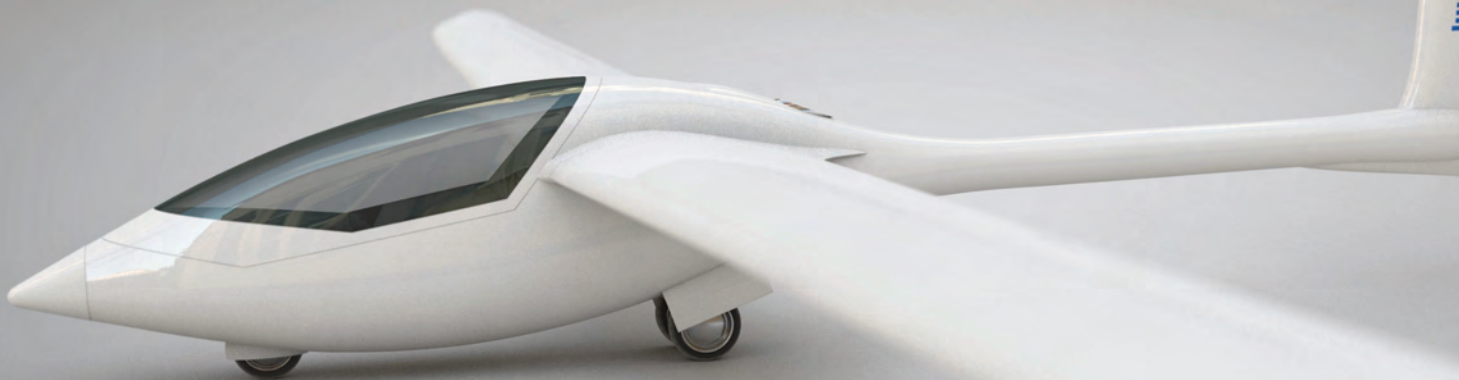


GloW

BY DAVE UNWIN



Will British company ProAirsport's innovative jet-powered UK Single Seat Deregulated class (SSDR) self-launcher transform gliding, or microlighting, or both?

Dave Unwin, *Pilot magazine's* Flight Test Editor investigates. Dave has been flying for 30 years and has around 5,000 hours in about 300 different types, ranging from antique gliders and vintage biplanes to modern turbo-props and jet fighters via WW2 bombers and fighters. He has an FAI Silver C, BGA 'B' category instructor rating and a CPL/IR for SEL, MEL and SES. He currently owns a Jodel D9 Bebe and also flies the Buckminster GC's Robin Remorquer and EuroFox (he is the Tug Master) and the Black Mountains GC's Piper Pawnee. This makes Dave eminently qualified to pass judgement on this new type of aircraft.

I love soaring. Soaring flight exercises a fascination that is both difficult to explain and hard to resist. Often described as 'three-dimensional sailing', the ability to fly a heavier-than-air machine for several hours and hundreds of miles by using the atmosphere as the fuel and your intellect as the engine, possesses an undeniable attraction. Of course, two inevitable downsides of the pure sailplane are that assistance is required to get the thing airborne, and when you land out. Furthermore, we all know that gliding can be almost as frustrating as it is fun, aircraft serviceability, airspace and airworthiness issues,

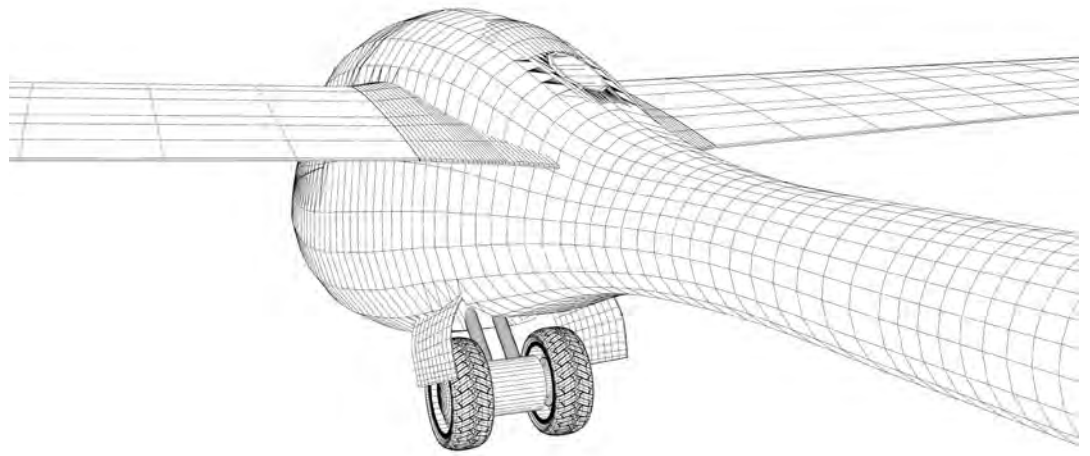
licensing, and of course the capriciousness of the weather. However, what I find really frustrating is when everything else is beautifully aligned and the gliding club is closed or distant!

Just like an ocean, the atmosphere is rarely flat calm; there are endless ebbs and flows, ripples and waves, and this means there is usually some energy somewhere that can be utilised. Furthermore, from an aesthetic view point the low light of early morning and late evening can be stunning. These are two of the reasons why, although I live only 20 minutes away from the gliding club, I keep a Jodel D9 on a farm strip only ten minutes from my house. I've had some fabulous soaring flights but I do find the engine intrusive. Of course, what I really need is a sailplane that I can rig by myself, and then safely self-launch from a 500-metre grass strip. I've never really been a fan of the engine-on-a-stick configuration, while the jet-powered self-sustainers just don't have enough thrust to self-launch. In fact, I have no desire to go back to the performance offered by early motor-gliders, which were desperately underpowered and possessed two distinctly unattractive traits – a marked reluctance to leave the ground and a disturbing eagerness to return to it!

Consequently, when I heard that ProAirsport was proposing a new type of self-launching SSDR sailplane powered by a lightweight turbojet, my initial reaction was one of scepticism. The history of flight is littered with the wrecks of ill-conceived aircraft, because trying to squeeze a thousand kilos of ingenuity and enthusiasm into eight hundred kilos of possibility almost always seems to end in tears. Subsequently, I must admit to being more than a little doubtful. Having flown a first generation jet fighter (a de Havilland Vampire) I know what it's like to fly



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an underpowered jet, and having taken a cursory glance at the specifications and weights, I doubted that this thing would have enough thrust to even taxi to the far hedge, let alone fly over it!

But then Roger Hurley, ProAirsport's CEO revealed that 'project GloW' sitting in his computer was a hybrid, and that the wheels would be driven by a powerful electric motor. Instantly my initial scepticism turned to enthusiasm, and I made an appointment to meet Roger at the ProAirsport factory. Here I studied the blueprints and CGI, inspected the fuselage plug and marvelled at the small size of the jet engine.

Designed to meet the requirements of the new UK Single Seat Deregulated (SSDR) class and the US Light Sport Glider, GloW will have a MAUW of 300 kg and an empty weight of about 180 kg, leaving a payload of 120 kg. If you fill the tank it's 27 kg, leaving 93 for pilot and parachute. Although many lightweight machines these days sport Ballistic Recovery Systems, there simply isn't room for one in GloW.

Both the methods and materials used in its construction are standard sailplane technology. The fuselage is essentially fibreglass with aramid and carbon fibre used only for local strength. The wing is foam core and fibreglass sandwich construction from an existing, well known sailplane wing design. Modern composites are fantastically strong, and as the cockpit area also has local carbon/aramid reinforcement I would expect it to be pretty crash worthy. The acrylic canopy, also 'standard', is forward-hinged and features a 'direct-vision' panel.

The fuselage carries the wing, engine, fuel tank, batteries and the clever powered undercarriage. The shoulder-mounted wing gently sweeps at the tips and uses a modified NN18-17

laminar flow aerofoil with only a small amount of dihedral. Large Schempp-Hirth type airbrakes are fitted to the top surface of the wing at about 45% of the chord. The location of the Titan jet engine is particularly interesting as it is fixed internally behind the cockpit and features an automatic open/close intake scoop. This very neat little turbojet is just 40cm long and weighs an astonishing 3.7 kg, yet produces a creditable 390N. This should be enough to produce reasonable climb rates at around 50 knots, while the 34 litre fuel tank should be good for several further climbs. Fuel quantity carried may improve, but current thinking is that only having a single fuselage tank is much simpler, particularly when rigging and de-rigging. As the engine can burn a variety of fuels, from Jet A-1 and JP-4 to diesel, kerosene and domestic fuel oil, it can not only be readily refuelled from a variety of sources but is incredibly cheap! I had a delivery of domestic fuel oil only yesterday, which was 50 p/litre. As it is expected that a take-off and climb to 3,000 feet will burn about eight litres of fuel, the cost of a relatively high go-where-you-want launch will still be less than the average winch launch, and a lot less than the average aero tow! In the cruise, fuel flow can drop as low as half a litre a minute.

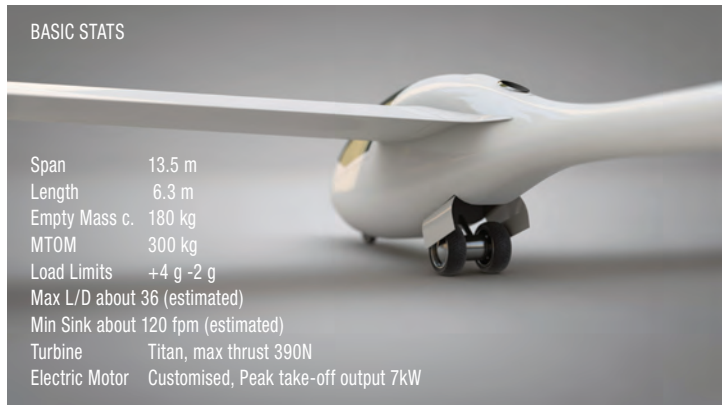
GloW has been designed for easy rigging, and a special trailer that allows solo rigging will be an option. And as the complete empty weight is only around 180 kgs, rigging shouldn't be too taxing.

Now we come to GloW's most unconventional aspect, the undercarriage.

This consists of four wheels of three different sizes mounted along the fuselage centreline. There's a small steerable

pneumatic nose wheel, a tiny solid urethane wheel (more of a 'tail bumper' really) under the tail and dual retractable mainwheels, so the aircraft sits upright wings-level. And this is where GloW gets really interesting, as these wheels are driven by a powerful electric motor. Modern electric motors put out a lot of torque and this can produce incredible rates of acceleration, (check out the Tesla car on YouTube if you don't believe me). Roger explained that this hi-tech, brushless motor is a standard commercial unit that has been customised for ProAirsport. Using the powerful electric motor to accelerate GloW up to take off speed is the design's 'secret sauce' – and I am utterly convinced of its virtues. For take-off, GloW can be wings-level taxied, even reversed into position, with the motor also acting in place of mechanical brakes (further advantages of electrically driven wheels) before starting the jet and setting full power. As the electric energy required for take-off is wanted for only a few seconds (the acceleration really should be outstanding, in fact wheel spin could be an issue if power is applied too quickly) then take-offs from farm strips should be an option.

The design certainly looked extremely professional (Roger has assembled an impressive team of pilots and engineers, including renowned aerodynamicist John Gibson, aero-engineer Vittorio Pajno and Finance Director Stephen Lynn) and Roger emphasised that although the SSDL class is not regulated or subject to mandatory airworthiness approval, ProAirsport decided from the start that the Light Sport Glider specification (ASTM F2564) would be adopted.



BASIC STATS

Span	13.5 m
Length	6.3 m
Empty Mass c.	180 kg
MTOM	300 kg
Load Limits	+4 g -2 g
Max L/D	about 36 (estimated)
Min Sink	about 120 fpm (estimated)
Turbine	Titan, max thrust 390N
Electric Motor	Customised, Peak take-off output 7kW

Cost? A price of GBP 43,950.00 ex-works has recently been released. Further details can be found on the company's website <http://www.proairsport.com/order.html>. I have the impression that this experienced team has put together a very do-able project.

I came away from my visit to ProAirsport completely converted to the idea. Imagine owning a self-launching micro-light sailplane, free from regulatory hassle and able to take off from any reasonable field or strip? It could revolutionise soaring for many pilots, particularly those who either can't get to the gliding club as often as they like, or just don't live near a club. As it says on their website, convenience, simplicity, independence and lower cost can make the 'Fly More, Fly for Less' idea a real possibility.

So taken was I with the project that as I left, I gave my card to Roger and said that if ProAirsport needed any help with the test flying programme I'd be delighted to help.....



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