# Ultralight perfection

## In its latest incarnation, the Sting is the kind of aeroplane you wish you'd trained on

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


Flashing past a flawlessly white cumulus, racking round in a tight 180 and then pulling joyously up into a steep climb – sometimes it just has to be done. The flight test card doesn't call for it, but when you are at the controls of an aircraft like the Sting – well, it'd be rude not to! Flying is supposed to be fun, after all.

The thing is that the majority of what I'll call the 'legacy trainers' are somewhat lacking in what a well-known car manufacturer calls 'va va voom'. The first aircraft I ever flew was a Slingsby T-21, and its RAF roundels gave even this very simple sailplane an almost indefinable air of glamour. And when I first got my hands on an ATC Chipmunk…well, to my fourteen-year-old eyes it was practically a Spitfire, and I was its pilot (and being a pilot wasn't what I wanted to *do*, it was what I wanted to *be*.) Consequently, when I first flew a rather weary Cessna 150 I was more than a little underwhelmed. This wasn't an aeroplane – it was a car with wings.

I stuck with it, but have often wondered how many potential pilots have given up over the years, simply because the aeroplanes they were training in were… well, just a bit dull.

Although there's been plenty of negativity around General Aviation over the last decade or so, recently things have certainly started to look up. Some of EASA's sillier rules are being reversed, airfields are being protected, there's the Red Tape challenge, tumbling fuel prices and a truly incredible array of new aircraft available, many of them generated by the FAA's innovative Light Sport Aircraft initiative. Typical of this new breed of sleek sporting aircraft is the Sting S4, from Czech aircraft manufacturer TL Ultralights.

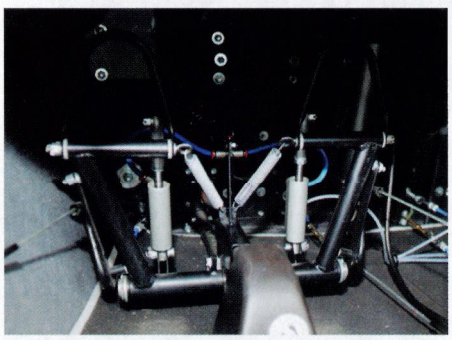
Photographer Keith, camera ship pilot Bob and I caught up with the Sting at the delightful Cambridgeshire airfield of

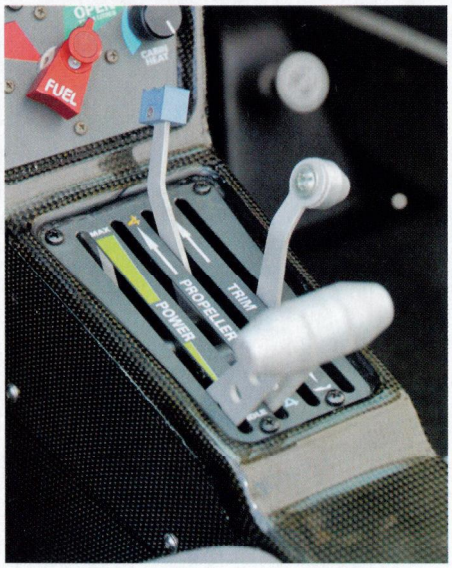

Conington, and as it taxied toward us my initial impression of this smart-looking speedster was very positive. It's an attractive little aeroplane, and the swept-back fin, upturned wingtips and large bubble canopy all combine to give it that dash of élan that is simply missing from the classic Cessna and Piper trainers that most of us learned to fly on.

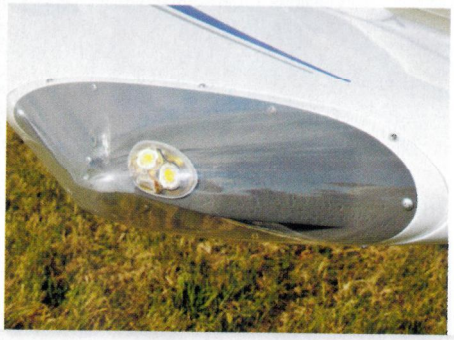
Owner Richard Reeves and TL distributor Peter Ronfell were both eager to show me around the aircraft, as not only is G-ZIZY the latest version of the Sting, but it is also the first S4 in the UK.

The preflight confirmed my preliminary impression of the Sting being extremely well made: one of the first things I noticed was that a considerable amount of attention has been paid to reducing drag. For example, the aileron Rose joints and pushrods are covered by streamlined fairings, while the wings and fuselage are extremely well finished. In fact the build quality is comparable to that of a modern high-performance sailplane. Although at first sight the Sting appears very different to its Sirius stablemate (see *Pilot*, November 2014), due to the advantages offered by economies of scale it should come as no surprise that the S4 shares considerable component commonality with its high-wing cousin.

For example, the robust-looking and relatively close-coupled undercarriage is essentially the same. The steerable nosewheel strut consists of a sliding steel tube with an internal spring for shock absorption with the main wheels carried by a composite bow. All three wheels feature snug-fitting spats and the mainwheels are fitted with hydraulic disc brakes. Unfortunately, another similarity with the Sirius is that the undercarriage has the same design flaw: it is impossible to inspect the discs and pads without a screwdriver. The nosewheel spat also has quite a lot of side area, and I made a note to check the directional stability.







**Cockpit features, anti-clockwise from main image:** panel fit includes Dynon SkyView displays, well-sited analogue stand-by instruments, Garmin radio and transponder, a single on/off selector for the three-tank fuel system and well-thought-out flap control; toe-operated brakes built into the adjustable pedal assemblies; ergonomic throttle, propeller and trim control lever array; and slab-like (but comfortable) seat backs, which fold forward to allow access to the baggage locker behind

**External features, clockwise from top right:** wide-opening canopy, held open by gas struts and lockable when closed; circular panel in rear glazing that blows out to allow BRS emergency parachute deployment; wing-tip LED lights under a moulded cover; the short-span, broad-chord ailerons; split flaps, taking up most of the trailing edge; and one of the three fuel filler caps, clearly marked with fuel grade – 'unleaded auto gas', note – and individual tank capacity


The engine is also the same – a 100hp Rotax 912 (the fuel injected iS variant), fitted with a slipper clutch and the 'soft-start' mechanism. The fuel system consists of two wing tanks with a combined capacity of 44 litres and a 77 litre tank mounted in the fuselage. Each tank has its own filler cap, the fuselage tank filler being sited in the starboard wing root. The propeller is a three-blade ground-adjustable Kiev unit, although an electrically-actuated constant speed 'Power Max' prop is an option. The engine installation is very neat and extremely accessible. The top and bottom halves of the cowling are secured by Dzus fasteners enabling both halves of the cowling to be removed, but what really caught my eye was the size of the NACA ducts in the lower cowling – they're huge!

Continuing the pre-flight inspection, another size-related anomaly is the very big pitot under the starboard wing, which wouldn't look out of place on a small airliner. As mentioned earlier, the wings really are beautifully made. I suspect that the moulds have been produced using CNC milling techniques, resulting in incredibly close tolerances and accuracy. The spar and all other load-bearing structures are constructed from carbon fibre reinforced fibreglass (the primary structure is an impressive 85% carbon fibre), while the shell structure of the wing is of foam sandwich construction covered with carbon fibre skins. It uses a laminar-flow aerofoil but there is neither a stall warner nor even stall strips. The trailing edge is swept forward slightly and features ailerons with a relatively short span but a very broad chord, and large-span electrically-operated split flaps. The flaps have four pre-set positions: 0, 15 25 and 40 degrees, and there is a ground-adjustable trim tab in the starboard aileron. All the LED taxi, landing, strobe and position lights are built into the wingtips and covered by Polycarbonate. There are also strobes in the belly and tail.

Aft of the cockpit the fuselage tapers quite sharply, before flaring up into the swept-back fin. This carries a cable-actuated horn-balanced rudder fitted with a ground-adjustable trim tab, while the fixed tailplane has a swept-back leading edge and features a one-piece, mass-balanced elevator fitted with a centrally-mounted large-span narrow-chord trim tab which, unusually for a separate elevator, acts as an anti-servo tab (i.e. one that makes the control effort progressively heavier with elevator displacement).

The rear windscreen incorporates an intriguing circular frangible panel. The

Unusually, the wing taper is all in the swept-forward trailing edges, giving the Sting a distinctive plan form

Galaxy ballistic recovery system fires the parachute container through this, the parachute only deploying when the container is nine metres from the aircraft, thus reducing the possibility of the parachute's canopy being damaged by debris or snagging on the airframe.

## Take care while climbing aboard

The forward-pivoting canopy opens wide and is held up by a pair of gas struts while access to the cockpit is via the wing's trailing edge. There is a useful step just aft of each wing, but it also really needs a raised hand rest between the seats so that passengers don't put their weight on the seat back as they're climbing aboard. As the seat backs pivot forward to provide access to the baggage bay behind the seats they're not the strongest, and it's just the most logical place to put your hand when getting in.

The cockpit is nicely fitted out, and is surprisingly spacious for a two-seat aircraft. The seats are extremely comfortable but fixed, although the rudder pedals adjust over a good range. There are two useful power outlets behind P1 and P2's legs while the parking brake knob is behind your left. The test aircraft's instrument panel is a digital delight, with two Dynon SkyViews (one with a 10.4 inch screen, the other a seven inch), each being capable of displaying any combination of PFD, EMS and Map/Nav as either single, double or triple displays) an iPad for Sky Demon and a back-up Garmin Pilot III GPS. The transceiver and transponder are also Garmin, with an analogue ASI, VSI and altimeter directly above.

**The test aircraft's instrument panel is a digital delight, with two Dynon SkyViews... an iPad and a back-up GPS**

Apart from the key-type rotary magneto/starter switch most of the electrical services are operated by guarded toggle switches, and although I would say rockers are less prone to damage (particularly with a low-wing aircraft, when people tend to step down into the cockpit), at least these do have guards. A centrally-located sub-panel links the centre console to the main instrument panel. It carries the toggle switches for the optional V/P prop, the FlyBox flap selector unit, fuel valve, fuel gauge and rotary cabin heat control. If you've been paying attention you may well be wondering why – despite the fuel system consisting of three tanks (one in each wing and one in the fuselage) – there's only one gauge and the fuel valve is simply either 'on' or 'off'. Well, this is because the

wing tanks drain into the fuselage tank, so the gauge reads 'full' until both wing tanks are empty. Similarly, the fuel valve simply shuts off the fuel between the fuselage tank and engine.

On the right of this sub-panel is the T-handle for the BRS, and on the left is a big red toggle switch, covered by a lift-up guard. The 912iS is very much dependant on electricity, as it is computer controlled and being fuel injected also needs an electric fuel pump to run. Unlike any other small piston aero-engine it actually has *two* independent generators, which operate through 'Lane A' and 'Lane B'. In normal operations Lane A drives the engine's electrics and Lane B charges the battery. If Lane A fails Lane B supplies the engine but stops charging the battery, making landing at the first opportunity advisable. However, in the unlikely event of both 'lanes' failing, the red switch is thrown and the battery powers the fuel pump and computer. A prompt landing is now imperative, but I think that the chance of both lanes failing is probably quite unlikely. At the bottom of the sub-panel are the throttle, prop and pitch trim levers, set in a neat centre console.

Between the seats is a large armrest – and TL have missed a trick here. If the lid was hinged it would provide a very useful storage space for charts, flight guides etc. To be fair there's plenty of stowage space in the pockets attached to the cockpit sidewalls and you can also reach the baggage bay behind the seats which can carry up to 25kg, but you can never have too much!


The big canopy has three latches – one on each side and a centrally-located one that can be locked with a key. Cockpit ventilation is good (there are NACA ducts in the canopy frame that feed fresh air into the cabin) but there are no DV panels, which is unsatisfactory as the canopy obviously cannot be opened in flight. To be fair, misting up is extremely unlikely as there are seventeen canopy ventilation holes, directly connected to the NACA ducts and positioned around the front of the canopy that direct fresh air up the windscreen. However, having recently had an oil line blow on my D9, I know how quickly the windscreen goes completely opaque – as the Editor can also testify. I'd always prefer to have a DV panel.

## Off the ground in 200 metres

Taxying is delightfully simple, with a fine view over the nose. The nosewheel steers through the rudder pedals, and if a very tight turn is required differential braking can be applied via the toe-operated hydraulic disc brakes.

With all the pre-take off checks complete, I line up on the runway behind the camera ship and open the throttle. With around half fuel and no baggage we are about 50kg below the maximum all-up weight of 600kg, which gives us a power-to-weight ratio of 5.5kg per horsepower and a wing loading of 50kg/sq m. Ambient conditions are an OAT of 17°C, a density alt of 10ft (as Conington is essentially at sea level) and a strong, gusty crosswind from port. I know that this will exacerbate any tendency to swing but there is no problem keeping straight and we use less than a quarter of the runway's 800m). As the needle of the ASI slips swiftly past the 50kt mark, I rotate and the Sting leaps off the ground and settles quickly into a 65kt climb with the VSI indicating just over 1,000fpm.

At 500ft I select 'flaps up' and they retract quickly with no discernible change in pitch. Passing rapidly through 1,000ft, I sweep the Sting into a graceful curving turn with plenty of 'cut-off' angle in hot pursuit of the camera ship. It's a lovely day, with fantastic visibility and some beautiful puffy cumulus just starting to form at around 3,000 feet. Within minutes we're above the clouds and Keith beckons us into close formation. Sometimes, flying in close formation can be really hard work and not much fun – but not this time! Above the clouds the air is silky smooth, and the taut handling, responsive engine and fantastic field of view make this photo-shoot one of the easiest and most enjoyable I've flown in a long time. With the sole exception of the rudder, the controls are actuated by push rods and consequently the Sting certainly has a very crisp feel about it.

With the shoot complete in record time, I begin to evaluate the Sting further. Control response and harmony are entirely satisfactory, while the superb visibility really does make it feel as if we are flying a little fighter. Obviously, sitting under such a big canopy does mean that you really catch the sun, and I'm glad that the two generous vents supply plenty of fresh air to the cockpit. Although we definitely don't need any heat I try it anyway, and it's a bit of a disappointment. The rotary heater control certainly puts plenty of heat into the cockpit, but unfortunately it only comes out by P1's right leg. The heater really should have at least two vents, and it would be even better if you could get some hot air on the windscreen to 'assist the demist'.

The stick-free stability is almost exactly as I'd anticipated it would be, being positive longitudinally, neutral laterally but just a little soft directionally. This may well be down to the size and shape of the nosewheel spat, ➔


and anyway I doubt that it would normally ever be an issue (my test represents a fairly extreme condition). Slowing down to assess the low-speed end of the flight envelope confirms that the Sting is as slippery as it looks, as it takes a while to reduce speed. Slow flight is very benign and stalls are an absolute doddle, whether flaps up or down, and with either no power or lots of power – the only surprise is how unsurprising everything is. Even full-power departure stalls are complete non-events, while recovery is quick and easy, with minimal height loss.

Accelerating out of the last stall, I set 5,000rpm and keep trimming forward. The trimmer is powerful, but also very progressive. The speed tape soon settles on an IAS of 98kt at 3,000ft, for a TAS of 106 and a fuel flow of 16lit/hr. This seems higher than I'd expected for an 'iS' – but Richard explains that this is the 'instantaneous' reading. On long flights, he routinely records fuel flows of twelve litres per hour. Opening the throttle up to 5,500rpm gives another five knots but – unsurprisingly – a significantly greater fuel burn. Richard tells me that at 5,800rpm he's seen speeds of around 114kt, but the fuel flow jumps by almost 50%, to 19 lit/hr. Fitting a constant-speed prop would really improve the fuel consumption; although even with a fixed-pitch prop the combined capacity of all three tanks (an impressive 121 litres) means that the range (with VFR reserves) is almost 900nm. Pull the power right back and the endurance is possibly a whopping ten hours – considerably more than either *my* bum or bladder can stand. And of course, those 121 litres take a big, 87kg bite out of the actually very useful 303kg 'useful load'

**Pull the power right back and the endurance is a whopping ten hours**

Back at Conington the crosswind was still pretty sporty, but the powerful controls made every landing very easy. Due to the blustery conditions 60kt seemed sensible, with 55 over the fence. Speed stability is good. This is a very capable little aircraft.

Conclusions? I liked it a lot, for as well as a fine tourer it would make an equally good trainer. Sadly current regulations only allow it to be used by either the owner or a close relative for training, which is a real shame. Perhaps more people would get into aviation if on their trial lesson they flew something that wasn't designed in the 1950s! ■

SPECIFICATION

**TL-ULTRALIGHT STING**
**(Kit Price £55,000 plus delivery and VAT)**

**DIMENSIONS**

| | |
|---|---|
| Wingspan | 9.12m |
| Length | 6.2m |
| Height | 2.05m |
| Wing area | 11.10sq m |

**WEIGHTS AND LOADINGS**

| | |
|---|---|
| Empty weight | 297kg |
| Max takeoff weight | 600kg |
| Useful load | 303kg |
| Fuel capacity | 121 lit |
| Wing loading | 54.05kg/sq m |
| Power loading | 8.04kg/kW |
| Baggage capacity | 25kg |

**PERFORMANCE**

| | |
|---|---|
| Vne | 157kt |
| Cruise | 100kt |
| Stall clean | 35kt |
| Climb | 1,000fpm |
| Take off distance (over 50ft) | 286m |
| Landing distance (over 50ft) | 365m |
| Range (VFR reserves) | 900nm |

**ENGINE AND PROPELLER**

Rotax 912iS liquid-cooled flat-four, producing 100hp (74.57kW) at 5,800rpm and driving a Kiev three-blade fixed-pitch propeller

**MANUFACTURER**

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