Aero AT-3

CAA approved and in production: a new low-cost trainer

Story by ***Geoff Jones*** *Additional flight test and photos by* ***James Allan***

THE POLISH-BUILT Aero AT-3 has joined the select band of two-seat, Rotax-powered aircraft which have made the grade as certificated aircraft. The CAA has approved the Aero AT-3 in the JAR/VLA category.

JAR/VLA stands for Joint Aviation Requirements/Very Light Aeroplanes and was established in April 1990 as the benchmark for the world's light aircraft. The criteria are:

- maximum of two occupants
- for flights in daytime VFR
- can be used for flight training for a Group A PPL
- maximum take-off weight of 750 kg (1,650 lb)
- minimum air speed (stall) of 45 kt
- use of a certificated aviation engine.

Other aircraft that have achieved JAR/VLA approval include the Italian III Sky Arrow, the Tecnam P92 Echo

and the Zenair Zenith CH 2000.

An initial batch of twenty is being manufactured by Aero Sp at Krosno in south-east Poland. The first two were being delivered to Sywell where they'll replace two Cessna 152 used for training. Trevor Archer and his team from S2T Aero, the UK agent for the type, see this as an encouraging change of direction. Perhaps the time is ripe. Flight schools have very limited choice of aircraft for student training. The last C150 and 152 were built in 1985 and the fleet is becoming extremely tired. In the Piper camp, the two-seat PA-38 Tomahawk was never a resounding success but is still much in demand. In France, the TB-9 and Robin/Apex Alpha are moderately popular, complemented at many French aero clubs by a variety of DR400.

Maintenance of aircraft under JAR/VLA has to be undertaken, as on any certificated aircraft, by a licensed engineer. S2T Aero has its specialist at Husbands Bosworth, but there's no reason at all why any other licensed company couldn't take on an Aero AT-3. Fifty-hour, 100-hour and annuals are all required, but the Polish designers have devoted a lot of time to making access and therefore maintenance as easy and as economic as possible. The top/bottom engine cowling detaches easily and access to the control rods and wires can be achieved in seconds with easy removal of the seats. Rotax maintenance is also swift and the fifty-hour check requires little more than an oil change and plug check.

I have been fortunate to fly three examples of the AT-3: the prototype, the first example imported to the USA and now the S2T Aero demonstrator in the UK. These two more recent examples are very similar and representative of the aircraft coming off the production line.

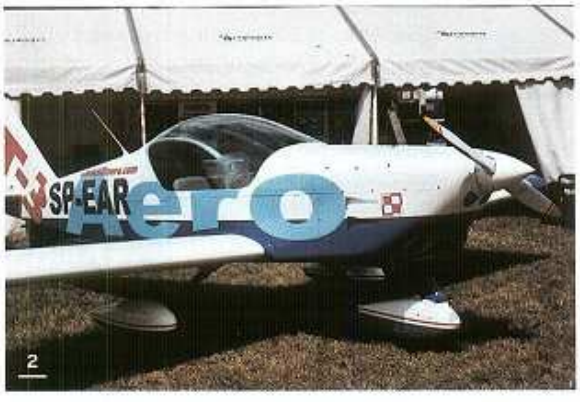
Aero AT-3's heritage stems from the French homebuilt design, the Pottier P.220. This design by the late Jean Pottier also spawned the Italian Storm and Czech Evektor EV-97, although as with the AT-3, each has a considerable number of design changes and innovations. Tomasz Antoniewski is the Polish designer who has given his initials to the AT-3, his second aircraft construction project being a Pottier P.220 which he improved and designated the AT-2. His AT-1 was a single-seat taildragger completed in 1991.

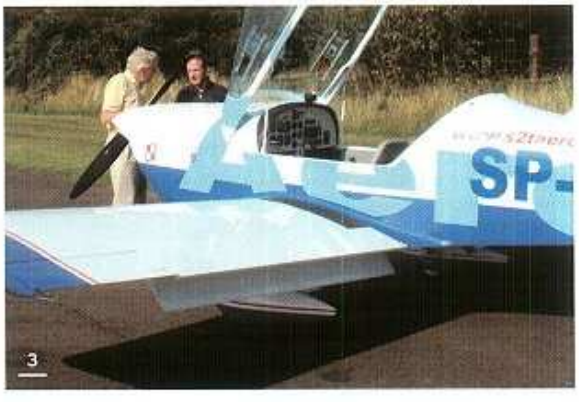
The AT-3 was conceived as a cheap and cost-effective way of promoting pilot training in Poland, where the cost of using certificated Polish types

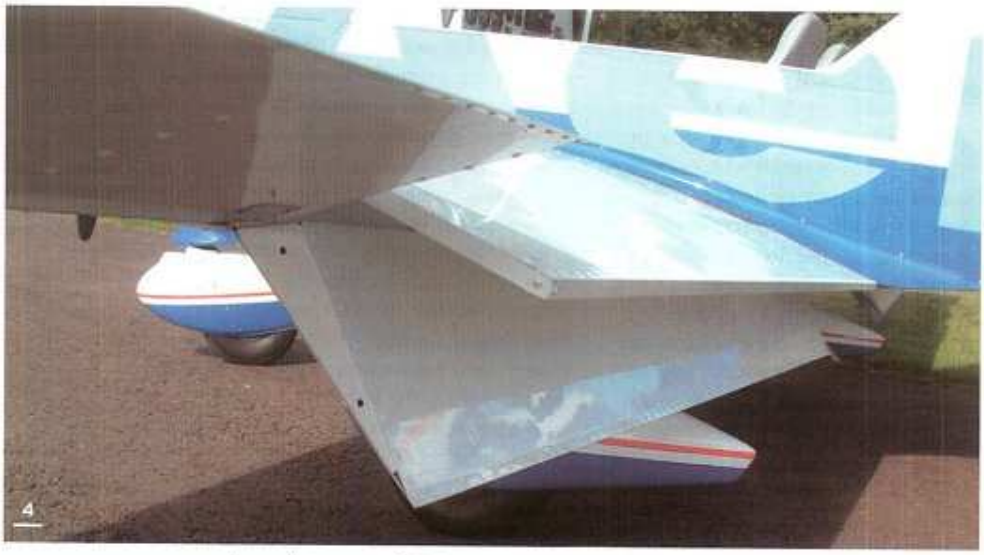
1 | Aero AT-3 seen at this year's PFA Rally, prior to the CAA approving the aircraft in the JAR-VLA category. Large rudder cutaway can be seen easily in this photo.

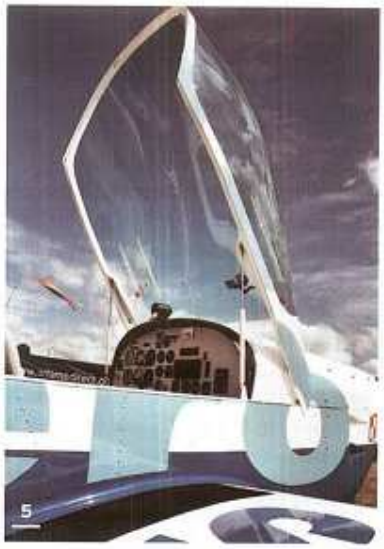
2 | Fitting the aircraft with the Rotax engine has made it a much more attractive proposition for UK flying schools and private owners looking for a new two-seater.

3 | Pre-flighting the AT-3 at Fife Airport (Glenrothes), where James Allan flew the aircraft, proved straightforward. Note the efficient split flaps, the forward-hinged canopy and the rather large step from ground level to wing walkway.









4 | Split flaps produce more drag than conventional simple flaps, as well as up to ten per cent extra lift. Ailerons are relatively small but still have good authority.

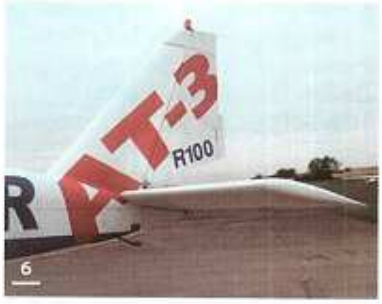
5 | One-piece canopy hinges forward.

6 | The unusually shaped empennage is due to this angular cutaway at the base of the rudder, allowing full upward movement of the horizontal stabilator.

7 | Easy access doors permit inspection of control rods and cables.

and newly-imported U.S. types was prohibitive. The all-metal structure was manufactured from 0.4, 0.5 and 0.6 dural throughout, but with composites used for the wingtips, cowling, wheel spats and a few other fittings. Antoniewski's experience with the Limbach 2400 engine (a much modified Volkeswagen four-cylinder) in his AT-1 and -2 made it an obvious initial choice for the Aero AT-3, but it was only a matter of time before the much lighter and more universally accepted Rotax 912 was adopted. Apart from weight, its frontal area is less and it is available in certificated form, the 100 hp 912S, thanks mainly to the efforts of HOAC/Diamond.

The engine installation is the biggest innovation in the five years of development since I flew the AT-3 prototype (*Pilot*, December 1999).



However, many cosmetic changes have been made, transforming the more austere aircraft into a sleek, soundly engineered and fully tested two-seater that would be a credit to the fleet of any aero club or flight training organisation. The Rotax has enabled the nose profile to be altered, and the fuselage stretched from 5.9 to 6.25 metres. The overall empty weight has reduced by 35 kg. The ugly nosewheel suspension has been redesigned and faired, which, together with spats, dramatically improves looks and speed. Design of the cabin area has resulted in a one-piece, forward-hinged canopy; together with a redesign of the rear fuselage decking, this blends perfectly from tail to the canopy roll-bar.

Roominess is also a feature of the cabin, wider than a Cessna 150 and comfortable for an instructor and student to bash away all day in the

The business behind development of the Aero AT-3

A SIZEABLE INVESTMENT in design, development and certification has been made in the AT-3 over the last eight years. Aero Sp's objective was to penetrate the USA market, hopefully in the new Light Sport Aircraft category which became reality in September. The AT-3 was one of the European designs considered by Mooney International (the Spanish CAG Toxo was another) to be manufactured for this market in the USA as the Mooney Mite II. That plan has now fallen through.

The Polish company became involved with Chris Nielsen and his AveoTech company in Texas, which marketed the AT-3 in the USA as the AveoXTC, AveoSport and AveoX. Two Polish-built examples were imported to the USA, plus detailed drawings, construction manuals etc. The potential deal with Mooney fell through and AveoTech is believed to have gone into liquidation, despite not having paid for the two Polish aircraft and, at the time of writing, still being in possession of the two aircraft with an acrimonious row resulting.

Regardless, the original Polish company, Aero Sp, owns the rights to the design, construction and marketing of the Aero AT-3 and is confident the AT-3 is technically and in price competitive and fulfilling perfectly the requirements for LSA aircraft in the USA.

The company will pursue co-operation with partners in the USA, and any other country outside Europe, for construction and sales. European demand will be met from the company's Polish factory.

S2T Aero was incorporated in the UK in September 2003 with the main purpose of promoting and selling the Aero AT-3. S2T directors Trevor Archer and Christopher Barcus founded the S2T Group of Companies in 2001, having over twenty years of experience of bringing various products to the market. The Aero AT-3 is their latest venture, and is central to their expansion into aviation. Their sister company, S2T Aviation, markets the PERFO ground reinforcement system for airfields. They also sell their own range of headsets, and *Memory Map* and *Winpilot* navigation software for pocket PCs. They also market the TrafficScope traffic avoidance system for cars.

circuit or on dual cross-countries. The size of the vertical tail and rudder has been increased, but its thickness reduced, making the rudder more effective. A single, seventy-litre, nose-mounted fuel tank is used, wet wings being considered for future developments and to increase range. The propeller is a certificated two-blade (three-blade optional) Aero Sail ground-adjustable prop; the tips flex slightly, adjusting automatically to different rpm. The cockpit has been tidied and thoroughly Westernised.

The wingspan has been increased slightly, from 7.32 to 8.08 metres, mainly with modified wingtips. The constant-chord NACA 4415M is the same, built around an aluminium 'ply' main spar. In the factory, the wings are built separately, then located in substantial fixings in the fuselage, secured and joined by eight large bolts. Options for the big flaps (two-thirds of each wing's span) are two-stage, mechanical, lever-controlled flaps, or electrically-operated flaps, both options with 40° maximum deflection. These bring the stall speed with full deflection down to 44 knots, and compliance with JAR/VLA. As a result of these wide flaps, the ailerons are correspondingly shorter span, but are nonetheless effective. The 2.72 metre span, horizontal tail (all-flying stabilator), now has a much larger, electrically-actuated trim tab, centrally located and occupying at least half of this span.

Climbing into the Aero AT-3 is easy, with the canopy hinged forward, via wingwalks on each wing root. The AT-3 sits quite low on the ground, so it's not an epic climb. Just placing your rear on the back of the seat and your foot on the cockpit wall, you can bring the other foot and leg inside as you slide onto the seat.

The AT-3 has dual sticks. The furnishings are good, the finish smart and rugged without pretension. I also like the off-white panel colour and it's a pleasure to see a familiar instrument fit after the mishmash of Russian/Western instruments fitted before. A standard T plus artificial horizon and vertical speed indicator comprise the six main instruments, with the engine instruments to their right. A neat, dual Bendix-King digital radio and transponder unit is fitted to S2T's demonstrator, with plenty of other space if you want to fit a FlyDat engine monitoring system, GPS or other equipment.

There's now a small park-brake knob, as well as toe-brakes for on-the-spot, tight ground manoeuvres. The French tradition of dual throttle controls has been adopted with one on the left-hand side of the panel and another in the centre. In the U.S.-based example there were four air vents along

Flying the Aero AT-3: a second opinion

PRE-FLIGHTING THE AT-3 is straightforward. Dzus-fastened access doors facilitate inspection of flying control rods and the cowling makes the engine easily accessible.

Being a JAR-VLA, it is a small aeroplane, yet surprising roomy and comfortable inside the cockpit. It lacks a footstep to help boarding and this manoeuvre involves quite a wide stride to avoid stepping on the flap area. The seats are fixed so smaller pilots may need 'booster cushions' to adjust their seating position but the leg and headroom is ample for my 6 ft 2 in on the leather-upholstered seat.

Steering is by differential braking which, as a long-time Grumman owner, I find second nature. I used 15° of flap for take-off. Initially, a light touch of brake was required to keep straight but once the ASI began to register, the rudder became effective. Rotation was at 42 knots. With two up and two-thirds fuel the ground run was scarcely 150 metres. Full throttle climbout at 54 knots V_x was a creditable 800+ fpm. Even in the climb, visibility ahead was significantly better than in a Cessna 152 or PA-28; in level flight the all-round vision is superb.

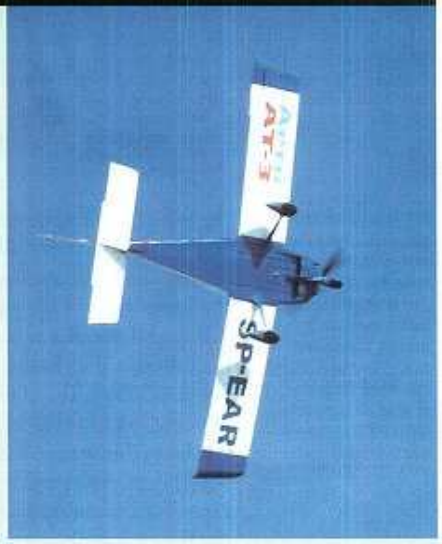
Putting the AT-3 through its paces was fun. I reckoned that, being a VLA, it might be somewhat skittish in its handling but was pleasantly surprised to find that it handled in all respects like a 'real' light aircraft. Full throttle at 3,000 feet produced 110 knots and at 75 per cent power the ASI showed 105 knots. Steep turns, at 92 knots and full throttle, were a delight to fly with a touch of back trim; no heavy stick or rudder forces when changing smartly from 60° bank one way to 60° the other.

Chandelles and lazy-eights were simple, smooth and effective but that is as far as aerobatics legally go in this machine, despite it being stressed to +3.8g/-1.5g. To get the machine anywhere near its V_{ne} of 127 knots I found you needed a seriously nose-down attitude and plenty of power.

I tried power-off stalls, clean and with 15° flap; steering straight ahead, the speed gradually dropped off to 44 knots indicated, with enough buffet to make the stall-warning light superfluous. With 40° flaps (landing configuration) and power on, I had to pull the stick hard, getting the nose surprisingly high before the ASI needle pointed somewhere well below 40 knots; distinct airframe buffet started and the nose dropped. All very innocuous with little if any sign of wing-drop.

I found moving the flaps to be unproblematic, although I have heard other pilots complain about them. The system is mechanical, controlled by a lever between the pilot seats, and there is a little trick to learn. A slight forward pressure on the lever is required before adjusting flaps either up or down, to release a safety lock. Utterly frustrating if you don't know about it, but simplicity itself once you do. And the flaps are effective, requiring only slight trim changes as you adjust them. Being split flaps rather than the conventional plain flaps of most trainers, they produce more drag and increase maximum coefficient of lift by about ten per cent.

After exploring general handling in the



open airspace around Fife, it was time for circuits. Here it behaved ideally... trainer typical. Around 85 knots seemed right for downwind, reducing to 65 knots after lowering part flaps, then about 50 knots for full flap at final, aiming to reach the threshold at about 45 knots. Going around is uncomplicated, providing you remember that trick of how to raise the flaps!

The AT-3 should make an excellent low-cost trainer as soon as Aero Sp gets it into full production. I emphasise low-cost because of its initial price and its 16 litres per hour fuel consumption. It could also be a nice private-owner two-seat aircraft, although its luggage carrying capacity might limit its appeal. On the other hand, buying one for €26,000 as a kit of high-quality, factory-built components and assembling it yourself sounds like a really attractive proposition.–*James Allan.*