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Pioneering speed

Now it has turbocharged Rotax 914 power, the 400's potential is fully realised

Words Dave Unwin Photos Keith Wilson



Slicing through the summer sky with the true air speed tickling 150kt, I couldn't help but be impressed. Although I was flying a sleek, retractable-undercarriage four-seater, this wasn't one powered by a big, gas-guzzling Lycoming or Continental, but a Rotax. The aircraft was a Pioneer 400

Quattrocentro, the first to be fitted with a turbocharged engine – and I want one!

I've always liked aircraft from the Alpi stable. I was impressed by the 200, very much enjoyed testing the first 300 in the UK, and for a year had an

'insurance share' in a particularly well-finished example of the same. Indeed, just about the only thing there wasn't to like about the 300 was that it didn't have enough seats. I was therefore intrigued to

learn that Alpi had a four-seater in the works, and as soon as I saw the first example, I just had to fly it.

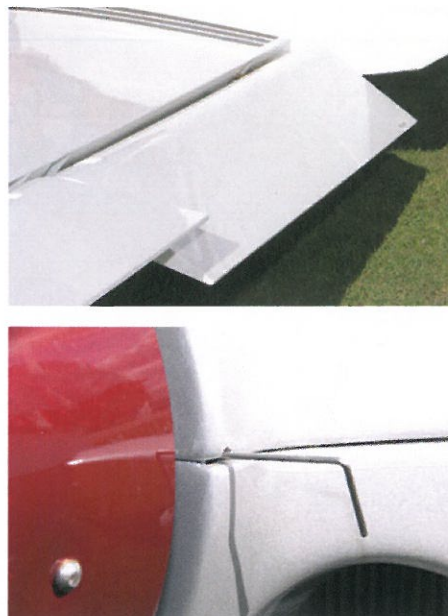
The wheels of certification turn slowly in the UK, and although a year has passed since the 400's debut at AeroExpo, it has yet to be certificated. However, Frank Cavaciuti and the team at Pioneer Aircraft don't stand still and, along with the

original 100hp version, they have just started flying the first 400 to be fitted with a turbocharged engine – a 115hp Rotax 914. This was the machine that I was scheduled to test.

Obvious lineage

Sitting on the apron at Sywell on a glorious August afternoon, the 400's lineage was

clear to see, for although the fuselage is obviously deeper than the very successful Pioneer 300 and has been extended to accommodate the extra pair of seats, it is not *that* much longer. The wingspan has also been increased, but the aircraft doesn't actually look that different. In fact, as you approach the 400, the most obvious clue that this isn't a 300 is that the



Rakish lines combined with practicality: the rudder trim tab is ground adjustable – electric operation is an extra-cost option; with a full-flap limiting speed of 85kt, you are likely to end up using the undercarriage as a speed brake; after sliding out two wire pins, the top cowl can be lifted off bodily to expose the engine (below) for full inspection

sliding canopy has been replaced by gull-wing doors.

Classic Italian styling gives much to admire. Strongly reminiscent of a Falco or SF-260, the fuselage lines flow effortlessly aft, from the tip of the sharp spinner to the top of the elegantly swept fin. In fact the only minor aesthetic aberration is that the 400 seems to stand slightly too tall on its retractable tricycle undercarriage. This is electrically actuated, the nosewheel retracting aft into the fuselage and the mainwheels outwards and up into wells in the wings. The mainwheel wells are partially covered by doors attached to robust-looking main legs. These are of the trailing-link type, and carry anodised

Beringer wheels and hydraulic disc brakes. Shock-absorption on all three legs is via gas struts.

A small portion of the nosewheel protrudes, even when it is fully retracted. It is good practice to stop the wheels from spinning by applying the brakes as the undercarriage goes up: on the 400 a small 'snubber' stops the brakeless nosewheel from revolving in flight.

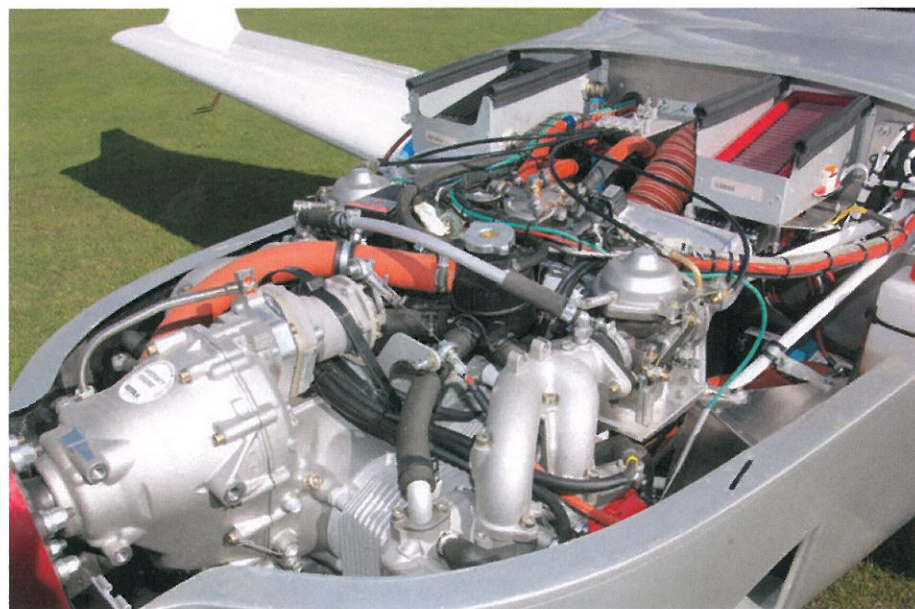
The aircraft is constructed using an interesting fusion of traditional wood and modern composite materials. The fuselage is a wooden framework which is completely covered by a two-piece carbon fibre shell, while the wings use wood for the main spar and ribs. These are covered

with plywood forward of the main spar, and Dacron fabric aft. The flaps, Friesse-type ailerons, fin, elevator and rudder are constructed the same way, while carbon fibre is used for the tailplane. The large-span slotted flaps are electrically actuated and have four positions: 0, 10, 20 and 30°.

Position and strobe lights are located below the elegant, up-swept winglets and there are dual landing lights built into the bottom cowlings. The test aircraft was fitted with an 115hp Rotax 914S turbocharged liquid-cooled flat-four, turning an electro-hydraulic constant speed two-blade Idrovario prop and fed from a forty-litre fuel tank in each wing.

While inspecting the cowlings, I noticed there was no access hatch for checking the oil and coolant. "No need for one, Dave," grinned Frank. "Watch this!" He then pulled out two heavy-gauge wire pins, slid the cowlings forwards and up, and it was gone, providing excellent access to the engine and its accessories – most impressive. Rotaxes are so reliable that there is otherwise a temptation to simply 'gurgle' the motor (turn the prop until the distinctive sound signifies the dry sump is clear), check the oil level in the separate reservoir and leave it at that. However, the diligent pilot will always want to inspect the cooling system, and with the 400's arrangement you can give the entire engine a very thorough preflight.

My initial impressions were that this was a well-designed aircraft, extremely well finished, and that a significant amount of attention has been paid to drag reduction. In fact, the only bits I didn't like (both



aesthetically and aerodynamically) were the tailplane attach bolts. Compared to the rest of the aircraft they are quite crude, and I was surprised that someone at Alpi hadn't faired them over with some sort of fillet.

A bit like the Tardis

To gain access to the cockpit you step up onto the non-slip wing root walkway (having opened the gull wing-doors first), using a step below the leading edge. The cockpit is a bit like the Tardis, in that it seems much bigger from the inside than it does from the outside. Interestingly, the rear seats are not far removed from the position of those in the two-place 300, and the 400's front seats have been accommodated by stretching the nose slightly and mounting the cushions on top of the wing's carry-through spar box. The rear fuselage has been extended to provide a longer lever arm to cope with the wider C of G range required for a four-seater.

The interior is luxuriously outfitted in red leather and is very smart. Before going flying, I tried the back seat, and was pleasantly surprised by the amount of room available. The 400 is more than a 2+2. There is even a baggage bay aft of the rear seats, although admittedly it is not large. I'm sure its small size is deliberate, to preclude the possibility of an imprudent pilot attempting to wedge too much stuff back there. The POH claims up to 30kg can be carried in the bay, but as the C of G shifts aft as the fuel burns down, you would have to watch the loading carefully.

As the aircraft was still on its Permit to Test, Frank was required to occupy the left seat, which actually suited me as I generally prefer to fly formation right-handed. This did mean that I wouldn't have access to the brakes, as they're only on the left (unlike the 300's centre-mounted handbrake, the 400 has toe brakes). However, as I only use the brakes for the run-up in an aircraft with a steerable nosewheel, I wasn't overly concerned.

The rudder pedals are fixed and any adjustment for reach is made by moving the adjustable – and very comfortable – pilot's seat. However, closing the door revealed a feature I didn't like: the door latch mechanism. This consists of three shoot-bolts, operated by a single lever, and I have to say I didn't think that the bolts looked long enough. Nor was there any sort of indication to show that the doors were correctly locked. I would prefer to see a second latch similar to a PA-28's, in this case mounted near the front bottom corner, where the door would be most likely to start opening under air-load. This might usefully incorporate a micro-switch connected to a 'door unlatched' annunciator light. Frank agreed, and said that Alpi were already looking at redesigning the door.

Rather a bare panel

The instrument panel looked quite different from the one seen in the 400 at the 2010 AeroExpo, and Frank confirmed that the undercarriage selector had been





moved further up the panel. As this was the demonstrator, I won't dwell on the instrument layout, as production aircraft will almost certainly vary. The panel actually looks quite bare, as all the engine's Ts & Ps – including manifold pressure and exhaust gas temperature – are shown in the neat Flybox EIS, backed up with an integral 'caution' annunciator light. This light is a bit small, and personally, I'd prefer 'master warn' and 'master caution' lights, similar to those for the Turbo Control Unit, which are mounted to the left of the ASI.

I liked the car-type air vents located at the sides of the panel, while the sockets for the headphone jack plugs are sensibly sited. Toggle switches operate most of the electric systems, but I'd recommend rockers – they are less prone to damage when people are climbing in and out. The battery/generator master switch is a split rocker, while a key-operated rotary unit operates the mags and starter.

A sub-panel links the main panel with the centre console, which extends aft between the seats. The sub-panel carries the electric flap control, rockers for the elevator and aileron trim, and co-located LED trim position indicators. A neat quadrant built into the console carries the big throttle and levers for the prop, choke and friction control, with an Andair fuel selector slightly further back.

The choke lever looks exactly like a mixture control – which I suppose in a sense it is – but I think that locating choke alongside throttle makes poor ergonomic sense. As it is used only on start-up I would suggest swapping its position with the carb heat. I'd also make the knob look like a choke control and ensure the relocated carb heat looks very different from a mixture control!

I would also like at least one DV panel. This machine has three-point harnesses, and regular readers will know that I prefer four, or even five-point ones. However, as the original 400 had the shoulder harness anchor points mounted on the floor (which is never a good idea) a three-point system may well be better for this airframe.

A distinctive muted whine

With the Rotax emitting its distinctive muted whine we set off towards the

runway behind Bob and Keith in the camera-Chippie. Taxying the 400 is easy: the nosewheel steers through the rudder pedals and there's a fine view over, and either side of, the nose. I did not miss having differential braking. With all the pre-take off checks completed, I lined up on the runway and opened the throttle smoothly. Anticipating that the turbo might lag and then cut in abruptly, and aware that the narrow-track undercarriage would exacerbate any tendency to swing

(remember, I didn't have differential braking) I deliberately brought the power in slowly. With about 55 litres of mogas in the tanks and no baggage, we were still about 200kg below the 400's maximum all-up weight of 800kg. The controls came alive almost immediately, and as the rudder has plenty of authority I had no difficulty keeping straight. As soon as the turbo cut in, the 400 surged forwards, the speed built rapidly and we were soon airborne and climbing away strongly.

I raised the undercarriage quickly and then retracted the flaps. As mentioned earlier, both the undercarriage and flaps are electric. When the flaps and wheels retract, the changes in pitch are subtle. Warning lights in the cockpit show the status of the two systems – and the nosewheel can also be seen through a window in the cockpit floor.

With the VSI indicating 1,400fpm at 70kt, I set off in hot pursuit of the Chipmunk. As I moved into formation it

became apparent that today's shoot would be slightly challenging. It was quite bumpy and, as the 400 is such a clean design, high rates of overtake need to be avoided as it is reluctant to slow down. Finally, the combination of large door pillars and thick canopy frame creates a bit of a blind spot. As usual, Bob flew a super-smooth lead and as soon as Keith had the pictures in the can he 'kissed us off'.

As the previous fifteen minutes had required a high level of concentration,

SPECIFICATION

ALPI AVIATION PIONEER 400
QUATTROCENTRO €130,000*
*as tested. With 912S engine: €115,000

DIMENSIONS

Wingspan	8.8m
Length	7.0m
Height	2.06m
Wing area	11.2m ²

WEIGHTS AND LOADINGS

Empty weight	400kg
Max all-up weight	800kg
Useful load	400kg
Wing loading	71.4kg/m ²
Fuel capacity	84lit

PERFORMANCE

Vne	150kt
Cruise (TAS)	138kt
Stall	48kt
Climb	700fpm
Take off distance (to 50ft)	260m
Landing distance (from 50ft)	280m

ENGINE AND PROPELLER

Rotax 914 turbocharged liquid-cooled flat-four, producing 115hp at 5,800rpm and driving a composite two-blade, constant-speed Idrovario propeller

MANUFACTURER

ALPI Aviation
UK Agent: Pioneer Aircraft Ltd
Tel: 01873 851116
Email: sales@pioneer.aero
Web: pioneer.aero



I opted to examine the high-speed side of the envelope first. At 5,000ft, 29 inches manifold pressure and 5,500rpm, I saw the ASI touch 140kt, which gave a TAS of 150. Pretty impressive, I'm sure you'll agree. A more representative cruising speed would be around 130-135, with a commensurately more economic power setting. In fact, if I owned a 914-engined 400, I would simply fly at whatever power setting gave me a navigation-friendly ground speed of 120kt, as I'm not very good at mental arithmetic!

Low level of vibration

The ambient cockpit noise was perfectly acceptable, even without a headset. The level of vibration is low, particularly when compared with some of the other Rotax-powered VLAs around. I believe that the wooden airframe absorbs vibration better than metal or composite aircraft.

In common with just about every four-seater ever made, it is not possible to fill the seats, tanks and baggage bay. However, at 5,000rpm it would be fair to plan for 350nm legs, including a 30-minute reserve.

Decelerating to assess the slow-speed side of the flight envelope took a while as the 400 really is quite slippery. Lowering the undercarriage below 100kt helps, and as the speed continued to drop I started to get the flaps down. Unlike the 300 (which does pitch down with full flap), the trim changes with flap selection were very subtle, due to the tailplane having a longer moment arm. The flaps don't actually reduce the stall speed very much, and are primarily drag producers. The all-down stall occurred at around 47kt, all-up at 50. As the stall is approached, only very light buffeting can be felt through the stick – although the stall-warner starts squeaking at about 60. At the stall, the 400 tended to drop its left wing, but only in a half-hearted

sort of fashion – and as soon as the backpressure was released, recovery was immediate. I never trim into a stall, and noticed that I was carrying quite a lot of backpressure. Frank had mentioned that he was still 'fine-tuning' the aircraft, and I wondered if it needed a little more up-elevator travel.

Accelerating out of the final stall and retracting the flaps and undercarriage, I began to explore the general handling. As with its smaller siblings, the balanced, harmonised controls make the 400 a real 'pilot's aeroplane'. The ailerons are light, the elevator powerful and the rudder well-weighted, while the fine field of view and control stick make you feel like you're flying a fighter, not a four-seat tourer.

An investigation of the 400's stick-free stability yielded some interesting results.

We had a fairly forward C of G, and it was quite positive longitudinally, and just barely neutral laterally. Curiously, directional stability was rather 'soft'. In fact, the nose would not return from a full left pedal input at 80kt. However, to be completely fair, this is not a condition that most pilots will experience, as just before I released the pedal the slip ball was jammed up against the end of the tube. It could also be that the ground-adjustable rudder trim tab needs to be reset, or that there is still some 'stiction' in the control circuit.

Back in the circuit, the 400 continued to impress. As the limiting speed for full flap is 85kt, it is a good idea to get the undercarriage down early if you find yourself with an excess of energy when downwind. As I'd suspected (and Frank had implied), on final with everything down I ran out of pitch trim and had to carry a bit of backpressure on the stick to nail the speed at 65. I think that a bit more trim travel or a slightly larger tab would fix this, although flying with even a little weight in the back would help. There is also a feeling of running out of up elevator when you're deep in the flare, but in fairness our C of G was well forward. Despite these minor niggles, it is still a very easy aircraft to land.

In conclusion, I was hugely impressed by the 400, and I would love to own one. Fast, comfortable and economical, it looks great – and actually flies as nicely as it looks. It could operate easily from the farm strip near my house, and I could take my wife and two small boys practically anywhere in the UK without refuelling – or the boys having time to get bored. ■

