Alpi Aviation Pioneer 300 Hawk

Small, but beautifully put together

*A stylish little two-seat kit that cruises at 130 knots on just 18 litres per hour sampled by **Keith Wilson** (who also took the pictures)*

There is something magical about Italian design – whether it is the stunning beauty of their buildings; the sheer elegance of Italian ladies and their clothing; the performance and smooth lines of their wonderful sports cars; or their beautiful aircraft. The Pioneer 300 Hawk is just such a beautiful aircraft.

The two-seat, side-by-side kit aircraft is of mixed construction, using both wood and composites. Most Pioneers are powered by a 100hp Rotax 912S and the example flown here is fitted with an Avtek Idrovario composite, two-blade, manually-adjusted variable-pitch propeller. Sitting on its neat tricycle, electrically-powered, retractable undercarriage and with a smart red and white colour scheme, the smooth, sleek lines provide a clear impression of speed. Although the Pioneer was not designed by Stelio Frati it is clearly influenced by his art, being a little Falco-esque in appearance. This cute but perhaps just a little small aircraft has been

designed for going places – quickly!

Originally designed as a 450Kg microlight for the Italian market by Alpi Aviation back in 1998, the Pioneer 300 has undergone significant updates (and weight upgrades) along the way. Many of the European constructed Pioneer 300s have been cleared to well over this weight. The Pioneer 300 Hawk model features a raised canopy providing more space for the taller pilot, gas-oil dampers within the main undercarriages for improved ride comfort, an all-composite instrument panel and with the wings now completely covered in plywood.

Work on approving the Pioneer for UK constructors started in January 2003 when the Popular Flying Association (now the LAA) visited the factory in Pordenone, near Venice and made a number of recommendations, especially in areas where the design might not comply with JAR/VLA requirements. All of these were accepted by the factory and incorporated into subsequent VLA as well as kit production.

The fuselage is made from a wooden truss structure with carbon fibre surfaces. The wings have wooden spars and ribs, with plywood covering, then a single layer of glass fibre on the top. This adds a little weight to the structure but ensures a smoother finish and keeps moisture out of the wood. The horizontal stabiliser is all carbon fibre while the vertical stabiliser's spar is of wood. All control surfaces are constructed of wood with fabric covering and doped. The ailerons are rod-operated while the elevator and rudder use cables.

Structural wood throughout is Norwegian spruce. Perhaps surprisingly, this species was not identified until some time after the design and stress analysis had been completed. As a result conservative values for the wood were used for the materials allowable. This, and conservative design, has led the LAA to clear what was initially a 450kg machine to fly at 560Kg. Plywood used on the wing leading edges is birch or Okomi.

Most of the structure – fuselage, control surfaces and pre-fabricated wings – are built in Croatia where there is a good skill base and the level of wages ensures excellent value for money. These components are shipped to the factory at Pordenone for inspection before the complete kit is shipped to the customer.

When Pioneer UK approached the PFA for the services of a suitably-qualified certification engineer they recommended Dave Simpson. He had already carried out similar work on a powered parachute, the AX-3 microlight, Avions Mignet's Balerit, the Ikarus C-42 and EV-97 Eurostar and came highly recommended. Initially, he worked on the Pioneer 300, then the 200 and 200 microlight version before starting recently on the Pioneer 400. "It was an interesting way to sell an aircraft to me" recalls Dave. "After completing the calculations and testing, I was convinced of its strength and integrity." He purchased a kit with co-owner Tim Franklin in 2006 and commenced the build. "I'm a very slow builder," he added, but what he really meant was he's a bit of a perfectionist. The aircraft is beautifully finished.

When the aircraft was completed in October 2009, it was registered as G-OPYO. Co-owner Tim Franklin is a farmer with some of his land set aside for pick-your-own strawberries and raspberries – adjacent to the Graveley runway.

The first flight was made at Graveley by Bob Morcom on 9th November 2009 and Bob went on to complete the LAA flight test programme in four weeks. Although Graveley may be considered small for a test flight, Henlow and Little Gransden are close by and Bob decided to see how the aircraft felt on the first flight before either landing back at base or diverting. After taxi trials and a couple of high-speed runs the first short flight was made. It lasted ten minutes, allowing basic control feel to be assessed and engine parameters monitored while the landing gear was left down. Such was Bob's confidence in the design and build quality he returned to Graveley and the rest of the test flying was carried out from there, with only minor adjustments needed to complete the test schedule.

Dave Simpson and Bob Morcom kindly brought the aircraft to Peterborough/Conington for me to fly. Its arrival turned heads and was the subject of close inspection by flying club members – all comments being complimentary. →

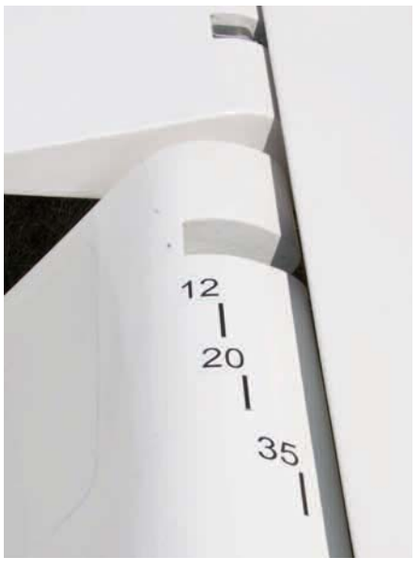
The elegant and stylish Pioneer 300 Hawk. Although not designed by Stelio Frati, it is clearly influenced by his art

First impressions

For the flight test, Bob Morcom is going to fly with me. The decision was made with the gross weight limitations in mind as Bob is significantly lighter than both Dave and me. Bob graciously offers me the left seat in G-OPYO, especially with the only brakes on my side. With a good quantity of fuel in the tanks and both of us on board, we are well inside the 560 kg maximum takeoff weight.

Walking towards the Pioneer parked on the grass, you get a wonderful sensation of classic Italian racing car design, with the smooth, sporty, red lines reminiscent of the Ferrari stable. That said, as you get close, you do begin to realise just how small this aircraft really is – after all, it is a VLA.

The walk-round is pretty straightforward but we pay particular attention to the undercarriage. The aircraft normally operates from a grass strip and it's important to check that the wheel wells are free of mud. Bob instructs me to get on board while he waits on the grass, for two people on the back of the wing at the same time will tip the aircraft back onto its tail. Using the small wing walkway, I clamber up the wing. Looking into the new cockpit, I am reticent about standing on the light grey and blue seats but Dave has cleverly fitted a carpeted step just ahead of the leading edge of the seats for just this reason. Once I slide into the seat, it is a snug fit, just like you'd expect from a high-performance sports car. The seats have been cleverly sculptured by Alpi to ensure maximum room for the torso and legs while providing excellent support. Bob assists me with strapping on the bright red Alpi four-point harness before he walks around the aircraft and takes his place in the right seat.



Top: classic Italian racing lines are clearly evident
Above: Pioneer 300 Hawk is happy on hard and grass runways. G-OPYO is operated from a private grass strip, so it's important to check the wheel wells are free of mud
Left: with no preset detents, the electric flaps are operated by a toggle switch just below the throttle while position indicator marks are visible on the flap

The cockpit is completed to a high standard for a kit aircraft. In front of the pilot is a cluster of six large 3 1/8-inch gauges, including an engine RPM gauge calibrated up to 7000 rpm, with the red line at 5800, for the Rotax 912S. It is positioned just to the right of the manifold pressure gauge. G-OPYO also has a TruTrak autopilot installed, working as a wing leveller and slaved from the GPS. On the right-hand side of the panel, in front of the passenger, are nine 2¼-inch engine management instruments. The centre of the panel is dominated by a slightly old-fashioned but reliable Garmin 296 GPS, a Bendix King KY97A radio and a small but tidy TRIG TT21 transponder and FlightTech intercom. Dave Simpson has carefully kept the weight down throughout the build.

Below this panel are the switch and indicator lights for the retractable undercarriage, just above the controls for the Avtek Idrovario composite two-blade prop. Moving down this panel is the spring-loaded plunger throttle (which almost caught me out later in the flight) as Rotax supply the carburettors with sprung open throttles in the belief that in the event of a cable break, a fully open throttle is better than a fully closed one. Below this are the electric flap switch and parking brake lever. To complete this section are switches and indicators for electrically-operated aileron and rudder trims. A nice touch is the clear panel by your feet allowing a view of the nose undercarriage.

Start-up

Start-up is standard Rotax. With the parking brake firmly 'on', master 'on' and throttle set to idle I turn the key. It immediately jumps into life, and after checking the oil pressure is rising I adjust the throttle for 2500rpm. With no other aircraft parked near us I opt to do our ground run on the grass. Bob leans behind and pulls the canopy forward to latch and lock it. This needs to be done very gently as the canopy is fairly flexible when open and must be held in the centre of the leading edge before being pulled forward. Failure to do this correctly may result in the rear centre guide jumping off its runner, although it only takes seconds to put back. Once secure I am able to work my way through the checklist, including checking the mags at 4000rpm and cycling the prop.

Ground checks complete, I move the throttle back to idle, release the parking brake and slowly apply power before checking the brakes, which are very effective, something which would need watching on wet grass. The nosewheel steering is light and positive, if appearing just a little lightweight on the grass. The

Left: neat and compact cockpit and panel layout; everything falls neatly to hand but there is little room for additions!
Lower left: sculpted racing seat and Alpi's own four point harnesses. Baggage bay is limited to 35kgs

little and wait… and at just over 40 knots she flies herself off the runway. We have only used around 200 metres. It immediately becomes apparent that aileron and elevator response is light and well balanced and keeping her straight is easy. Once I'm sure we are heading skywards at best climb speed (60 knots) I dab the brakes and move the undercarriage lever up. It takes around ten seconds for the gear to retract fully. The effect on the trim is obvious and I compensate for the changes. Next, I increase the climb speed to 65 knots before cleaning up the flaps. Once again, the trim change is obvious. It quickly becomes clear to me that this aircraft is going to need lots of trim changes. A small gripe here; the trim switch is located on the centre console and involves moving your hand down – off the

narrow wingspan is a distinct benefit manoeuvring between the aircraft parked on the apron. At the hold I put the electric fuel pump on and set the flaps to 12º by holding the flap switch down until the mark appears on the actual flap, clearly visible over my left shoulder – simple but very effective. There are no pre-set flap detents. With controls checked for full and free and the seatbelts secure, I taxy onto Conington's runway 28.

Take-off

Following Bob's lead, I gently add power and keep straight with right rudder. At around 25 knots I ease back on the nose a

Technical Specifications Pioneer 300 Hawk

Dimensions:		
Wingspan	24 ft 9 in	7,55 m
Length	20 ft 6 in	6,25 m
Cabin width	3ft 5 in	1,05 m
Cabin height	3 ft 5 in	1,05 m
Wing area		10 m^2
Weights:		
Empty	715 lbs	325 kg
Maximum take off	1234 lbs	560 kg
Maximum payload	520 lbs	235 kg
Maximum fuel capacity	17.5 galls	80 litres
Maximum baggage	77 lbs	35 kg
Performance:		
Maximum speed Vne	150 knots	
Cruise speed (70% power)	130 knots	
Stall speed (full flap) IAS	27 knots	
Rate of climb	1,150 fpm	
Service ceiling	16,000 feet	4876 m
Take-off run	623 ft	190m
Landing distance	918 ft	280m
Range (at 75% power with 30 minute reserve)	500 nm	800 km
Airframe limits	+3.8/ -2 g	

Engine & propeller:
100hp Rotax 912 ULS driving a two-blade composite, variable-pitch Avtek Idrovario propeller of 5 ft 11 in (180cm) diameter.

Manufacturer:
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throttle – to adjust the trim while holding increased stick pressure in your left hand. A coolie hat-style trim adjuster on the stick would make life considerably easier.

I increase the climb speed to 85 knots – which provides us with a climb rate of almost 1,000 fpm – and continue up to 2,000 feet, keeping one eye on the coolant and oil temperature gauges, before levelling off and reducing the throttle back to 5000rpm. I adjust the prop pitch to 21 inches and wait as the speed quickly builds to 110 knots, while still adjusting the trim. This economical cruise speed uses only 15 litres per hour.

Party trick

Before we explore the handling characteristics, Bob wants to show me the Pioneer's party trick. He adjusts the power and trim to ensure the aircraft is absolutely in balance and tells me to lean backwards at the same time as he does. The aircraft starts to climb immediately and he allows it to continue for around 20 seconds before suggesting we both lean forward. Yep! The aircraft slowly moves from nose up to nose down and continues downward. Now we both move back into our normal positions and the aircraft slowly returns to straight and level flight. This neat demonstration confirms the narrow centre of gravity range of the Pioneer, reminding one to check the weight and balance calculations on all flights.

I check its high-speed cruise, opening the throttle to its maximum continuous setting of 24 inches, adjust the VP prop to 5300rpm and re-trim as the aircraft quickly increases speed to around 130 knots. Once trimmed it sits there reasonably comfortably, although today there are a few thermals around. The high wing loading copes well with the bumps. At this speed, fuel burn is just 18 litres per hour, giving us a high-speed cruise still air range of around 500nm plus a 30-minute reserve. Very impressive if you are in a hurry to get somewhere, although the noise levels in the cockpit at this speed without the headset are not overly comfortable – thanks goodness for ANR!

With the power back to economical cruise I try some turns left and right, and the well co-ordinated flying controls take it all in its stride. The relatively small rudder is not always required but does make nicer, smoother turns when employed correctly. What I quickly notice is the amount of speed that is washed off during these turns, especially when I tighten them. I'll need to watch this when I'm back in the circuit.

Next, I climb up to 5000 feet to explore the slow-speed handling. With checks complete I reduce power almost to idle and pitch the nose up, decelerating at the standard one knot per second. As the speed steadily decays I check the ball is in the middle and bring the power right back

Above: fuel efficiency and speed make the Hawk an excellent tourer. This photo: great handling, although the speed tends to wash off quickly in tight turns

to idle. Initial buffet can be felt through the stick at around 40 knots and the audible stall warner sounds in my ears. I continue with the back pressure while she starts to wallow, and eventually she stalls at around 35 knots with the nose dropping almost apologetically. There is no tendency for either wing to drop. I try with take-off flap (12º) and landing flap (35º) set; the characteristics are similar, although the stall speed is now nearer 30 knots; the ASI's accuracy at this attitude is not perfect and we see 25 knots indicated with full flap. The standard recovery is effective and the height loss minimal. Just to prove the point, I keep full flap down and lower the undercarriage to see if this has any effect. I needn't bother, as it doesn't! With the nose held high and the stall warner screaming in my ear it mushes down and eventually stalls at under 30 knots with little tendency to drop a wing. All very benign.

A push on the stick combined with an increase in power and we are flying again with minimal height loss. With full power applied, the acceleration is brisk but I don't need to worry – there is no gear down speed limit. I start to retract it anyway, this time anticipating the significant trim changes required. The blue 'gear in transit' light stops flashing to indicate the gear is up and I am able to check visually through the Perspex panel by my feet. Next, flap is selected up, and again I anticipate the trim changes. Bob suggests we try an accelerated stall at cruise power and I gradually increase back pressure on the stick until 3g is indicated on the gauge. This aircraft really talks to you. It's like flying on cobblestones and it just sits there waiting… until I increase the back

Left: curved approach at Graveley means flying over a corner of the golf course Bottom left: with hanger space at a premium, G-OPYO is stored on a hoist

pressure even further and it gives up flying. It flicks quickly and positively to the right and returns to straight and level flight. Textbook.

As I return to the circuit there are a few words of wisdom from the right seat: "Plan ahead, watch the speeds and keep on top of the trim." And good advice it was too! Crosswind landing limits for the aircraft are 15 knots with full flap so today's gentle 45 degree, 10 knot wind won't be a problem. I join the circuit at Conington and reduce speed to 110 knots while setting the prop to fully fine. Downwind checks complete, I start to slow the aircraft down by reducing power. As the speed reduces, significant amounts of trim are required. Back below 80 knots I get the first stage of flap down and start to lower the gear. The trim change with both gear and flaps is quite amazing; significant nose-up trim is required. As I gently turn onto base leg I lower the second stage (20º) of flaps. I am now anticipating the corresponding change in trim – clearly, I am getting used to it.

Onto final approach, I check three greens and take full flap (35º) while trimming. "Nail 65 knots on approach, slowing to 55 over the hedge," is the advice from the right. The rudder is effective all the way down and easily counters what little crosswind there is. I keep it lined up with the centre line and aim at the numbers which are approaching quickly. With the nose delicately pulled back to protect the gear, I touch down gently with some power on. There is no tendency to bounce and I immediately remove the last of the power while keeping her straight with rudder, and think about applying the brakes.

I fail to lock the throttle closed. That bloody spring-loaded throttle plays its trick on me and starts to increase power again! Initially, I am slow to react but when I do, I hold the throttle back with my right hand to make sure it doesn't repeat its trick, with the stick firmly in my left hand keeping the pressure off the nose wheel. The very effective toe brakes quickly arrest our roll. Despite the drama we have used less than 500 metres of runway, but I'm sure the book figure landing roll of 280 metres would be easily attainable with practice – and a change of throttle!

As we taxi, Bob opens the cockpit and allows some welcome cool air inside. The large Perspex area certainly induces heat in the summer although I hadn't noticed it in flight due the efficient cool air ducts installed by Dave during the build. I taxi back to the grass parking area. After mag checks, I shut down the Rotax 912S which stops immediately – and somewhat alarmingly if you are not used to it – as I move the ignition switch to 'off'.

Conclusions

This is a nicely built and well-finished example of the Pioneer 300 Hawk kit and great fun to fly. Clearly, Dave Simpson's perfectionist tendencies are evident in the build and its flying characteristics.

While the Pioneer 300 Hawk, at a MAUW of 560kg, qualifies as a VLA, it doesn't always fly like one. True, it slows down quickly – just like many other VLA's it doesn't have the weight to provide inertia – but with a manually-operated VP prop, retractable undercarriage and all the trim changes, this aircraft is really a complex single. You mustn't let it get ahead of you or let the rapid decrease in speed catch you out in the base turn.

Comparison with other two-seat kit aircraft is a little difficult because most of the competition do not qualify as VLAs. For speed and economy it compares well with the all-composite Europa XS but loses out a little with payload. The all-metal fixed tricycle gear RV-6A has a better payload and top speed but at the cost of a considerably higher fuel burn (and noise level).

Despite its fuel efficiency and great turn of speed, the Pioneer 300 Hawk lacks baggage space. What baggage is permitted – a maximum of 35kg on a shelf behind the seats – has to be carefully factored into the weight and balance calculations. The Pioneer 300 Hawk is a great flying picnic hamper, absolutely ideal for a fast, day trip or perhaps an overnight stop, but lacking in that all-important baggage space for a few days away.

Bob Morcom recently took his daughter Louise to the Badminton Horse Trials in G-OPYO. Taking off from Graveley, Hertfordshire, their airborne time was a mere 45 minutes each way – rather than a 2 hour 45-minute car journey plus an allowance for the queues getting into and out of the car park. Car and aircraft would burn similar quantities of mogas for the return journey. I know which method of transport Bob preferred – and so would I, although I would change that bloody throttle mechanism first! ■