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Photos: Aussie Brown

Aero AT-3 R100

Geoffrey Boot was not an immediate convert to the Polish-built VLA trainer/tourer when it made its UK debut three years ago. Significant changes, including a new engine, lead him to reconsider...





If you're having a sense of déjà vu, you'd be right: three years after **FLYER** first tested the AT-3 following its UK debut at Aerofair, we present the AT-3, reloaded.

Back in 2002 the importer of the new, Polish-built AT-3 clearly had his sights set on the training and light touring market. I felt then that it was lacking in a number of areas – particularly if it was going to make it into the basic trainer market, so long dominated by the Cessna 150/152/172 and Piper PA-28 series.

But importer Trevor Archer has stuck with it, and in conjunction with the Polish company and designer Tomasz Antoniewski, he has refined the aeroplane. I like to think this is in part as a result of my criticism and input, and it's reassuring that the AT-3 gained UK CAA Type Approval last October and full Europe-wide EASA certification in January 2005, in the JAR/VLA category. This fairly new category of EASA/JAR certification restricts aircraft to a maximum takeoff weight of 750 kg, with a maximum stall speed of 45 knots.

Good news is the new Aero AT-3 R100 surpasses these criteria by a fair margin.

Trevor sees the aircraft as an obvious choice for flight training schools/organisations which require replacements to the ever-older training fleet. The 172 and PA-28 are, of course, available new – but we all know that the 'traditional' models out there are getting long in the tooth. For many years the holy grail of light aircraft designers has been to find an economic replacement that is as easy to fly, safe and cost effective.

The initial batch of AT-3s has now seen over 3,000 hours of service in Polish flight schools and are, by all accounts, still going strong. The Polish parent company is now up to serial number 13 – lucky for some (we hope)



Bigger tail = better directional stability/control!

especially as they are about to expand into larger premises. Airframes numbers 11 and 12 have been sold to Sywell Aerodrome where they are due to become part of a new flying club based on the old Brooklands Club. With further aircraft having already been sold to Germany and France, sales progress is clearly being made.

So what of the reloaded AT3 R100, and what has changed since we last featured it?

Even from a cursory glance, G-SPAT – this would not have been my favourite registration – is much improved in appearance over the 2002 model. It's still the same basic simple metal



Basic finish is what you might expect in a trainer: proper sticks may spoil students progressing to Cessnas & Pipers, those 'self-opening' Rotax throttles will not!

◀ aircraft but overall the finish and paint job have improved. (The 'SPAT' bit, by the way, comes about because 'SP' is the Polish registration prefix and 'AT' is a nod toward the AT-3. The registration of the kitplane version we flew later, G-UKAT, suggests it's the first UK finished kit version – which is true.)

The AT-3 now looks longer and sleeker. This is no optical illusion: it has grown 28 cm of which 10 cm have been added to the rudder. In addition to this and still an option – one that I would have thought was essential – all the wheels are neatly spatted (G-SPAT again?) and faired to give the aircraft a more pleasing appearance as well as aerodynamic advantage.

'The AT-3 now looks longer and sleeker. This is no optical illusion: it has grown 28 cm, of which 10 cm have been added to the rudder'

Last time we tested it, the AT-3 was equipped with a 100 hp Limbach L2400 engine, which at the time had various issues, not least of all TBO implications. So it was out with the Limbach and in with a 100 hp Rotax 912S a higher powered version of the original 80hp 912 seen in Diamond's early Katanas.

The Rotax is not only around 35 kg lighter, thereby adding useful load, but because of this it has to be mounted further forward – which has had an impact on one of my main criticisms of the AT-3 last time round: directional stability and rudder authority. Extending the nose has both increased

the polar moment in yaw and required an increase in the vertical tail area – and they have managed to incorporate much of that increase in the rudder.

This aircraft is mainly aimed at the training market, where routine inspection has to be made simple for students and instructors alike. For this reason, on the outside there have been further improvements which make life and access easy for 'frequent users'. The cowling is modified to allow easy access to the engine compartment on both sides, with just three fasteners to undo on the hatches on each side of the cowl (instead of the original eleven screw fasteners). It's also become easier to inspect the control rod linkages, thanks to

small inspection plates under each wingtip and under the fuselage tail section.

The fuel, some 70 litres in total, is still housed in a tank forward of the cockpit, which could be difficult for shorter pilots to visually inspect because of the central filler cap – but it's no problem to actually check it, as the filler cap now has a calibrated dipstick attached to it.

The wing-root walkways still stop short of the trailing edge and require a considerable step up to mount the aeroplane – Trevor joked about supplying a small set of steps, but don't think it's *quite* that much of a problem... While the canopy

can be hinged well forward for easy access once you're up on the wing, getting it open initially is not easy from ground level – there's a distinct knack to be mastered, and you do need to use both hands.

Access to the large cockpit – far roomier than the 'industry standard' Cessna 152's – is easy. The canopy has a key lock, which is useful for securing the aircraft, and once you're inside the baggage compartments, which are behind the seats, can also be equipped with locks (an optional extra) to provide additional security: useful, perhaps, if the aircraft is used for touring.

With the exterior problems taken care of, what about the internal ergonomics? The seats and the pedals remain non-adjustable but, to be fair, thanks to the short rudder/brake movement – something that could be termed 'high gearing' – the standard seats will accommodate a wide range of heights. For very small people (those who are even smaller than me) Trevor suggests an extra set of slip-over seat covers, or seats with thicker upholstery, which were in fact installed in the kitbuilt model which we flew at the same time, and these boost both the height – for viewing over the cowling – and shorten the reach to the pedals.

The cockpit has also been refined. All the instrumentation now is of western origin and, thank goodness (this was particularly relevant as it was a very sunny day) the coaming over the instrument panel has been matt blacked, eliminating any reflection on the windscreen.

Other improvements – although these remain options on the basic package – are a parking brake (situated in the footwell to the right of the P1 seat, which locks the hydraulic brakes – very much a

necessity in a training aircraft) and ventilation options, either using vents in the coaming or vents in the DV windows to either side of the canopy. The test aircraft was equipped with the latter: they worked well under the hot conditions, but did lead to some additional microphone noise, due to the airflow at face level. The optional vents in the coaming would provide a more refined and far quieter source of ventilation. Cabin heating is now standard, as it should be in any aircraft which has pretensions of serving as a trainer in the UK.

The panel is well finished, and there is enough room for the usual instrumentation and avionics – and, in fact, for much more, although the aircraft's basic day VFR certification really means that such extras won't be essential.

Getting going

The original AT-3 was fairly weight sensitive but with an extra 30 kg or so of useful load it is now possible to load it with two 90 kg adults and full fuel.

Starting the Rotax engine is simple: pull out the choke, turn the key and you're away. The electronic ignition and liquid cooling lend an almost car-like ease and lack of bother. The canopy is secured by two independently locked lever fasteners, either side of the cockpit – their security being an essential check item before takeoff. In front of these are two further levers, which will release the canopy in the event of an emergency.

The canopy itself is treated with a UV blocker, which means that for follically challenged people like me you can fly all day in the bright sunlight without getting your head sunburnt. It also keeps the temperature down. The (optional) tinted canopy also removes the need to wear sunglasses in sunny weather (*but you might wonder about the wisdom of this in gloom-prone Britain. At least you can take the sunglasses off when it turns dark... – ED*)

The rudder pedals are both equipped with easy-to-apply toe brakes. The nosewheel is free casting, so steering is courtesy of differential braking. The slipstream dictates that the aircraft will, under power, always turn towards the left – so right brake is required almost all the time while you're taxiing, in order to hold the aircraft straight. Once you get used

to this – it's very much a Diamond/Grumman/Rallye feature – there are no real problems. In fact, one of the AT's advantages is the ability to pirouette the aircraft in its own length.

G-SPAT is equipped with a two-blade propeller. Interestingly, G-UKAT – the kitbuilt, non-certificated aircraft – is equipped with a three-blade prop (which has just received EASA certification) and Trevor tells me is likely to become standard equipment. While initial acceleration in G-SPAT was modest, it still required an initial dab of right brake to keep the aircraft straight. The three-blade version in the kitbuilt really pushes you back into the seat, requiring a bootfull of rudder and some additional/supplementary braking. This is where the improved directional stability is essential, coping with it is a useful skill for a student to learn.

Either version leaves the ground in less than 200 metres (the three-blade version actually gets off in 145 m). Both require dabs on the right brake to maintain direction at the start of the takeoff run, but above 20 kt the rudder livens up in the airflow and you don't need the brake pressure any more. Rotation is at a very modest 42 to 45 kt; 15° of flap is the norm for takeoff.

The flap lever is between the seats and looks rather like a handbrake lever, with a lock button on top. It is easy to operate once you have learned the technique: it's a matter of pushing down on the lever to unload it before pressing the button, and feeling the detents for 15° and 40°.

Once you're airborne the nose needs to be eased down while you look for 60-65 kt, after which flaps are raised and the aircraft climbs away at a rate of between 600 and 800 fpm, depending on the speed. In hot conditions, our photo ship – a C172 with four people on board – staggered into the air and we easily out-climbed it and caught up.

Levelling off at 3,000 ft with 5,000 rpm on the frugal Rotax we kept up an indicated 98 kt. At this speed the aircraft will burn as little as 16 litres of the 70 litre fuel capacity per hour. Eat your hearts out, Lycoming and Continental!

The three-bladed version is even faster. This is surprising as three blade props, by virtue of more blade area, induce more drag. They are usually

AERO AT-3 R100

£55,000



► PERFORMANCE

Max cruise speed	116 kt
Max rate of climb at S/L	807 fpm
Takeoff run to 50ft	445 m
Range	429 nm

► DIMENSIONS

Wing span	7.55 m
Overall length	6.25 m
Height	2.23 m

► WEIGHTS

Empty weight (wet)	350 kg
Max takeoff weight	582 kg
Max fuel load	70 lit
Seating	2

► EXTRA

Powerplant

100 hp Rotax 912S

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We Like

- Ready access to pre-flight inspection items
- Roomy cockpit
- New parking brake & increased load capacity
- Low initial outlay and good fuel economy

We Don't Like

- Having to adjust the fixed seating with cushions
- Lack of trim change with flap deployment (for a training aircraft)



This is a much better idea than struggling with the original AT-3's multitude of cowl fasteners



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AERO
G-SPAT

AT-3
R100



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◀ better when it comes to takeoff and climb performance, but usually don't perform so well in the cruise. In this case the three-bladed prop would appear to produce the same airspeed at 200 rpm less. Trevor assured me that the airspeed indicator and revcounters on both aircraft were reading correctly – so there we get a case of the exception proving the rule! This is perhaps achieved by the 'aero elastic' nature of the three-blade propeller, which is specially designed in Poland for the AT-3; the blades adjust their pitch slightly according to the loading to improve the angle of attack, without the need for any constant speed mechanism. (Well, that's what they told me, and it seems to work!)

After a thirty-minute photo session of close formation flying I felt very comfortable with the aircraft and learned to appreciate the excellent visibility afforded by the large wrap-round canopy. I even managed to keep my cool thanks to air from the DV window vents and that low-UV canopy. Cockpit noise, by the way, is pretty much average for training aircraft.

So what of the more advanced handling characteristics and those which students are likely to explore during their training syllabus? Stalling first; the pre-stall steep clearing turns are easy, but require full power to maintain height and airspeed. The wide wing section looks as though it will have fairly benign stall characteristics and of course VLA Certification requires the stall to be less than 45 kt, which it is. Clean (no flap) and with no power, both the visual (a light in the panel) and aural stall warnings started just below 50 kt, with the stall occurring at just under 45 kt IAS. Stabilator authority is obviously restricted, as it is difficult to accelerate in pitch into the stall and thus there was no real nose drop – just a mush down with a heavy buffet.

Setting 15° of flap simply lowered the stall speed and gave the same benign characteristics. With a full 40° of flap the airspeed just about registered zero before the stall, but as is normal with lots of flap it was a whole lot more frisky, and had a propensity to drop, in this case, the left wing. Nothing serious, and in all cases recovery was easy just a matter of nodding the nose down and/or applying power.

In the VLA category there is no requirement to demonstrate spin recovery (and it's not part of the PPL syllabus any more), so we just didn't go there, but Trevor tells me that the Poles had spun the aircraft over 200 times and they are still alive to tell the tale. The AT-3 apparently recovers normally within one-and-a-half revolutions, this being achieved by moving the control column forward, or simply releasing it. After one full turn there is apparently no delay with recovery. Tests have been performed on all versions: the shorter fuselage (L100) and longer (R100) and even after changing to the new trim tab.

Another potential pitfall for students in the circuit is the full-flap go round. In types with smaller engine this is often very limited, so we set up full flaps for a simulated approach at 65 kt. Smoothly applying full power, and not forgetting to apply some rudder to keep the ball in the middle, the aircraft was capable



You get a lovely view through that bubble canopy – and its UV-blocking coating minimises the sunburn

of climbing at just over 200 fpm – adequate to get out of trouble.

Unfortunately – although this isn't necessarily a bad flight characteristic – extending or retracting the flaps induces minimal pitch changes. This isn't a bad thing, but it does make it difficult to demonstrate what will happen on most conventional aircraft. If the engine does decide to pack up then the speed to aim for is 65 kt, which will give you a 600-700 fpm descent in the glide. It's fairly benign and there are no 'nasties' to catch you out.

Back in the circuit, 80 kt seemed to work quite well on the downwind leg, followed by lowering 15° of flap on the base leg and reducing the speed to 55 kt with full flap over the threshold. The only

rounding off a lot of the rough edges.

It's still not perfect – but then what aeroplane is? There are some things that you simply have to live with. This is a very small machine and it's never going to have adjustable seats or a steerable nosewheel – but then neither do Grummans, Rallyes or even the Cirrus – nor a number of other aircraft. The AT-3's compromises work and they are foibles one has to get used to.

Handling is thankfully more spirited than the industry standard – but once again, 3,000 hours of Polish experience lead me to believe that, rather as it is for 2005 students training on Piper Cubs or Tiger Moths, it's just a matter of adjusting to type. True, if someone had been flying a

'Handling is more spirited than the industry standard, but as it is for 2005 students training on Cubs, it's just a matter of adjusting to type'

thing to remember is either to set the throttle friction tight or to hold the lever back, as the spring loaded 'fail safe' Rotax throttle tends to open if it's not held tightly, which proves a little disconcerting in the flare (a trait the AT-3 has in common with other Rotax powered aircraft).

Speed control is important: and providing you get that right, landing distances are short – around 400 m over a 15 m obstacle, or around 200-250 m ground run, at the most. For touch-and-goes it is important to remember that the aircraft is going to run left unless you put in some right rudder – and maybe a judicious jab of right brake – as you put the power on.

The pilot's visibility and positive handling characteristics encourage spirited flying and prove that the AT-3 is capable of credible chandelles and lazy eights, always bearing in mind the +3.8/-1.5G limits and V_{NE} of 127 kt.

Summing up

I was not that impressed with the AT-3 when I initially reviewed it in 2002. Trevor Archer and the Polish manufacturer have, however, stuck with it and consequently produced a much-improved product,

Cessna 152 they may find the AT-3 difficult at first but the transition would not be difficult with proper training.

The basic price is £55,000 (excluding VAT) for the certificated VLA version, give or take options – which is not a lot for a new aeroplane. Better still, if you're a homebuilder you can buy the kit for around £20,000. Build it carefully and you end up with an aircraft of 'certifiable standard' – which is very reassuring and seems a bargain.

The AT-3's simple construction and frugal engine should reduce running costs and stack up well against the lower capital costs of a second-hand aircraft. Sywell has put its toe in the water to try out the type; other training outfits are said to be negotiating AT-3 purchases.

It will be interesting to see how sales develop but in the meantime, as I said in my original article, there is one thing for sure: as always the market and time will provide the answer. ■

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