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Alpi's mini Falco

Handsome, well-designed, crisp in its handling and speedy, the Pioneer kitplane returns to the UK market with a new agent and the prospect of being available in ready-to-fly form

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

Walking towards the Pioneer 300 outside new UK agent Cavendish Aviation's hangar at Earls Colne, the initial impression is of its sheer elegance. The classic Italian styling is strongly reminiscent of a Ferrari or Maserati, or—perhaps more appropriately—a Falco F.8L or SF-260. From the tip of the sharp spinner through the flowing lines of the fuselage and big bubble canopy to the top of the stylishly swept fin, it just shouts speed.

It soon becomes apparent that the 300 is not only a very well-designed aircraft, but that the Cavendish-built test aeroplane, G-OALP is finished to a very high standard, which includes the company's innovative nano-tech 'Aerocoat' process. Basically, it looks great. 'Lima Papa' is powered by a 100hp fuel-injected Rotax 912iS (the 100hp carburetted 912 is also an option), which turns a hydraulic constant speed Idrovario two-blade propeller and is fed from two forty-litre wing tanks.

Inspecting the oil is done via a small hatch, although removing the top half of the cowling doesn't take long as it's secured by Dzus fasteners. Having studied the engine installation, I think it would benefit from a NACA duct on the starboard side of the cowling to feed cool ambient →

Care is required in climbing aboard – and you have to avoid putting any weight on the canopy, which is easily dislodged

air directly to the air filter via a length of Scat hose. Currently the engine will be breathing in hot air after a long taxi on a warm day: not what you want at the start of the ground roll.

Unusually for an aircraft in this class, the 300 is fitted with an electrically-operated retractable tricycle undercarriage. The nosewheel retracts aft and the main wheels outwards and up into wells in the wings. Sturdy half-doors are carried by the undercarriage legs but the main wheel wells have no doors. As there is no Vle (max speed with undercarriage extended) I wondered if perhaps the idea was to allow the undercarriage to be used as a crude airbrake, as with the Bonanza. A large portion of the nosewheel protrudes even when it is fully retracted. The wheels are a good size, the nosewheel being only slightly smaller than the mains. The robust-looking main undercarriage legs are the trailing-link type, and carry hydraulic disc brakes.

The wings and fuselage are interesting. Although the design is entirely conventional, the materials used are an intriguing mix of old and new: along with modern composites there are also wood and fabric. The fuselage consists of a wooden framework covered by a carbon-fibre shell, while the wings use wood for the main spar and ribs. These are covered with plywood forward of the main spar and Dacron aft. The ailerons and large-span electrically-actuated slotted flaps are constructed in the same way, as are the elevators and rudder. Carbon-fibre is used for the fin. LED position and strobe lights are faired into the upturned wingtips.

To gain access to the cockpit you step up onto the wing, but before doing so (and assuming the canopy is unlocked) a small handle at the back of the canopy is rotated 180° and used to pull the canopy aft along a rail. This seems unnecessarily complex to me, as I can't believe failing to rotate it so it's flush (sharp-eyed readers will have already spotted I forgot) adds a measurable amount of drag. It is a bit of a step up onto the wing, but as long as the flaps have been left lowered it's not too difficult, although care must be taken to avoid using the canopy frame as a handhold, as it's easy to pop the canopy off its rail. Steve tells me that they are going to fill the wing root on the fuselage with PU foam so that it can be used as a step.

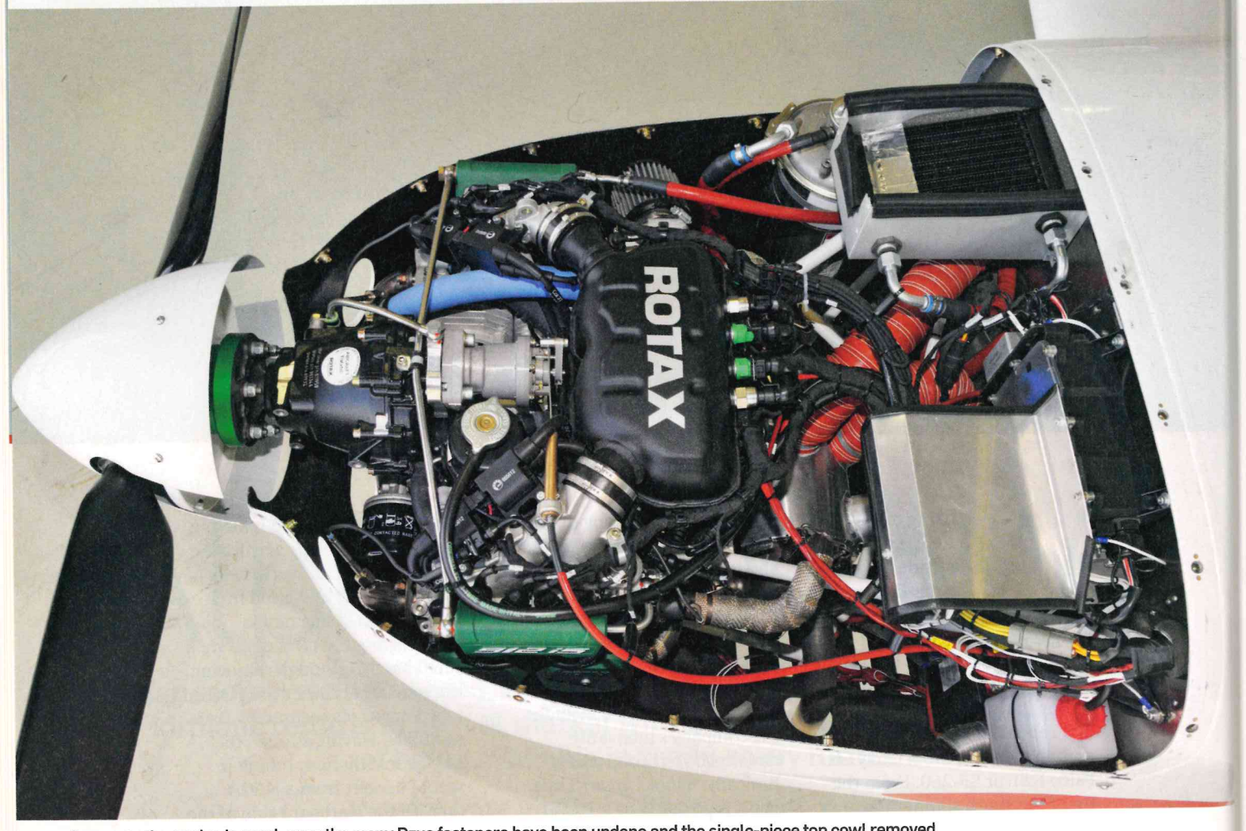
On the plus side, the canopy slides back a good way and the non-slip wing root walkway is a sensible size. Why some manufacturers skimp on this small, but important detail will forever remain a mystery.

Having settled into the very comfortable seat I take stock of my surroundings. The cockpit is a good size and offers plenty of space for both pilots and baggage. Directly behind the seats is a deep, but narrow baggage bay, which can take up to 20kg of luggage. A large, flat parcel shelf can carry up to a further 15kg.

The cockpit is a good size and offers plenty of space

The panel is quite nicely laid out but there's always room for improvement. The toggle switches for the electrical services are a bit vulnerable for an aircraft with a sliding canopy, and – just like last month's test on the Dynamic – I'd recommend rockers. The separate switches for the dual ECUs (or lanes in Rotax-speak), dual fuel pumps, start power switch, and the large red 'Start' button are unnecessarily complex, particularly when all these functions can be combined in a neat rotary switch (see *Pilot*, June 2018).

For primary flight information, there's a compact AvMap 'Ultra' EFIS directly in front of the P1 →



Access to the engine is good, once the many Dzus fasteners have been undone and the single-piece top cowl removed

ABOVE: **upturned tips and square-edged ailerons**

LEFT: **both elevator and rudder are fitted with tabs, although the rudder trimmer is optional and not fitted to demonstrator 'LP**

RIGHT: **steerable nosewheel, mounted on a telescopic strut**

BELOW: **the canopy handle is designed to pop in flush**

TOP TO BOTTOM: **test aircraft VFR panel fit is a mixture of analogue and 'glass' – and has a row of switches rather vulnerable to being knocked while climbing in; fixed seats, nicely upholstered in leather; Alpi-branded seatbelts have high-level shoulder strap anchorage – much safer in the event of an accident**

position and this is surrounded by an analogue altimeter, ASI, VSI, and Turn & Slip. All the engine information is displayed on a neat Invigilus 'FlyBox' EMU to the left of the Turn & Slip, with NAV data supplied by a large AvMap EKP V. Other options are all analogue, dual Dynon SkyViews or Garmin G3X touchscreens.

Neither the seats nor the rudder pedals adjust (adjustable pedals are an option) but the cockpit fits me nicely, although it did seem that the control sticks are slightly too tall – and I'd always prefer a throttle quadrant to the 300's plunger arrangement. In fact, Papa India's power controls are most unsatisfactory, as the two plungers are simply too close together. I'd recommend a Vernier for the prop, and a T-handle for the throttle, mounted slightly higher than the prop Vernier. This would also make the flap switch easier to operate and the position indicator easier to see, as it is directly below the twin power control plungers. I think Steve agrees and has a redesign in mind for the throttle. (And while writing this report I learned that the 2018 P300 incorporates several improvements, including a throttle quadrant, redesigned flaps, larger fuel tanks, and a taller, longer canopy.)

The undercarriage selector is well positioned, but while I'd be content to leave the rocker switch for aileron trim where it is on the centre console, the elevator trim really should be on the stick top. The position indicators for both trims (LED strips) would be better on the panel, and while there is plenty of storage offered by the pockets suspended from the cockpit sidewalls there's still room for a sizeable glove box next to the transceiver and transponder. There's a neat little stowage box under the P1's right elbow, but it's mostly filled up by the crank handle for the undercarriage emergency extension system.

The feature that I really didn't like, however, was the brake. Although the brakes themselves are very powerful, the method used to operate them is most unsatisfactory. A single lever placed below the throttle on the centre console requires you to push for braking. Separate ergonomic studies by the RAF and USAF in the 1950s both advocated 'forward to fly, backwards to land' with regard to control operation, and it's incredible that someone even thought up this particular arrangement, let alone approved its installation! Toe brakes are an option, which Steve has wisely taken up.

The large bubble canopy slides shut easily, and locks with a well-designed latch, although it's a shame that the aircraft is not approved for flight with the canopy open. I've always liked sliding canopies, and don't understand why anyone would install one without designing it so that it can be at least partially opened in flight – even if within strict limits (i.e. only up to 30cm and below 70kt). This design oversight actually ranks as a defect due to the omission of a DV (direct vision) panel, leaving you helpless in the event of the canopy misting up or being obscured by oil in the event of engine failure.

With Steve in the other seat I slide the canopy closed, set the switches, press 'start' and the engine bursts instantly into life. I'll say this about the iS engines: they're certainly easy to start. No choke or primer – just like a modern car. With the engine idling smoothly at 2,000rpm, I release the parking brake (on the centre console between the ghastly hand brake and emergency undercarriage extension system), add a touch of power and set off towards the runway. The nosewheel steers through the rudder pedals and is very positive, while the field of view over – and either side of – the nose is fine. Check the ECUs and pumps, cycle the prop, change tanks, set the flaps, check the trims and – once the oil temperature hits 50°C – we're good to go. We'll be talking about the summer of 2018 in twenty years time, so take my word for it: today's ambient conditions are *well* above ISA, with barely a zephyr troubling the windsock.

All the pre-takeoff checks are complete, so I line up on the narrow Runway 06 and smoothly open the throttle. With around half fuel and no baggage, we are approximately 40kg below the maximum all-up weight of 560kg, which gives us a power-to-weight ratio of 5.2kg per horsepower.

The field of view over and either side of the nose is fine

Acceleration is excellent, the controls come alive almost immediately. A bit of right rudder keeps things aligned nicely, but it is more skittish than a C152 or PA-28, so (and particularly with a strong crosswind from port) don't neglect the rudder. As the needle of the ASI swings swiftly past 45 knots I rotate and the 300 simply leaps off the ground in around 100 metres. A quick dab on the brakes, retract the undercarriage and then raise the flaps. Both sytems are electrically-actuated, warning lights in the cockpit showing the undercarriage status. There are three lights for 'Locked Up', 'Unlocked' and 'Locked Down' by the selector, and the classic three greens in the correct layout above the throttle. Rather unusually, when retracted the nosewheel can also be seen through a window in the cockpit floor.

Best rate-of-climb speed is 65kt and this soon had the VSI indicating just over 1,500ft/min. The 182 camership flown by Nigel Willson and carrying Keith is a couple of miles in front, but a bit of geometric cut-off and plenty of throttle has us tucked nicely into echelon port even before we go 'feet wet' at the coast. The light is good and the air smooth and kind, but what should be a very straightforward shoot is hindered slightly by the throttle being just too close to the prop plunger, and the blind spot created by the windscreen bow and canopy frame. Note that this observation →

CLOCKWISE FROM TOP LEFT: **undercarriage lights, closely spaced and identically-shaped throttle and propeller plungers, and (almost hidden below) flap switch/indicator; centre console brake T-handle, elevator and rudder trims, and parking brake valve; and the quality Andair tank selector; independent ECU CBs and indicator lights, with starter switch below; the little window that allows visual confirmation that the nosewheel is retracted; and the emergency manual undercarriage extension crank in position**

isn't a valid criticism of the type (even though Alpi does have a four-ship formation team, the 300 is not designed for close formation work) I'm just making excuses for my flying!

Finally, it's a wrap, and we can continue with the evaluation. The formation flying has already revealed crisp, precise handling and the large bubble canopy and control sticks (so much better than a yoke) definitely give that fighter-like feel, so I start with some steep 360° turns and sharp reversals. These soon confirm the handling is nothing short of superb, with beautifully balanced, authoritative controls that make the 300 a joy to fly. Harmony of control is also ideal, with light ailerons, a slightly heavier elevator and a well-weighted rudder. The controls also 'firm up' nicely as the speed increases – and the 300 does accelerate quite quickly – greatly reducing the possibility of the pilot inadvertently overstressing the airframe. In many ways it's a shame that it doesn't have two throttles (for example, like the SF-260) for this is an aircraft that really should be flown right-handed. Visibility in the turn – and indeed in every phase of flight – is good, for the windscreen bow/canopy frame only really intrudes in close formation.

To investigate the aircraft's stability I trim for ninety knots, pitch up until the ASI shows eighty then release the stick. After one-and-a-half long wavelength, low-amplitude phugoids the ASI settles back on ninety. For the next test I slow to eighty, pick an object on the horizon and apply full rudder both ways while holding the wings level with aileron, and then releasing the rudder. Finally, I bank thirty degrees left and right and release the stick. It seems that the 300's stability is positive longitudinally, strongly positive directionally, while the spiral stability is just barely neutral (to the left) and slightly divergent to the right.

Despite its narrow-track undercarriage, the Pioneer's ground handling is trouble-free and it steers nicely

Slowing down to assess the low speed side of the flight envelope can take a while as it's quite slippery. However, as there is no undercarriage limiting speed (probably because there are no wheel-well doors) I use the wheels as a sort of crude airbrake to increase the drag. As the airspeed finally dips below the 80kt Vfe, I extend the flaps fully and slowly let the speed bleed away at one knot per second. The pre-stall buffet is very subtle which is why there is an artificial stall-warning device (a large red light) on the panel. At the stall there is a very slight tendency to drop a wing, but nothing major and as soon as back pressure is released the wing starts flying again. I try several stalls in different configurations, and with a bit of power the ASI's needle eventually ends up wavering somewhat pointlessly near the 22kt mark, which clearly can't be correct. The actual stall is probably around 40-42kt, and at high alpha there has to be a significant discrepancy between actual and indicated airspeed due to position error.

At the stall there is a very slight tendency to drop a wing

A stall with a small amount of power set and the wheels down and full flap extended as if on final, is much more representative of the real world. The nose gets pretty high at this speed, and would provide an excellent visual cue that perhaps a look at the ASI might be in order! Finally, a departure stall with the wheels down, ten degrees' flap, full throttle and high RPM. The 300 literally ends up hanging off the prop: any pilot who inadvertently stalls this aircraft shouldn't be flying in the first place.

Having climbed back up to 3,000ft, it's time for a look at the cruise at 75% power. With 26 inches of manifold pressure and 5,000rpm set we get 122kt IAS (129kt TAS) for a fuel flow of around eighteen litres per hour. The OAT is +14°C, some six degrees warmer than it would be on an ISA standard day, and the impressive true airspeed (remember it's only got 100hp) was confirmed by the GPS, as we were flying perpendicular to the local wind. Fascinating facets are the relatively low levels of noise and vibration compared to some of the other Rotax-powered VLAs I've flown. The 300's wooden airframe probably absorbs vibration better than metal or composite airframes. In fact, at 26in MP and 5,000rpm the engine is practically purring, and it didn't sound as 'busy' as some Rotax installations do.

Time to go home, which we do in a gentle 200-300fpm cruise descent. The speed increases until the needle of the colour-coded ASI is right on the start of the yellow arc, and as we now have also picked up a slight tailwind we're almost doing two and a half nautical miles a minute, at 18 lph. Not bad.

Back at Earls Colne the surface wind is light and variable so we use R06. The 300's handling in the circuit is as easy as in every other phase of flight. Although the flap limiting speed of 80kt could be higher, being able to use the undercarriage as an airbrake is very useful, and not →

only if you have an excess of energy as you turn downwind. You can also fit in with faster traffic much easier, particularly as you don't have to worry about shock-cooling. The changes in pitch trim are negligible when the undercarriage is selected up or down, but stronger with flap extension—another reason to put the trim switch on the stick. In fact, on final if you close the throttle fully and select full flap there is a significant pitch-down.

For the first landing I choose to land on the parallel grass runway and use 65kt on final with the second stage of flap, bleeding back to sixty over the fence. The 300 is very speed-stable, and the ASI needle is nailed as we sail over the fence with the throttle at idle. However, as there is almost no wind, the float is prolonged and we touch down further into the field than intended.

Full power and the 'touch' turns into a 'go' instantly. Round we go and this time I try full flap, five knots less for the Vref and a dribble of power. This works perfectly and I'm more than happy, but Steve wants me to try and meet the EASA CS-VLA requirement of a descent with idle power, flaps at the 'landing' setting, undercarriage extended, a speed of 1.3Vs1 (approx 57kt) and trimmed longitudinally.

It can't be done: you simply don't have enough trim authority, and end up carrying quite a bit of back pressure on the stick. Of course, it could be done (by increasing the size of the trim tab, or shifting the C of G aft) but—other than the hypothetical force-landing case—there's no future in being at 57kt, idle power and full flap any distance from the runway. Fifty-seven is the speed at which you want to be approaching the flare, not the middle marker! In this configuration and speed it's really sinking as you're right on the back on the drag curve and firmly 'in the bucket'. In fact, quite a bit of power is required to arrest the sink rate. It's unrealistic, and I think a product of CS-VLA and the relationship between stall speed and trimmed speed.

In the real world, and when flown by typical pilots, the speed and configuration promulgated in the 300's POH is perfect. Use Flap 2, 65kt on the approach, Vref of sixty with a suggestion of power, and it comes down the slope like it's on rails with enough energy for a short float and a gentle touchdown—which is what I did for the final landing onto the tarmac. Bottom line: 65 is correct, 57 is too slow.

I subsequently discussed this at length with the LAA's Chief Engineer Francis Donaldson, who made the very pertinent point: "If it was made to comply with CS-VLA, it would not enhance safety in this particular case. That's not to say that CS-VLA is ill-judged or onerous—it's a great benchmark—but given that these are sports aircraft, a pragmatic, intelligent approach to each individual design yields us many more aircraft types available at a more affordable price and an excellent fleet-wide safety record." I'd say he's exactly right.

Anyway, back to the 300 and, as you may have already concluded, I loved it. It looks good, goes well and is a delight to fly—and Cavendish is on the path to being able to sell it as a ready to fly aircraft. For many years I've often thought I'd love to own one, but as I'm now married with two boys I need more seats. What I really want to fly is the four-seat P400, powered by a Rotax 915iS. So Steve, you've got my number...

ALPI AVIATION PIONEER 300 AIRFRAME KIT £55K, ENGINE £22K

Dimensions:

Length	6.25m
Height	2.0m
Wing span	8.10m
Wing area	10sq m

Weights and loadings

Empty weight	305kg
Max auw	560kg
Useful load	255kg
Wing loading	56kg/sq m
Power loading	7.5Kg/kw
Fuel capacity	80 litre
Baggage capacity	35kg

Performance

Vne	150kt
Cruise	135kt
Stall	41kt
Climb rate	1,500ft/min
Service ceiling	16,000ft

Engine

Rotax 912iS liquid-cooled flat-four, producing 100hp (74.57Kw) at 5,800rpm.

Propeller

Idrovario two-blade constant speed

Manufacturer

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UK agent: Alpi Aviation UK
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Email: *info@flypioneer.uk*
Web: *www.flypioneer.uk*