Sirius contender

Now available in the UK as a quick-to-build kit, this nicely designed, all-composite high-winger has a lot to offer

Words *Dave Unwin* **Photos** *Keith Wilson*

I've pointed out before that some Light Sport Aircraft (LSA) are really beginning to blur the line between new types and 'classic' training aircraft such as the Piper Cadet or Cessna 152, and as soon as Editor Philip Whiteman and I saw the Sirius at Sywell during this year's LAA Rally we agreed that that line had been blurred still further. A flight test was arranged for the following week, and as the high-wing machine turned final at Gravely my initial impressions were reinforced: the Sirius really does look like a C152, or perhaps a scaled-down 182.

UK agent Peter Ronfell was barely out of the cockpit before I began studying the aircraft with considerable interest. With in excess of 30,000 150/152s made, Cessna's classic trainer remains one of the most successful GA aircraft of all time, and while I've flown literally dozens of types that were intended to replace it, I've still never flown one that was a real contender. Could the Sirius make the grade? I couldn't wait to find out!

Like a composite 152

Closer inspection confirms my initial impression: it does indeed seem to be very much like a composite 152, but with better access and a bigger cockpit. Power is provided by – you guessed it – a 100hp Rotax 912S, fitted with both the 'soft-start' system and a slipper clutch. However – and unusually for a 600kg aircraft – the test aircraft had a three-blade electrically-actuated constant-speed 'Power Max' propeller.

The engine installation is very neat and extremely accessible. Top and bottom halves of the cowling are easily removed by undoing Dzus fasteners and there's lots of room around the engine to work on it. There is also a small hatch in the top of the cowling for checking the oil, but you can't see the coolant expansion tank. This may be deliberate as it's a good thing to check the hoses occasionally too, and they are there to be seen when you take off the top cowl to check the coolant level.

I was intrigued by the battery – it's a tiny Odyssey PC310 and is actually worth a mention. Originally developed for military aircraft requiring very high power delivery for short durations, this is a pure lead (not lead alloy), maintenance-free, dry cell battery which uses TPT (thin plate technology). It can be mounted upright or flat and the manufacturers claim it has exceptionally good anti-vibration properties, a fast recharge capability and recovers well from heavy discharge. However, the best bit is that it weighs only 2.7kg yet can put out in excess of 2,250 amps for five seconds – even at very low temperatures. I was impressed!

In common with the 21st Century theme there is no carb heat – it has the SkyDrive coolant-heated water jacket system. The fuel-injected 912iS is also an option (and one I'd probably exercise if I were buying a Sirius). Carburettors are *so* last century…

It's unusual to see an 'anaolgue panel' and now unfashionable control yokes in 2014

The undercarriage looks suitably robust, main wheels being carried by a composite bow while the nosewheel strut consists of a sliding steel tube with an internal spring for shock absorption. Now, LSAs typically offer either a castoring nosewheel with steering via differential braking or a steerable nosewheel and non-differential braking, whereas most 'classic' GA types usually offer both nosewheel steering *and* differential braking. Interestingly, while the Sirius's nosewheel steers through the rudder pedals, TL also provides toe-operated differential braking: for an ultralight aircraft, the Sirius has many features usually found on larger ones. I was impressed by both this, and also the fact that the mainwheels feature split rims, making it easy to change a tyre. All three wheels have snug-fitting spats and the mainwheels are fitted with hydraulic disc brakes. However, to inspect the brakes part of the spat has to be removed, a feature I wasn't so keen on. Inspecting the brakes is part of the daily inspection – and you shouldn't have to remove screws to do it.

Below: potentially a life-saver; the fuel filler caps have integral, calibrated dipsticks

The thin, strut-braced wings use a laminar-flow aerofoil and have a 65-litre fuel tank in each (45-litre tanks are an option). They taper mildly and have slightly down-turned wingtips. Two excellent features are that the fuel caps have integral, calibrated dipsticks and the height of the aircraft is such that even a 1.72m-tall Dave can refuel without a ladder! The large single-slotted flaps are electrically actuated and have three settings, 0, 15 and 30°. As with the rest of the aircraft the wings are very well made. In fact, bearing in mind this is a laminar-flow aerofoil section, I was surprised there were neither stall strips nor stall warning vanes and made a mental note to carefully check not only the actual stall but also the aircraft's behaviour when approaching it.

I also noted some further nice attention to detail: the pushrods and Rose joints for the flaps and ailerons are faired over, the block of twelve LED taxi/landing lights is built into the port wing's leading edge and the strobe and position lights are faired into the wing tip. Another nice touch is the sensibly-sited tie-down rings. These can be critical for light aircraft surviving high winds, and it's surprising how many designers neglect to fit them.

The tail consists of a fixed tailplane and two-piece horn-balanced elevator, mildly swept fin and horn-balanced rudder. All the primary controls are actuated by pushrods except the rudder, while the port elevator carries a cable actuated trim tab. There are ground adjustable tabs on the right aileron and rudder.

What looks like a small baggage bay door on the starboard side is actually the hatch cover for the optional BRS system. This is made by Galaxy and the way it operates is interesting. Typically, the parachute is dragged out by a rocket: in this case it is thrown out bodily in a container, and only deploys when nine metres from the aircraft. This, it is claimed, greatly reduces the possibility of the canopy fouling on the aircraft or being damaged by debris.

Just as well designed inside

Access to the cockpit is excellent, as the sills are low, the gull-wing doors open wide and are well braced by gas struts. Good cockpit access is important, as many potential customers are no longer in the

Detail design, facing page

1 as with more and more new aircraft, a cluster of LEDs replaces the wire filament landing light, offering better reliability and extended life

2 new to us, the thin-plate technology Odessy PC310 battery is both tiny and light, yet offers high output

3 the neatly guarded electrical switches are located overhead, freeing up panel space

4 quadrant-mounted throttle, propeller and trim levers are both ergonomically shaped and functional

5 the spats look good and are maybe worth a couple of knots, but they make the brakes hard to inspect

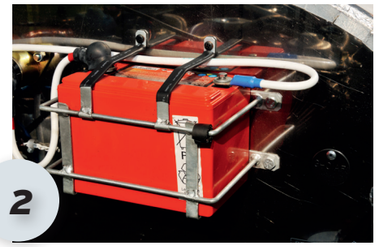
6 not, as you might at first think, a baggage compartment door; this is the BRS hatch

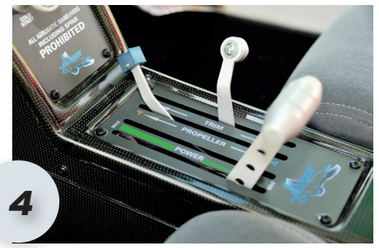
7 angled stripes behind the fuel sight gauges are designed to alert you to dry tanks

8 naked engine: the top cowl has to come off for coolant level checking, putting the vital hoses right under your nose for inspection

9 the armrest between the seats neatly doubles up as a locker for odds and sods

10 ergonomic flap and fuel selectors; confusing prop switches, choke and cabin heat controls





The Editor thinks the Sirius looks like a 182 that's been put on a diet

first – or even second – flush of youth. The Sirius really scores here as, unlike most of its contemporaries, it has panel-mounted yokes. Now, the stick or yoke question is almost as universal as the high, or low-wing debate, but one thing is irrefutable; when getting in and out you can't beat a yoke that sprouts from the panel (except maybe a sidestick, but let's not even go there…)

The baggage bay can take 25kg and is accessible in flight. It's also easy to load, as the seatbacks are held in place by Velcro and can be quickly removed, while additional storage space is provided by the map pockets built into the doors and the glove box under the neat lift-up central arm rest. The comfortable seats feature four-point harnesses but do not adjust. The windscreen is adequate but not overly large, and although the rear windows ensure the cabin is very well lit I couldn't help but feel that the overall field of view would be enhanced by a skylight. The cockpit is generously proportioned (an impressive 1.13m at the widest point) and seems even bigger. It's clearly been designed to accommodate large people, and although the pedals adjust I could've used a cushion to raise me up and push me forwards.

The cockpit is generously proportioned... designed to accommodate large people

The overall impression is that this is how a 21st Century Cessna 152 should look. Yokes, adjustable rudder pedals, toe brakes, nosewheel steering and – somewhat surprisingly – an almost entirely analogue panel. Well used to most modern aircraft having either Dynon or Garmin glass, I find the unusual arrangement quite refreshing – or is the Luddite that lurks somewhere within most aviators who learned to fly in the last Century coming out? (Of course, various Dynon options are available). All the flight instruments are on the left, with the engine gauges mostly on the right except the tachometer and manifold pressure gauge. A curious anomaly is that the AH and altimeter have been transposed, but that's the way Peter likes it. The test aircraft had an iPad mount in the centre of the panel, although the DI was noticeable by its absence.

A sub-panel extends down from the centre of the instrument panel and this carries the flap selector and co-located position indicator lights, fuel valve, fuel pressure gauge and plungers for the choke and cabin heat, plus two toggle switches for the electric propeller. These initially confused me, as there is also a typical prop control lever next to the throttle. How they work is that the prop can be selected to either manual or auto by use of the left-side toggle switch. When in manual, the switch on the right of the sub-panel is used to increase or reduce pitch as required, while if auto is selected then the right switch is redundant and the pitch control lever is used in the conventional fashion instead. Why have two systems? I don't know! A little green light illuminates when the prop is on the fine pitch stop, whichever system is used

The fuel selector is well placed, but I'd also like a *both* setting. Another instrument anomaly is the fuel pressure gauge, which – bearing in mind the Sirius is a high-wing design with effective gravity feed – is both quite large and prominently placed. I also thought that the green light for the auxiliary fuel pump was too bright. It'd be a real distraction when night flying. Finally the knobs that actuate the choke and cabin heat are just a little too alike for my tastes, and should really be done in different shapes. It could be a bit awkward if you pulled one, and instead of getting an agreeable flow of warm air into the cabin the engine suffered a rich cut!

Fuel quantity can be checked by either referring to the optional fuel computer or looking at the sight tubes in the wingroots. These show only the last twenty litres in each tank, which is still enough for well over two hours of flight.

The panel is almost completely free of switches, with only the key-type rotary magneto/starter switch in it and most of the other toggle switches set in a neat overhead panel. A centre console between the seats contains levers for the throttle, prop and pitch trim, with the parking brake knob behind your right leg and a handy power outlet behind your left.

Each well-sealed door has a central spring-loaded latch and an over-centre lever that drives the two fore-and-aft

The Sirius has the kind of excellent short-field capabilities to make a dramatic looking approach like this a non-event

locking pins. A nice touch is that this lever covers the latch when closed. Unfortunately there are no DV panels, but as the top-hinged doors can be opened in flight (or removed altogether) their omission isn't a real issue.

Not bothered by the heat

Taxying out reveals good characteristics, with positive nosewheel steering and powerful, progressive hydraulic wheel brakes which are both operated through the rudder pedals. During the run-up checks I discover that you're definitely aware of when the flaps are in transit as the rather loud flap motor is directly overhead and it vibrates. (Peter tells me that a fix is in hand as a second bracket will be fitted to stop the vibration.) As the grass runway is only 400m long and we're taking off towards rising ground I'm especially interested in the takeoff and climb performance, particularly as we have two fairly heavy pilots and around 100 litres of fuel onboard. This being the second week in September I'd anticipated that the ambient conditions would be close to ISA, but with an OAT of 23°C it's remarkably hot and there's barely a breath of wind blowing down the runway. I wonder briefly if I might be in for a bit of a thrill, but have forgotten the advantages conferred by a C/S prop.

Lined up to the left of the cameraship, I give it a five-second head start and then open the throttle. Acceleration is excellent, and a smooth rotation at 40kt gets us off the ground and accelerating quickly towards the Vy of 70kt and an initial climb rate of around 1,000fpm. As we climb away to the east I begin to experiment with the general handling, but before I can really come to any definite conclusions the sudden appearance of Keith's camera lens indicates it's time to move into close formation for the air-to-air photos. This is always an enjoyably challenging aspect of the job as it requires very accurate flying. On this occasion it is particularly hard work as it is quite a bumpy day (we spot several gliders above us, testimony to the strength of the thermals) while I also really miss having a skylight.

Interestingly, the rather 'different' requirements of a formation photo-shoot (for example, extreme crossed-controls)

The Sirius's sweet spot is 90kt at 4,000rpm, which returns 32mpg

occasionally reveal unsatisfactory handling characteristics that might otherwise remain unnoticed during normal flight: The Sirius behaves nicely, having crisp controls, and a responsive engine, while the field of view is typical of a high-wing aircraft.

With the photo session complete, I continue my examination of the general handling characteristics. A sequence of turns and reversals using varying degrees of bank reveals that the roll rate is agreeably brisk without being skittish. Only small amounts of rudder are required to keep the slip-ball centred. Harmony of control is as it should be, with the ailerons being the lightest and the rudder the heaviest, while breakout forces are low with very little 'stiction', despite the fact that there are only sixty hours on the airframe. The mechanical elevator trim has authority and the lever is logically placed.

The directional stability – although positive – is not quite as strong as I'd expected. Laterally, it is just slightly on the positive side of neutral, while the longitudinal stability is strongly positive: trimming for 90kt, pitching up until the speed drops to 80 and then releasing the stick, the aircraft returns immediately to the trimmed speed. I began to suspect that the C of G is distinctly forward, and an exploration of the stall characteristics confirms this. Slowing down to explore the slow side of the speed envelope reveals that really quite high stick forces are required (I never trim into a stall). One positive is that the Vfe is higher than many similar machines. High stick forces aside, slow flight is very benign, although I have to say that the pre-stall buffet is barely perceivable and wonder if perhaps either stall strips or an artificial stall warner might be a good idea. The Sirius finally quits flying at 35 knots IAS with 0 flap, and about 30kt with 45°, although at such slow speeds I'm never convinced of the accuracy of an ASI due to position error. These figures are certainly very low, and if the speed is reduced at one knot per second the aircraft never really stalls but just sort of mushes while the sink rate increases. By hauling the nose well above the horizon I finally get the nose to drop, but the Sirius really is very well mannered.

Accelerating out of the final stall I ask Peter what power settings he typically cruises at, and on his advice use 4,000rpm and about 22in manifold pressure, trimmed slightly forward, and let it accelerate. At 3,000ft the IAS shows 90kt – a true air speed of 96 – while the fuel computer shows we are burning 15.8 lit/hr. Obviously it will go faster at the maximum continuous of 5,500rpm but

SPECIFICATION

TL-ULTRALIGHT SIRIUS £55,531 (kit price exc VAT)

DIMENSIONS

Length	6.97m
Height	2.25m
Wingspan	9.4m
Wing area	11.26sqm

WEIGHTS AND LOADINGS

Empty weight	345kg
Max AUX	600kg
Useful Load	255kg
Wing loading	53.28kg/m2
Power loading	8.04kg/kW
Fuel capacity	130litres
Baggage capacity	25kg

PERFORMANCE

Vne	137 kt
Cruise	90-115kt
Stall	30kt
Climb	1,000fpm
Take off (over 50ft)	310m
Landing (over 50ft)	320m

ENGINE AND PROPELLER

Rotax 912S liquid-cooled flat-four, producing 100hp (74.57kW) at 5,800rpm and driving a PowerMax three-blade constant speed propeller

MANUFACTURER

TL-Ultralight s.r.o.
Hradec Kralove
Czech Republic
www.tl-ultralights.cz

UK AGENT

TL-Sting (UK) Ltd
Phone: 01257 452498
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Web: *tl-sting.co.uk*

burn (in percentage terms) a lot more fuel – approximately ten litres an hour more in fact! (For those who doubt the truth of the 'speed-squared' law consider this: a ten per cent increase in speed burns about fifty per cent more fuel.) The Sirius's sweet spot is 90kt at 4,000rpm, which at 5,000ft in still air returns a creditable 6.3nm/lit or 32mpg, which is better than many cars. Furthermore, with up to 130 litres available the still air range (no reserve) is an impressive 738nm.

Back at Gravely I study the windsock carefully, for although thus far the Sirius had proved to be more capable than its 20th Century counterparts, Cessna engineers definitely got the 152's flaps right. Indeed, any pilot transiting from a 152 onto a modern LSA soon learns to monitor their airspeed carefully, as if you're in close to the runway and either hot or high you may easily end up with an embarrassment of speed or altitude!

Throughout the flight I'd felt that the C of G was quite well forward and this was confirmed in the circuit. Despite hauling the trim lever straight back to the aft stop, it seemed I was carrying several kilos of backpressure to maintain the promulgated Vref of 55kt. To be honest, in the prevailing conditions this actually felt a bit fast, and as the aircraft stalls at thirty knots I'd have liked to have shaved off at least five, and possibly even ten knots. However, Gravely isn't the place to experiment (the undershoot area is non-existent) and holding fifty all the way down would've required so much backpressure that it would be distinctly uncomfortable. (I'd very much like to try a few landings with the C of G further aft and a long runway, so that I could aim to touch down at the start of the second third of the tarmac.)

After a couple of touch-and-goes for Keith's camera I go for a 'full stop' and despite the forward C of G, nil wind and hot weather we are still down and comfortably stopped in around 300 metres with only light braking, although the actual touchdown could've been softer.

Taxying back for another go, I rotate at thirty instead of forty and get airborne a lot quicker, while my second landing is considerably smoother.

A lovely little aeroplane

Having shut down I turned to Peter and said: "You know, it's a lovely little aeroplane, but it definitely needs some weight in the tail – maybe even a kilo or two." "You're exactly right" he replied, and went on to explain that the PowerMax prop is three kilos heavier than the original two-blade Kiev prop and has only recently been fitted. TL Ultralight recommends putting 1.5kg in tail with this prop and I can confirm that it really needs it. (I understand that since I flew it the weights have been installed, and the C of G is much more satisfactory). Nevertheless it's an impressive machine, and the grass runway, hot day and lack of wind had provided a real test which it had passed with ease. Furthermore, with our combined weights and the 100 litres of fuel we'd been right on the 600kg MAUW, for although TL claim an empty weight of 297kg the demo aircraft has 'all the trimmings' (Galaxy BRS, C/S prop, long-range tanks etc) and weighs in at 345kg.

To conclude, I feel that in many respects the Sirius is closer to a classic light GA type than most of the forty-plus Light Sport Aircraft I've tested since the class was introduced in the USA a decade ago. With its control yokes, toe brakes and steerable nosewheel, comparisons with the classic Cessnas that most of us learned on are inevitable, because that is clearly what it is intended to be. It's certainly much closer to a 21st Century 152 than the late, unlamented 162 Skycatcher! Of course, the Sirius is currently marketed in the UK as a kit aircraft, and under the present rules an amateur built Permit Aircraft can only be used for flight training if it is owned by the student or a close relative (although I believe that the rules governing ab-initio training in Permit aircraft are currently under review). Nevertheless, I think that any pilot contemplating trading in their old 150 or 152 should seriously – or even Siriusly – consider the Sirius.