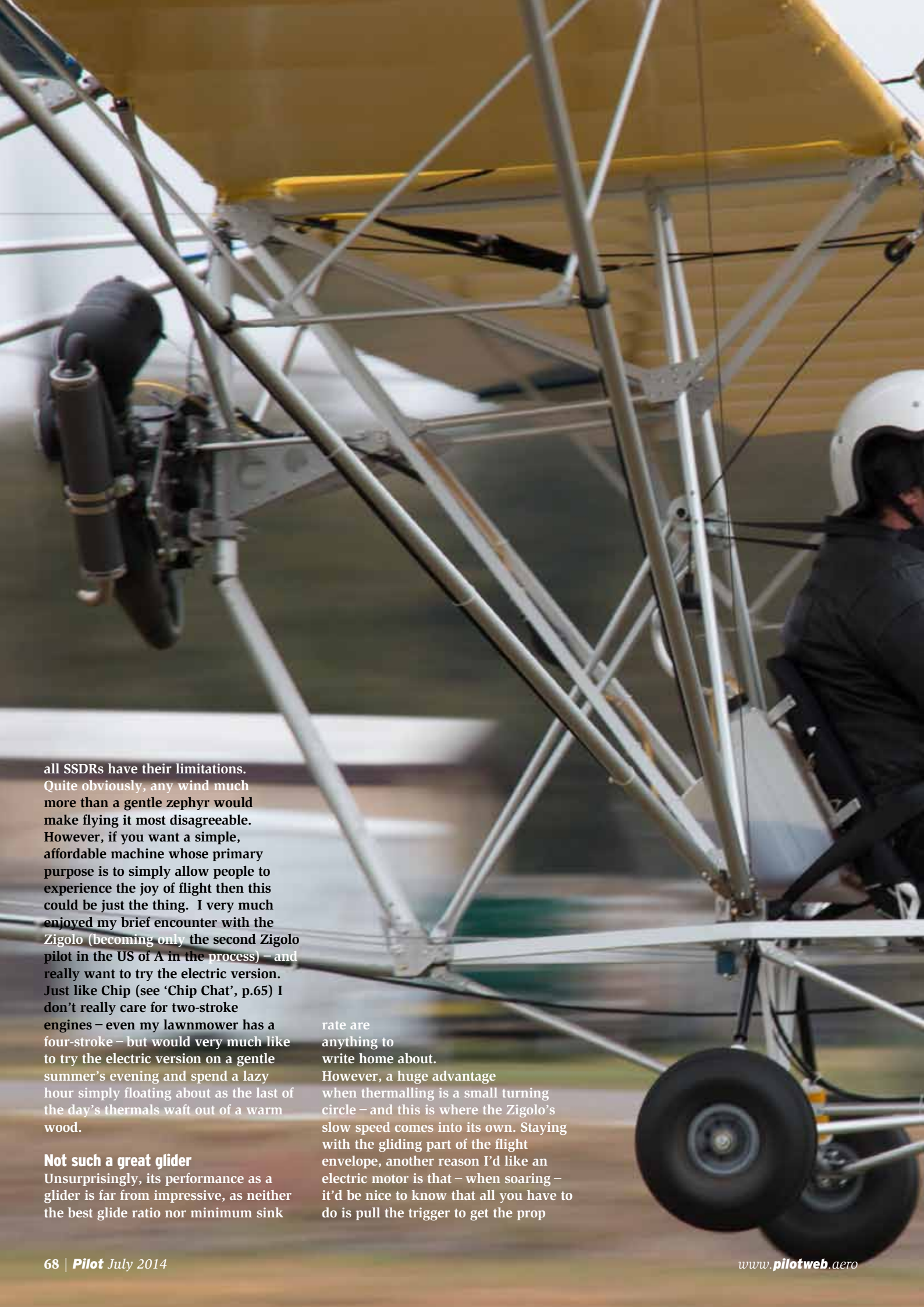
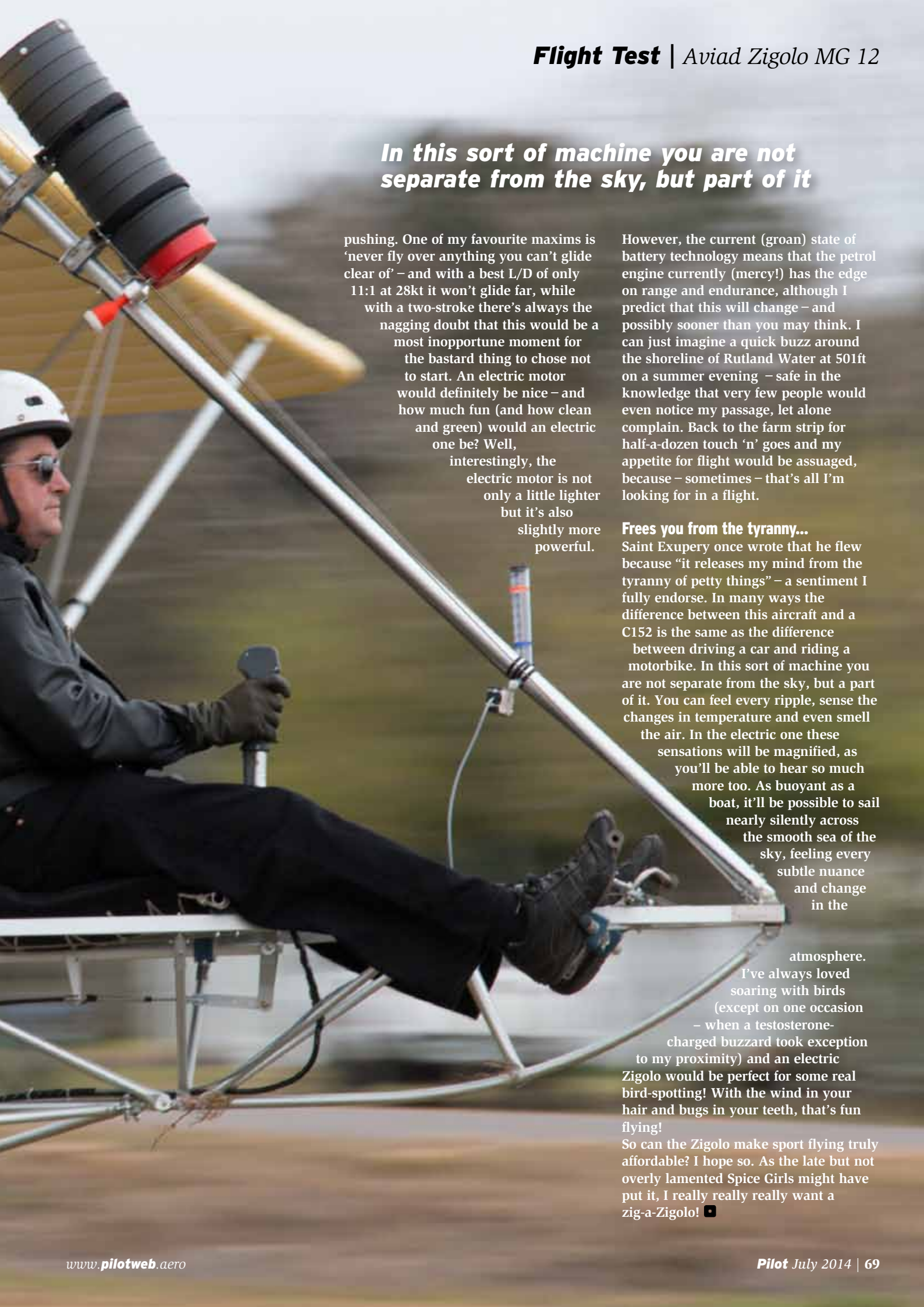


all SSDRs have their limitations. Quite obviously, any wind much more than a gentle zephyr would make flying it most disagreeable. However, if you want a simple, affordable machine whose primary purpose is to simply allow people to experience the joy of flight then this could be just the thing. I very much enjoyed my brief encounter with the Zigolo (becoming only the second Zigolo pilot in the US of A in the process) – and really want to try the electric version. Just like Chip (see 'Chip Chat', p.65) I don't really care for two-stroke engines – even my lawnmower has a four-stroke – but would very much like to try the electric version on a gentle summer's evening and spend a lazy hour simply floating about as the last of the day's thermals waft out of a warm wood.

Not such a great glider

Unsurprisingly, its performance as a glider is far from impressive, as neither the best glide ratio nor minimum sink rate are anything to write home about. However, a huge advantage when thermalling is a small turning circle – and this is where the Zigolo's slow speed comes into its own. Staying with the gliding part of the flight envelope, another reason I'd like an electric motor is that – when soaring – it'd be nice to know that all you have to do is pull the trigger to get the prop



In this sort of machine you are not separate from the sky, but part of it

pushing. One of my favourite maxims is 'never fly over anything you can't glide clear of' – and with a best L/D of only 11:1 at 28kt it won't glide far, while with a two-stroke there's always the nagging doubt that this would be a most inopportune moment for the bastard thing to chose not to start. An electric motor would definitely be nice – and how much fun (and how clean and green) would an electric one be? Well, interestingly, the electric motor is not only a little lighter but it's also slightly more powerful.

However, the current (groan) state of battery technology means that the petrol engine currently (mercy!) has the edge on range and endurance, although I predict that this will change – and possibly sooner than you may think. I can just imagine a quick buzz around the shoreline of Rutland Water at 501ft on a summer evening – safe in the knowledge that very few people would even notice my passage, let alone complain. Back to the farm strip for half-a-dozen touch 'n' goes and my appetite for flight would be assuaged, because – sometimes – that's all I'm looking for in a flight.

Frees you from the tyranny...

Saint Exupery once wrote that he flew because "it releases my mind from the tyranny of petty things" – a sentiment I fully endorse. In many ways the difference between this aircraft and a C152 is the same as the difference between driving a car and riding a motorbike. In this sort of machine you are not separate from the sky, but a part of it. You can feel every ripple, sense the changes in temperature and even smell the air. In the electric one these sensations will be magnified, as you'll be able to hear so much more too. As buoyant as a boat, it'll be possible to sail nearly silently across the smooth sea of the sky, feeling every subtle nuance and change in the atmosphere. I've always loved soaring with birds (except on one occasion – when a testosterone-charged buzzard took exception to my proximity) and an electric Zigolo would be perfect for some real bird-spotting! With the wind in your hair and bugs in your teeth, that's fun flying!

So can the Zigolo make sport flying truly affordable? I hope so. As the late but not overly lamented Spice Girls might have put it, I really really really want a zig-a-Zigolo! ■