The Virus arrives in the UK – and it's such a fine aircraft you'll find our enthusiasm infectious

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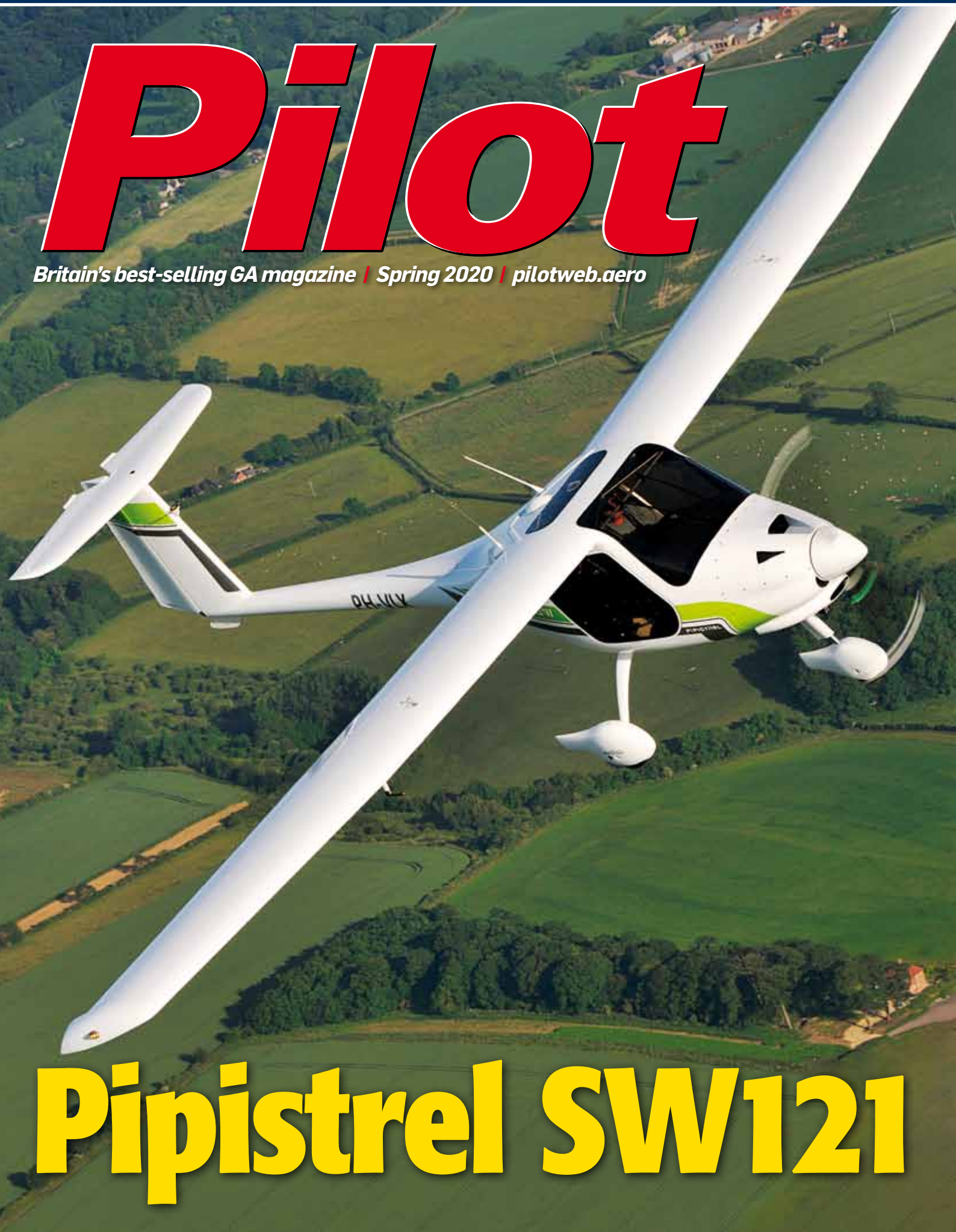

Pipistrel SW121

A WELCOME VIRUS

This EASA-approved Slovenian Light Sport Aircraft comes well equipped, handles nicely, is speedy and will carry a decent load over a long distance with great efficiency

Words: Dave Unwin
Photos: Keith Wilson

"Salt Prebrief go!" I'm a little slow locating the transceiver and pressing the flip-flop button, and after a brief fumble to change channels hear the fragment "…alt two, one—check in!" I should've called "Two's up" without Al having to ask and he sounds mildly irritated—but then he often does with me. "Salt One, Salt Two" I reply quickly. Deepak nods approvingly "you are very professional" he observes. I grimace ruefully and concentrate on Salt One…

Probably the best bit about being *Pilot's* Flight Test Editor is the sheer variety of aircraft that I get to fly, and on a lovely June day last year I got to test two quite different and equally delightful aeroplanes from the same manufacturer. Now, I say different but must allow that when parked next to each other at Saltby airfield in Leicestershire the two aircraft did look remarkably similar, which is perhaps not unexpected as they are both products of the Pipistrel factory in Ajdovscina, Slovenia. Yet upon looking closer, there were several subtle but significant differences. The Dutch registered one had drooped wingtips and a different propeller, the spats seemed bigger and the tail bumper larger.

Intrigued, I asked FlyAbout Aviation's main man Deepak Mahajan, who explained that although they may look alike they're far from the same, as the G-registered one, the Alpha is a microlight approved for the British market and built to BCAR-S (aka British Civil Airworthiness Requirements, the 'section S' bit denoting Small light aeroplanes) while the Dutch-registered Virus SW is based on EASA CS-LSA (Light Sport Aircraft) construction standards. →

ABOVE: **constant-speed MT propeller helps bestow impressive short-field and high-speed cruise performance**
BELOW LEFT: **along with carfeully profiled spats, the composite undercarriage bow generates minimal drag**
BELOW RIGHT: **an unusual Pipistrel detail – moulded-in fixed tabs, designed to trim out elevator forces**

There are still lots of questions, most of which I'll find the answers to in the air, but am intrigued by the different registrations. After all, aren't the UK and the Netherlands both in EASA? "Its complicated – and costly" explains Deepak, "just believe me, the UK CAA really knows how to 'gold-plate' something – and I know a lot about gold-plating!" How come? "I used to be a jeweller," he grins.

I fly the Alpha first (see *Pilot*, September 2019) and although very impressed, I can't help but feel that the inherent (albeit artificial) constraints placed upon it by its low maximum all-up weight and commensurate reduced useful load mean that, when flown two-up, it is somewhat restricted. Possessing a not inconsiderable personal MAUW, I knew that – even without flying it – the Virus SW would be a better fit for me, so what's the same and what's different?

The similarities are that both aircraft are primarily made of composites (carbon fibre and Kevlar over a carbon/aramid sandwich). There's a small difference in that the Virus's metal components are constructed from titanium, whereas less expensive magnesium is used for the Alpha. In both designs the mainwheels are carried on a composite bow and feature hydraulic Beringer disc brakes, while the nosewheel steers through the rudder pedals and uses an oleo arrangement for shock absorption.

Interestingly the snug fitting spats on all three of the Virus's tricycle undercarriage wheels are larger than the Alpha's, with considerably more keel area behind each axle. I suspect this is to increase directional stability at the much faster speeds that the Virus SW is capable of. The SW's wingtips feature a pronounced droop, and when Deepak operates the airbrake lever I note that the Schemp-Hirth type brakes only have a single paddle, while the Alpha's smaller ones have three, looking more like venetian blinds.

As with every other Pipistrel I've flown, the SW is packed with sophisticated features that you wouldn't usually find on a light aircraft, and even the pitot-static system is interesting, as the single pitot tube on the starboard wing, incorporates an alpha (angle of attack) sensing port – more on this later. The tail unit is the same, with the tailplane and separate elevator mounted on top of a slightly swept-back fin which carries a broad-chord rudder. There is also a metal tail skid which looks like a small ventral fin and is bigger than the one fitted to the Alpha. I suspect this does two things; adding keel area on a long arm aft of the C of G to increase directional stability for minimal extra drag, while putting a bit more mass at the tail to offset the extra weight of the constant-speed propeller. Cables actuate the rudder, pushrods are used for the elevator, airbrakes and full-span flaperons (combined flaps and ailerons).

The airbrakes can be held open in any position or locked in three settings – closed, half open and fully open – while the flaperons have four: 'minus' (-5°), zero, '+1' (9°) and '+2' (20°). Pitch trim is provided by a spring-bias system mounted on the elevator push-pull tube and is actuated by an electric servo motor. Of particular interest are the small moulded tabs on the rudder and elevator. The rudder's is simply a non-adjustable trim tab, but the pair on the elevator intrigue me. It transpires that as the elevator is cambered slightly to provide better 'negative lift' at low speeds (and thus enhanced responsiveness in slow flight and improved stall recovery) compensation for trim forces at higher speeds is required, hence the fixed trim tabs.

Power is provided by a closely-cowled 100hp Rotax 912S3, which turns a composite two-blade MT constant-speed propeller. It is fed from two fifty-litre fuel tanks (one in each wing) with a 1.5 litre stainless steel collector tank located immediately downstream from each tank, amounting to a maximum fuel weight of 74kg.

Up to 25kg can be carried in a small baggage bay behind the left seat, which is accessed via a small door on the port side. The SW's useful load can properly be described as useful. Deepak and I both possess 'fuller figures' and a quick calculation confirmed that with full fuel and max baggage we couldn't quite stay below the 600kg max weight. However, full fuel gives about five hours, and my personal tank can't do that any more! As it is, the baggage bay is not full and we fill the tanks before flying, so the mass is within a kilo of the 600kg MAUW for the flight test.

ABOVE: **the heavier, faster Virus is distinguished from the microlight Apha by its downturned wingtips and extended spats**

Giant gull-wing doors and low sills make accessing the cockpit easy, particularly as the doors are held wide open by neat little pin and clip devices. These are strong enough to allow taxying with the doors open but not flight… As with the Alpha, this makes the omission of a DV (direct vision) panel more reprehensible.

As anticipated, although the Alpha and Virus SW are quite similar in appearance, the two cockpits are very different, so with the rudder pedals set (they can be altered in flight and over a good range) and both of us strapped in, I study the controls and instruments with considerable interest.

A neat central binnacle carries all the instruments and avionics, while the pedestal that braces the binnacle also holds all the switches and circuit breakers, plus the small parking brake lever and something new to me – a battery disconnection ring. This is connected via a cable to a lever that is used to isolate the unit should either the alternator or rectifier malfunction and begin to overcharge the lightweight lithium battery with potentially catastrophic results, such as a thermal runaway.

The primary flight, navigation and engine information are all displayed on a pair of Garmin G3X displays. The PFD (primary flight display) is on the port side and features a seven-inch screen arranged in portrait, with an identical display to starboard which functions as the MFD (multi-function display). The PFD is very impressive, and even incorporates an automatic accelerometer and colour-coded angle of attack (A o A) display. The alpha sensing port in the pitot tube provides A o A information for the display and a warning buzzer, which actuates at the top of the yellow warning zone and increases in volume and frequency as the alpha increases. The yellow region begins at an alpha equivalent to flying at 1.3 x Vs at 1g, while the red A o A region corresponds to 1.1 x Vs at 1g and the green region simply shows the margin above the stall.

At the top centre of the panel are a large standby analogue ASI and altimeter, with the autopilot control panel underneath them, and then a Garmin GTR225 transceiver (a Garmin GNC255 NAV/COM is an option) and a GTX328 transponder. At the base of the panel and looking slightly incongruous (though no less worthy) amongst all the digital delights is a classic slip ball. To the right of the MFD is the cabin heater control panel, which even incorporates an electric fan – an especially useful device for demisting the windscreen.

For a 100hp two-seater this really is a very sophisticated aircraft, and one of my very few criticisms is that such a hi-tech machine really deserves a more refined stick top. There's only a PTT there, but it should also have switches for the electric trim, autopilot disconnect and possibly even control wheel steering.

Mounted on the floor and between the seats is a quadrant that carries the throttle, propeller and choke levers, with the three-position fuel selector valve immediately aft. Slightly further back is a switch for the electric pitch trim and its co-located indicator (trim position is also shown on the PFD), and the large handbrake-type flap lever, there being another lever for the airbrakes set into the roof in front of a red T-handle for the BRS. The panel is plastered with placards and I note with interest that while the airbrake's limiting speed is higher than the Alpha's at 100kt, the limiting speed for +2 flap is lower, at 65 – in fact, too low.

The doors share the same strengths and weaknesses as the Alpha's. All the transparencies (including the windscreen) use Lexan that features a rather dark tint, and while its acceptable on a bright July day, on a gloomy autumn evening it'd be most unsatisfactory. However, the door locking design (three locking pins actuated by a single handle) is both robust and simple. →

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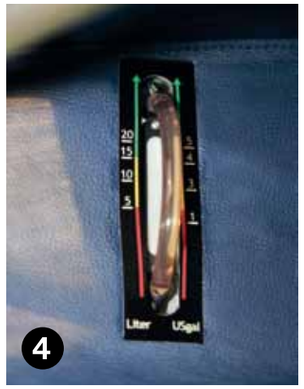

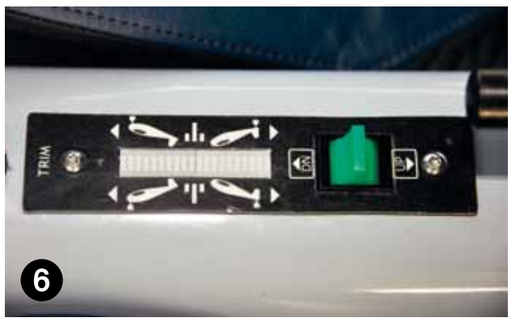

1: **a highly capable and sophisticated panel fit for a Light Sport Aircraft**
2: **handbrake-style flap lever sits between the seats, red BRS pull above**
3: **pitot/static and alpha sensor tubes and and wiring – one of the less tidy features**
4: **we've never been keen on fuel sight gauges, but at least the Virus's are backlit**
5: **nice engineering: the adjustable rudder/brake pedal assembly is unlocked by an easy to reach knob, just ahead of the stick**
6: **electric elevator bias trim, with graphics designed to be viewed from either seat**
7: **solidly constructed quadrant carries cast metal throttle and propeller levers**
8: **operated independently of the flaps, the airbrakes are controlled by this overhead lever, fitted with a thumb-operated latch**

Unlike the Alpha, there isn't an auxiliary electric fuel pump, and as the Virus has been on the ground for several hours while I evaluated the Alpha, a little choke is required for a cold start.

Now, I was very impressed by the Alpha, but almost as soon as we start rolling feel more of an affinity with the SW. It might be the greater weight (over 120kg more on the same undercarriage improves the ride quality and damps out the rocking motion) or possibly the toe brakes. While evaluating over 300 different types I've flown aircraft fitted with practically every type of retardation device, from heel brakes and hand brakes, nose skids and tail skids to thrust reversers and drag chutes, yet I will always prefer toe brakes, even though you don't use them much in the Virus because the nosewheel is steered through the rudder pedals.

As expected, the pre-take off checks are slightly more complex, since tanks need to be changed and the prop cycled, but the protracted delay while we wait for oil temperature to reach the minimum 50°C required for take-off makes me wonder whether the SW might benefit from an oil cooler door like the one fitted to the EuroFox cameraship, and this impression is confirmed when Al calls "Salt One's ready" when our oil temperature is still quite cool.

Performance at maximum weight

With 168kg of Dave and Deepak, 10kg of baggage and 72kg (100 litres) of fuel (the fuel quantity is shown on backlit, colour-coded sight tubes in the wing roots) we are within a kilo of the MAUW, while ambient conditions are an OAT of 20°C and an elevation of almost 500ft. This means the density altitude is well above ISA, while there's just a gentle crosswind from starboard.

Despite the constant-speed prop and twenty extra horses the additional 128kg means that SW isn't quite as sprightly a take-off performer as the Alpha—although it's still pretty good. Forty-eight knots is attained after quite a short ground roll, so I gently ease the stick back and we're airborne and accelerating rapidly. As the speed tape slides through seventy I just reset the flap lever from +1 to zero,

LEFT: **reached from outside, the small baggage bay will take a maximum of 25kg**

nail the airspeed to the 78kt Vy for best rate of climb and the VSI shows a solid 1,000fpm.

Having confirmed that the climb rate is as claimed (and, unlike some manufacturers, Pipistrel's numbers always check out) I lower the nose and increase speed to ninety. This greatly improves the field of view and enhances engine cooling, while from a handling perspective, as soon as the wing takes the weight, just as it felt on its wheels I can sense the SW is much more stable, while the crisp controls provide plenty of authority.

We've taken off in trail behind Al and Keith in the EuroFox cameraship and 'Salt formation' is soon soaring confidently above the beautiful Vale of Belvoir. The earlier shoot with the Alpha had not been my finest hour (the end result was good, but it took longer than usual) and I'm determined to make amends. Unfortunately, my fumble with the flip-flop doesn't get things off to a great start, but things soon slot into place and the shoot is as slick as the previous one was sloppy.

As it is now early evening the thermals have died away, and although the high wing means the field of view is the same and the SW's airframe is just as slippery as the Alpha's I can use the CS prop and mechanically-actuated airbrakes to my advantage, while the significantly smoother air makes maintaining position considerably easier than four hours previously. Finally, the much higher wing loading (63kg/sq m against the Alpha's 45) gives a much more solid ride.

With the EuroFox heading homeward and all the sailplanes back on the ground we've got the beautiful evening sky to ourselves, and it's so agreeable that initially I give Deepak a quick tour of the local area and show him Belvoir Castle and the 'Jacobethan' blend-of-styles masterpiece that is Harlaxton Manor. The high-or-low wing debate is probably as old as aviation itself, but although a low wing is better when flying formation or towing gliders, I much prefer a high wing for aerial sightseeing and the SW's massive glazed doors do provide a fine field of view downwards.

Eventually I decide to do some work and start with a look at the stick-free stability around all three axes. The directional stability seems stronger than the Alpha's—possibly because of the larger spats and tail bumper, while longitudinally and laterally it shares the same traits as its lighter sibling, being strongly positive in pitch and neutral in roll. Stalls are straightforward and it's easier to decelerate than the Alpha as the airbrakes can be used up to 100kt, while the flaps can be set to +1 at 81. However, the flaperon lever should a little longer, as operating it is slightly awkward. Below 100kt the Virus feels more comfortable with the flaps at zero, while once you really get going the minus setting is best.

As the speed tape on the PFD sinks through 65kt, I move the flap lever to +2, which lowers the flaperons to their maximum of 20°. At the stall there's a slight wing drop, which occurs at around 45kt. Adequate aileron control is available post-stall.

For an examination of a departure stall, I retract the flaps to the take-off setting of +1, open the throttle and pitch up. The stall warner gets excited as the airspeed bleeds away but it's still all very benign, and even stalling →

The cabin heater... even incorporates an electric fan, useful for demisting

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with the flaps at their minus setting doesn't provoke a malevolent reaction, so I move onto an investigation of the primary flight controls.

As with the Alpha, the Virus's controls are well harmonised around all three axes, with minimal 'stiction' and low breakout forces. Keeping the slip-ball centred requires only small amounts of rudder, although while studying the excellent POH in depth post-flight I did note that it contains the curious admonition to 'avoid prolonged use of more than 75% rudder deflection as this may result in a pitch-down moment'. I wish I'd read that before we flew, as I'd have very much like to have applied full rudder just to see what it does! This and the spin characteristics are worth investigating the next time I fly a Virus.

Anyway, a few steep turns and sharp reversals confirm my initial impressions of agreeably taut handling and excellent control response, so it is on to an examination of the biggest difference between the two types—cruise performance. Unsurprisingly, having twice as much fuel, flaps with a negative setting and a CS prop make this a very impressive touring machine. At 6,000ft 75% power (5,500rpm and 23 inches of manifold pressure) and the flaps at 'minus' gives a true airspeed of 132kt for a fuel burn of 23 lph, while at 4,000ft 65% power (5,100rpm and 23 in MP) still gives 116kt TAS for less than 23 lph. Go up to 10,000ft—we didn't have time, unfortunately—and the POH claims that 65% power (5,500rpm and around 20 in MP) will give 125kt true for barely 19 lph. This makes 500nm feasible in only four hours, with an hour's reserve fuel, at a very impressive 32 (air) miles per gallon. However, if you do decide to cruise that fast and that high, a word of warning: Above 10,000ft the Vne drops from 163 to 140, and a cruise descent could possibly approach that speed.

Back at Saltby the wind has died away to barely a gentle zephyr, and as we have the field all to ourselves I shoot several touch 'n' goes with various combinations of flap and airbrake settings, simply because I can. Deepak recommends sixty knots over the fence with the flaps at +2 and the airbrakes locked at the 'half' setting, and this works well. However—and just as with the Alpha—precise pitch control is imperative if an unwanted increase in airspeed is to be avoided. For real precision and improved accuracy (for example, when landing in a short field) I find it best to set the flaps, close the throttle and control the descent angle with the airbrakes, just as you do in a sailplane.

At the end of a long but fun day's flying, I was very impressed by both the Alpha and Virus—but personally tilt more towards the heavier aircraft. Unlike the Alpha, there are no trade-offs required regarding the useful load and you can safely fill the seats, fill the tanks, and still use most, if not all, of the baggage bay. In fact, my single biggest criticism is the name, as with the coronavirus all over the news as I write, getting a 'Virus' does sound somewhat undesirable, when it's actually a great aircraft!

PIPISTREL VIRUS SW121

€169,000 EXC VAT & DELIVERY

Dimensions

Length	6.45m
Height	2.06m
Wing span	10.7m
Wing area	9.51sq m

Weights and loadings

Empty weight	349kg
Max auw	600kg
Useful load	251kg
Wing loading	63.1kg/sq m (12.9 lb/sq ft)
Power loading	8.16kg/kW (13.0 lb/hp)
Fuel capacity	100 lit
Baggage capacity	25kg

Performance

Vne (IAS)	163kt
Cruise (TAS)@6000ft	132kt
Stall	45kt
Takeoff over 50ft	323m
Land over 50ft	447m
Climb rate	1,050fpm

Engine

Rotax 912S3 air/liquid-cooled flat-four, producing 100hp (74.57kW) at 5,800rpm

Propeller

MT composite two blade constant-speed

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