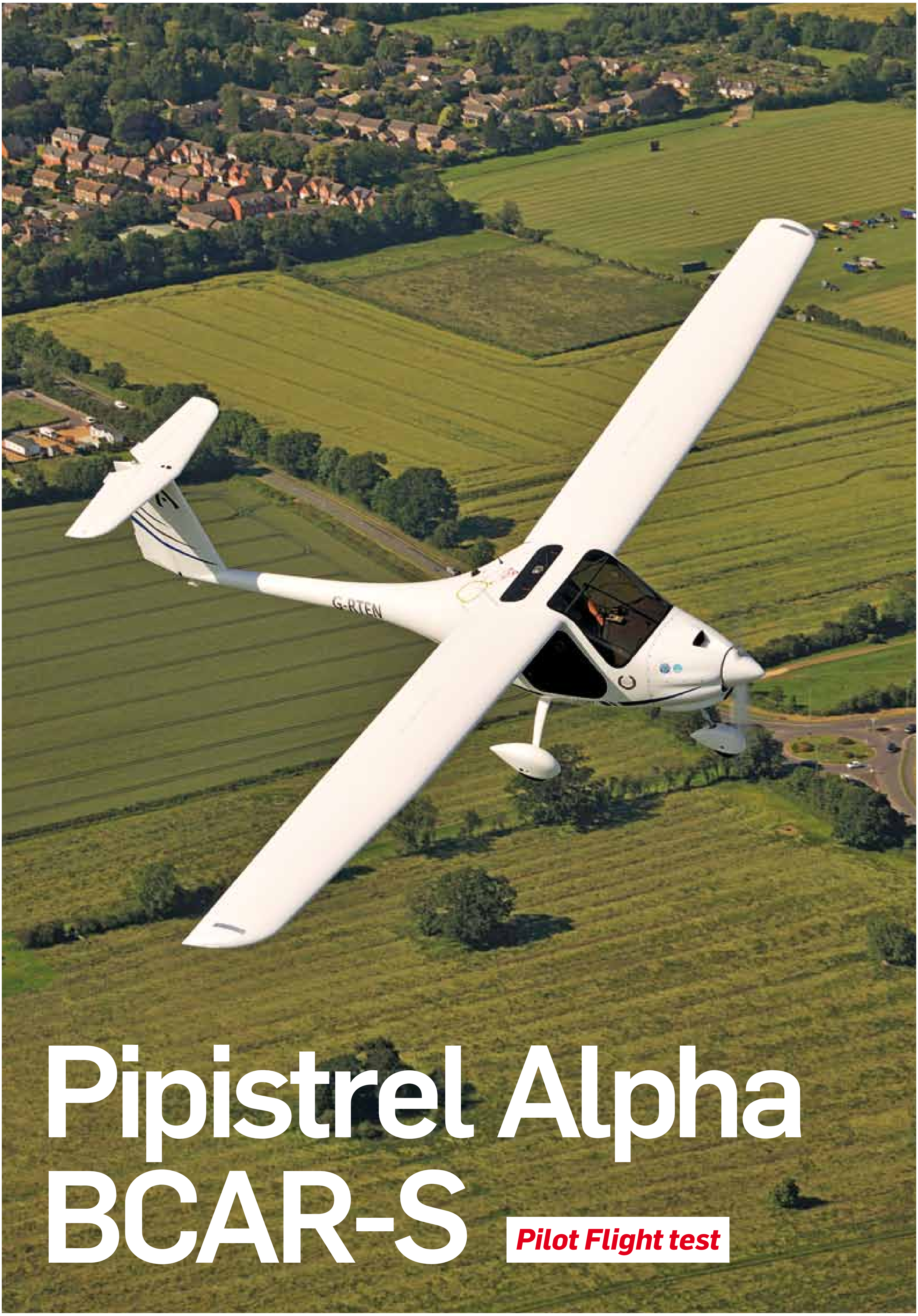



# Pipistrel Alpha BCAR-S

**Pilot Flight test**

# Alpha class

**This slippery Slovenian ultralight trainer/tourer, now built to British airworthiness standards, soon dispels anyone's preconceptions of a microlight**

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

Zipping along at an easy hundred knots in a comfortable cockpit with a plethora of precise digital information on the instrument panel in front of me, one thing is irrefutable: microlights have come a long way!

The manufacturer of this test aircraft—Slovenian company Pipistrel—has also come a long way, and in a remarkably short time. Established in 1989 by Ivo Boscarol, in just thirty years the Ajdovscina based concern has produced myriad designs, won multiple awards, and manufactured some 1,500 aircraft. FlyAbout Aviation, led by the irrepressible Deepak Mahajan, is the UK Agent. On a fine June afternoon Deepak arranged for me to sample examples of the Alpha and similar Virus SW121 at Saltby in Leicestershire.

These two Pipistrels may look similar but they're really very different—and I'm looking forward to flying both, starting with the Alpha. This version has been built to BCAR-S (British Civil Airworthiness Requirements, Section S refers to Small Light Aeroplanes) and is very much aimed at the UK market.

You can often learn a great deal by taking a long look at an aircraft from a distance. On this occasion I notice that there seems to be more side area forward of the centre of pressure than aft, and make a note to double-check the directional stability. Up close it's obvious that this is a well-built, high-quality machine, and the superior aerodynamics permitted by using moulded components produce an aeroplane that is so efficient it even won an award from NASA. Like many microlight aircraft it is predominantly constructed of composites (primarily carbon fibre and Kevlar over a carbon/aramid sandwich—although titanium and magnesium are also used) and is extremely strong.

The Alpha is powered by the near-ubiquitous Rotax 912 engine. Quite closely cowled, it is the 80hp 'S' variant, turning a composite two-blade fixed pitch propeller made by Pipistrel,



and fed from a single fuselage-mounted fifty-litre fuel tank behind the pilot's seat. Also incorporated into the fuselage is a Galaxy BRS (ballistic recovery system). This is a very impressive system that has a minimum operating envelope in horizontal flight of only 200ft and 25kt. In a remarkable display of understatement, the POH states 'you should know that the phase following parachute deployment may be a great unknown and a great adventure for the crew'. Not being in the mood for a great adventure, Deepak and I agree that the only reason to pull the handle would be if the aircraft were completely unflyable after a mid-air collision or major structural failure. In any other situation, we'll ride it down. With the best L/D (glide ratio) an impressive 15:1 at 64kt, and a minimum sink of 460fpm at 58kt there should be a field within range where we can park it with some degree of grace.

The Alpha has a very simple tricycle undercarriage which requires minimal maintenance—useful on a trainer. All three undercarriage wheels feature tight fitting spats. The nosewheel steers through the rudder pedals and uses an oleo arrangement for shock absorption, while the mainwheels are carried by a composite bow and have hydraulic disc brakes. These are interesting, as the brakes are set within the hub, presumably to protect them. This arrangement makes them impossible to inspect during a preflight but, according to Deepak, they last longer as a lot of the wear on most aircraft brake discs and pads is caused by dust and grit. Putting the brakes within the wheel hubs seemed like a clever idea to me, but (and particularly when flying trial lessons) the main wheel spats appeared quite vulnerable to an errant boot. They do feature 'No Step' stickers but I couldn't help wondering if some sort of quick release might be a good idea.

The forward fuselage and cockpit are quite large while, aft of the cockpit, the empennage tapers sharply, making it almost a 'pod-and-boom' design. The T-tail is mounted on a mildly swept-back fin, which carries a broad-chord rudder. The tailplane features a separate elevator and there is also a metal tailskid which looks like a small ventral fin and probably adds a little bit of side area on a long arm aft of the centre of pressure, increasing directional stability for minimal extra drag. Pushrods actuate the elevator and flaperons.

**It is unusual to see a microlight fitted with airbrakes**

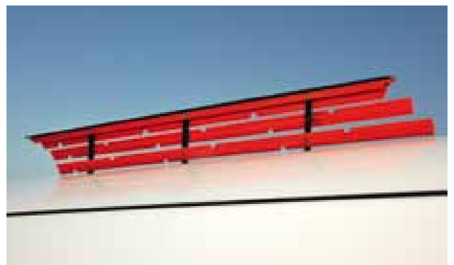
Curiously, while there are what look like moulded-in trim tabs on the elevator, these are non-adjustable and longitudinal trim is actually provided by an electrically-actuated spring bias system. Cables are used for the rudder. Of particular interest are the large triple-paddle Schemp-Hirth type airbrakes fitted to the top surface of the wing at about 45% of the chord. Not only is it unusual to see a microlight fitted with airbrakes, but these are electric—and automatic! More on these later.

The full-span flaperons have three positions: '0', '+1' (15°) and '+2' (25°) and considerable effort →

The undercarriage is claimed to require little maintenance, but those spats look vulnerable to 'an errant boot'

The elevator is cambered to produce a downforce on the tailplane and the fixed tabs are there to trim out control loading

Near 'zero-zero' capability: the BRS 'chute deployment minima are 200ft agl and 25kt



Airbrakes are designed to pop out automatically when the flaperons are fully drooped

Neat detail unusual for a microlight: combined wing-tip navigation and landing lights has gone into reducing drag, as the gaps are all nicely sealed. Finally, the wings can be quickly and easily removed as the fuel tank is in the fuselage and the connections for the flaperons are automatic.

Another fascinating feature is the position lights built into the wingtips. These very powerful LEDs actually look opaque and colourless when turned off, but once on are so bright that they can even be seen in daylight.

By now I was getting the distinct impression that the Alpha is very much a 21st century aircraft, an impression strongly reinforced on entering the cockpit. Cockpit access is excellent as the sills are low and the gull-wing doors (which are essentially giant windows, skinned with Lexan) are enormous. Ease of ingress and egress can only become more important as the economic power of the 'grey pound' grows! Once open, elegantly simple pin and clip devices hold up the doors, and the aircraft can be taxied with them open on hot days. Unfortunately, although the Alpha can be flown with one door off by simply removing two hinge pins, the doors cannot be opened in flight – which makes the omission of a DV panel worse. The rudder pedals adjust over a good range and can be altered in flight. Up to ten kilograms can be carried in a small baggage bay behind the P1's seat.

Once strapped in with the H-type harness, I study the controls and instruments. The neat panel is mounted in a binnacle braced by a small column carrying the electrical switches, circuit breakers and cabin heat control. Between the seats is a beautifully made quadrant for the throttle and choke levers, with a small switch immediately aft of it for the electric pitch trim, and the fuel shut-off valve to its left.

The choke seems somewhat over-engineered, but the advantages of not putting a trim switch on each stick top should be obvious – it is not only cheaper, simpler and lighter but is also less likely to break.

Slightly further back is a single lever for the brakes (which also doubles as the parking brake)



ABOVE: **well-positioned digital-analogue flight instruments top the very 21st century panel. Design and quality of the choke, throttle and brake quadrants is superb**

LEFT: **electrics are all grouped on the central pedestal**

RIGHT: **seat back tilted forward to reveal the port side baggage bay, placarded for 10kg max**





and then the large flap lever. The instruments are particularly interesting. Made in Slovenia by a company called Kanardia they are highly sophisticated electronic devices which present flight and engine information in both analogue and digital formats. The top row consists of a large ASI and altimeter, with a unit called a 'Horis' in the centre. It's fed from various sensors via a CAN (Controller Area Network) bus and its main page is a very comprehensive AHRS (Attitude Heading Reference System) display, which shows attitude in roll and pitch, airspeed (both IAS and TAS), vertical speed, altitude, outside temperature, windspeed and direction, heading and the barometric setting. It also has DI and g-meter pages. Deepak was fulsome in his praise for the Kanardia instruments and they really are very high quality. An excellent feature is that each click clockwise on the rotary knobs fitted to the Horis and altimeter increases the barometric pressure

## The Kanardia instruments are really high quality

setting by one hectopascal. Furthermore, the tactile rotary action makes it obvious to the pilot that the pressure setting has been changed.

Below the top row is a central EMS display, with the trim indicator, VSI, and tachometer to its left, a transceiver and transponder underneath, and an iPad mini-sized space to its right, next to a USB port. It's all very well thought-out and – bearing in mind the Alpha is a microlight – extraordinarily powerful, but what really caught my eye was the selector for the electric airbrakes. This has three positions: 'Extend', 'Retract', and 'Auto'. The first two settings are self-explanatory, but with 'Auto' selected the airbrakes automatically extend when the second stage of flap is lowered. This system is a new one on me, which I am eager to investigate. However, I make a mental note


that their limiting speed is not overly high at seventy knots, while Vfe, the flap extension limit – also 70 – is quite low too. Finally, there is a good old-fashioned slip ball at the base of the panel, where both the student and instructor can see it. This is a fine facet for a trainer, as is the fact that the throttle, flap lever and trim switch can all be easily reached from either seat.

The doors are held closed by three locking pins actuated by a single handle. An excellent arrangement, but I wasn't quite so happy with the tinted Lexan used for all the transparencies. We don't get that much sun in the UK and, frankly, I'd much rather just wear sunglasses when it is uncomfortably bright. The tint is

TOP TO BOTTOM: **the 'handbrake' lever operates the flaperons, airbrakes being extended at '+2' when set to 'auto'; combined brake/parking brake hand lever; and (from left in photo) electric trim switch and the beautifully engineered throttle and choke levers**

quite dark. On the other hand, a very interesting aspect that shows Pipistrel does think about things is that, as the electric fuel pump is generally used only for priming the carburettor, it doesn't have an operating switch as such, just a circuit breaker.

Taxying out reveals the Alpha is very easy to handle on the ground. Steering is supplied by a pivoting nosewheel (via the rudder pedals), while braking is provided by powerful but progressive lever-operated hydraulic disc brakes. With 160kg of Dave and Deepak and thirty litres of fuel on board (the fuel quantity is shown very accurately on the EMS) we were right on the 472.5kg MAUW (maximum all-up weight). You've probably already worked out that the Alpha can be registered in various forms around the world, up to a 550kg LSA, each variant being essentially the same except for the paperwork. However, when registered as a microlight, the useful load is only 186kg. Put a well-fed pilot on each seat and you cannot fill the tank and remain legal.

With an OAT of 22°C and an elevation of almost 500ft, the density altitude is well above ISA, and there's just a gentle crosswind from starboard. Acceleration is excellent. Rotate at forty knots after quite a short ground roll, and the Alpha fairly leaps off the ground. Flaps up promptly (the limiting speeds really are quite low) and an initial climb at the Vy (best rate speed) of 73kt has the VSI showing a shade over 1,200fpm. Of course, the nose is really pitched up, greatly reducing the field of view, but even lowering it to more like a cruise-climb attitude still gives about 700fpm at 95kt and 5,000rpm.

Joining up with Al and Keith in the EuroFox cameraship is not easy. The high wing means the field of view isn't great for formation work. The airframe is very slippery, the prop is pitched for the cruise (i.e. on the coarse side), and the limiting speeds for both flaps and airbrakes are low. The thermals are making the air quite bumpy, and the Alpha is quite light, with a low wing-loading. I've got practically →

everything against me! Patience and perseverance are the keys here and we eventually get it done, but during the post-flight debrief we all agree this wasn't our finest hour.

With the cameraship heading home we've got the sky to ourselves, so I start the flight test card with an exploration of the stick-free stability around all three axes. It seems to be strongly positive longitudinally, neutral laterally and just barely neutral directionally. There are two reasons for this. As mentioned earlier, the Alpha is almost a 'pod and boom' design and has very little keel area aft of the centre of pressure; also I suspect that the airflow around the steerable nosewheel is holding on some rudder at high yaw angles.

Stalls are very straightforward, although slowing down takes a while, as the Alpha is quite slippery and it is not possible to use either flap or airbrake above seventy knots. (A minor gripe here is that I find the flaperon lever slightly awkward to use, and would recommend making it slightly longer.) As the needle of the ASI finally sinks into the white arc, I begin lowering the flaperons to their maximum of 25°. As the lever is set to +2 the electric airbrakes automatically extend and there's a very slight nose-down pitching moment, which is easily trimmed out. There's a minor wing drop at the stall, which occurs at around thirty knots, and there's adequate aileron control, even post-stall. Having retracted the flaps to the takeoff setting of +1 (which also automatically pulls in the airbrakes) I increase power for a look at a departure stall. As expected, this manoeuvre provokes a slightly more vigorous response, although the ensuing stall is easily recovered from with minimal height loss. Flaps up, the stall is still less than forty knots.

I also examine the sideslipping characteristics. As previously mentioned, the aircraft has a considerable amount of keel area in front of the centre of pressure, which can be detrimental for sideslips. In fact, it slips well and recovers promptly.

Moving onto the primary flight controls reveals the Alpha to be nicely harmonised around all three axes. A couple of steep turns and reversals reveal crisp, authoritative controls with delightfully light stick forces. Only small amounts of rudder are required to keep the slip-ball centred, and harmony of control is as it should be, with the ailerons being the lightest and the rudder the heaviest. Breakout forces are low, with little 'stiction', despite the fact that this is a relatively new airframe.

The overall handling really is very light and might come as a surprise to pilots who initially trained on heavier aircraft. I suspect that pilots transitioning onto an Alpha from a legacy trainer like a C152 or PA-28 might find the handling light to the point of skittish. Conversely, the first time an Alpha pilot samples an older type they'll probably find the handling incredibly heavy. Whichever way you're converting, a comprehensive briefing and an hour or two with a good instructor should cover it.

As the Alpha is both trainer and tourer, it seems logical to consider both aspects, so I set throttle and trim and note some numbers. The figures for speed and range are impressive. Max cruise of 110kt at 5,100rpm gives a TAS of 120kt at 5,000ft, but the engine does sound rather busy. A more comfortable cruise rpm is 4,600, which still gives an IAS of 90, for a fuel flow of less than 10 lph at 4,500rpm, giving a still air range of almost 400nm, plus DAY-VFR reserves. However, as I pointed out before, there are trade-offs to be made with regard to the useful load, although even only half-filling the tank →



ABOVE & OPPOSITE: **the Alpha's flowing lines and T tail reflect contemporary sailplane design – it certainly gliges well**

RIGHT: **full-span flaperons give a most un-glider like roll response. Spamcan pilots may find it feels rather skittish** still gives a still air range of over 200nm. It certainly doesn't seem to impede Deepak, who spends a great deal of time leading touring groups around Europe. Personally, after a couple of hours in the cockpit I'm usually ready for a break anyway.

Back at Saltby a few circuits reveal that the sheer slipperiness of the Alpha reinforces the requirement for accurate speed control on final and confirms the necessity of the airbrakes. The recommended Vref (threshold speed) of 55kt is only fifteen knots below the flap-limiting speed of seventy—and worth remembering during a missed approach. The 55kt Vref is quite conservative; fifty felt fine, as the wind was quite light.

An interesting aspect of the Alpha's envelope is the great disparity between the distance required to clear a fifty-foot obstacle when landing or taking off. Most light aeroplanes require less distance to land than to take off, while the reverse is true for jet aircraft. Not so the Alpha. The good power-to-weight ratio and low wing-loading provide sparkling takeoff performance, but the clean airframe (even with full flap and airbrake) means that almost twice as much distance is required to land over an obstacle as take off over one. In one sense this is a good thing, as you'll never go into somewhere you can't get out of!

Careful attention to speed and pitch attitude is very important on final: if you allow the nose to dip even a little it will accelerate. I tried a landing without the airbrakes and, once it entered ground effect, the Alpha just kept flying, even with full flap. So beware; landing without flap or with the airbrakes retracted would require a lot of runway!

**It's frugal with fuel but fast enough for training**

Incidentally, the max demonstrated crosswind component for landing is an impressive eighteen knots, or almost two-thirds the stall speed. However, I think I'd probably divert.

I was very favourably impressed by the Alpha, and can fully understand why Deepak is such a fan. It's frugal with the fuel but fast enough for training (and relaxed touring), while the comprehensive avionics suite make managing the motor, engaging with ATC, and handling the navigation simple. It takes busy airfields or grass strips in its stride equally easily, and the thought I kept coming back to as we zipped along at over 100kt TAS in quiet, warm comfort was simply this: Is this thing *really* a microlight?

## ALPHA BCAR-S €96,500 EX VAT

### Dimensions

| | |
|---|---|
| Length | 6.45m |
| Height | 2.05m |
| Wing span | 9.24m |
| Wing area | 10.50sq m |

### Weights and loadings

| | |
|---|---|
| Empty weight | 286kg |
| Max auw | 472.5kg |
| Useful load | 186.5kg |
| Wing loading | 45.0kg/sq m (9.21 lb/sq ft) |
| Power loading | 7.29kg/Kw (13.02 lb/hp |
| Fuel capacity | 50 lit |
| Baggage capacity | 10kg |

### Performance

| | |
|---|---|
| Vne (IAS) | 134kt |
| Cruise (TAS) @ 6,000ft | 115kt |
| Stall, full flap | 34kt |
| Takeoff over 50ft | 265m |
| Land over 50ft | 460m |
| Climb rate | 1,220fpm |

### Engine

Rotax 912S air/liquid-cooled flat-four, producing 80hp (59.65kW) at 5,800rpm

### Propellert

Pipistrel composite two-blade fixed pitch

### Manufacturer

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