Nigel Charles looks at the Europa's dramatically changed, graceful performance with motor-glider wings

Photos Andrea Featherby

Europa XS Motorglider

It has been 18 years since I first saw the Europa prototype at the PFA Rally at Wroughton. I think I knew almost immediately that the Europa was going to be something special. Kit aircraft at that stage were in their infancy and we were at a point where modern technologies such as composite materials and lightweight engines were encouraging innovation. With the help of the LAA (PFA as it was known then) a number of kitplane manufacturers brought their ideas to the marketplace. The canard designs of Burt Rutan from the USA whetted the appetite and enthusiastic potential kitplane customers soon appeared at shows like the PFA Rally.

One of the early UK builders of the Rutan designs was Ivan Shaw. He built a Varieze and subsequently a mini Starship twin derivative, but he recognised that the requirement for long, tarmac runways (readily available in the USA) was a handicap in Europe. The UK, for example, has over 500 airfields with runways over 400m but only about 125 of these offer hard surface runways. He quickly came to the conclusion that there was demand for an aircraft that could handle farm strips and at the same time cruise at a reasonable speed while avoiding consuming large volumes of avgas.

The problem was that tyres with a large footprint were required to cope with farm strips, and large tyres create drag. One solution was a retractable undercarriage, but the weight and space required for two large tyres was potentially problematic. Ivan realised that the monowheel layout of the motor-glider could be modified to become retractable. This was a fairly straightforward design idea for the main wheel, but his idea to use the flaps to retract the outriggers (like the Harrier jump jet) was a stroke of genius. From this concept the design of the monowheel Europa was born.

The Rotax 912 four-stroke engine had been available for a while and was proving to be a rugged and economical source of power. Ivan based the design around this engine and, despite attempts by some to use other powerplants, the Rotax stands out as the powerplant of choice today. Having conceived an aircraft that would have low touchdown speeds, yet was clean enough to have cruise speeds of three times the stall speed, Ivan needed some clever aerodynamics to turn his design into reality. Fortunately he met with Don Dykins, who had recently retired from British Aerospace having

been chief aerodynamicist for the Airbus wing. Don not only designed a wing that satisfied Ivan's requirements but even more cleverly arranged it so that, with no tailplane alterations, it could later accept substitution between standard and motor-glider wings.

While the aircraft has always been a delight in the air, early monowheel versions of the Europa were a little tricky to handle on take-off and landing, particularly on hard surfaces. Many of the resulting mishaps were due to a lack of training, but some modifications were made to simplify the necessary type-specific training. For those who prefer to keep things simple, there is a version with a 'training wheel' at the front (otherwise known as the trigear).

Ivan managed to get full kit production going in a couple of years – no mean achievement. The huge demand for the aircraft during the late nineties resulted in over 1,000 kits being sold.

Swift to the rescue

After Ivan handed over the reins, the company went through several owners who took their eye off the ball. These were the wilderness years, and the promised motor-glider wings sat on the backburner. Thanks to the conscientious caretaker management of John Wheeler and Roger Bull, the reformed company soldiered on waiting for reinvestment.

The Europa has unique qualities and it needed a fresh approach by someone who recognised these. Its concept may be 18 years old, but its design is up with the best on offer today. What other aircraft can really offer a 120kt IAS (130kt TAS) cruise burning 18 litres of unleaded fuel while carrying a 550lb payload using a 400m rough grass strip and then be put into a trailer at the end of the day?

Fortunately for Europa and its ardent band of followers, along came David Stanbridge who runs several companies under the title Swift Technology Group. Much of the company's expertise and success comes from the oil industry, but David is an aerodynamics engineer who has always wanted to put his skills and expertise back into his love of aviation. He is designing his own aircraft which, as you might expect, will be called the Swift. However, he was so impressed with the Europa that he decided to buy the company! No doubt the Europa will benefit from spin-offs from the development of the Swift.

Motor-glider enthusiasts will be glad to know that one of David's first development projects for

the Europa is to get the motor-glider fully approved in the UK. Although several examples have been flying in the USA and elsewhere, where certification for kitplanes is more relaxed, the final steps to complete Permit approval in the UK are only just about to be realised. This is the prime reason why the flight test aircraft for this article was registered in Luxembourg. The enthusiasm by the original owner of LX-CWT was partially because the airfield from which he wished to operate only allowed gliders and motor-gliders.

This leads us on to look at the reasons for some pilots to choose a motor-glider over conventional GA aircraft. In many countries now the motor-glider can be flown without a full Class 2 medical. This means otherwise grounded pilots can continue flying. Some glider pilots may wish to get away from the need for a launch-and-recovery support team. What's more, pilots don't always want to use their aircraft as a glider. In the case of the Europa, you really can have your cake and eat it. One day it can be used for gliding, using the motor-glider wings, and the next it can become a VLA aircraft for conventional touring or daytrips.

Unhurried grace

My own window of opportunity to fly this aircraft was narrow as it was due to be flown back to Luxembourg after Europa Aircraft had completed a monowheel to trigear conversion for its new owner. Fortunately, I had the unexpected bonus of flying with Ivan who already had 10 hours on this particular airframe – Ivan positioned the aircraft to Sherburn, where he briefed me on the essentials.

The enormity of the wing is an important consideration for anyone who hasn't taxied a motor-glider before. In motor-glider guise, the Europa has had its span increased by as much as its fuselage length (about 20ft), so care is required in confined areas. Although this example is a trigear, both monowheel and trigear versions are available. The monowheel version uses up a lot of space due to its much greater turning circle, so parking away from the pack would be a wise precaution. Ground manoeuvring is much easier in the trigear as it has a tighter turning circle care of the castoring nosewheel and differential braking, although quite a lot of power is required to get a turn started. At low speeds, steering is provided by the brake pedals, which are mounted between the rudder pedals.

Ivan briefed me to use either the brakes or the rudder pedals but not to try to use both at the same time. I subsequently suggested to David Stanbridge, who was with us for the day, that he might like to consider changing the design to more conventional toe-brakes, as handling the trigear version in any significant crosswind is always going to be a handful with its relatively narrow, tracked, main wheels. The monowheel version should prove to be easier to control laterally as full into-wind aileron can be applied with support from the upwind outrigger wheel. The directional stability of the motor-glider is better than the standard Europa due to the significantly greater inertia of the long wings.

Once airborne, the increased lateral inertia reminded me of my airliner flying days. The motor-glider wing is graceful but cannot be hurried, whereas the standard wing offers fighter-like direct response similar to the Van's aircraft. The wing loading is about 30% less with the increased area, making for a slightly rougher ride in turbulence.

Even though we were at maximum weight, the climb angle was very impressive. This particular aircraft has the Rotax 912S (100hp) coupled to

While this example of the MG doesn't have an audio vario fitted, one is due to be installed in a UK-registered version of the aircraft, which has just received its Permit to Test from the LAA

an Airmaster constant-speed prop with warp-drive blades (probably the most popular engine/prop combination for the Europa). However, one of the other flying examples in the USA, a monowheel variant with a turbocharged Rotax, has earned the nickname of mini-U2 (after the spy plane) and with the steep climb performance you can see why.

The wing efficiency in the climb reminded me that it was time to try out what this aircraft is all about and that meant turning the engine off. Having isolated the ignition, I was rewarded with near silence while we drifted down at about 300fpm at 70kt IAS. This would have probably reduced to about 250fpm had we feathered the prop, giving a glide angle of about 28:1. The cleaner profile of the monowheel would probably give a slightly better glide angle.

We used our height to check the stall characteristics. The stall proved to be very gentle with no wing-drop at all. A little more warning buffet from repositioned stall strips might be helpful or, as I would prefer, a stall-warner could be fitted to avoid spoiling the wing leading-edge performance. Stall strips can cause the stalling speed to increase, hence my preference for a stall-warner.

> "Glider pilots get an aircraft that can be used for touring when thermals are absent"

When it came to formation flying – with a C150 camera ship – this was easy from a speed perspective, but with the large wingspan, care was needed to anticipate bank corrections due to roll inertia. Unlike the standard wing, the long wing also needed some rudder to help to keep the turns balanced.

Dramatic change

After a long transit, we positioned straight in on a westerly runway. The big flap/airbrakes have two settings but they are normally fully-extended on final and significantly steepen the approach, so much so that even with light headwinds a fair amount of power was required to keep a normal glidepath. No doubt variable amounts of this would prove useful in the event of a forced landing. The added inertia on round-out (although only slight in pitch), along with moving the feet from the rudder pedals to the brake pedals during the latter stages of the rollout, were the only real differences from the standard Europa.

No crosswind limit has yet been published but I would suggest that 10kt rather than the 15kt used by the standard Europa would be a sensible starting point. The better directional stability is offset by the concern about wing-lift in gusty conditions, particularly with the trigear.

As is always said, a flight is not finished until the engine is turned off, so care is required with that big wing while taxying, both with proximity to obstacles and to prevent wing-lift in a crosswind.

Adding 10ft to each wing has changed this aircraft dramatically. Normally at this point we would consider the advantages and disadvantages of a change of design, but in this case, having the ability to change between sets of wings in effect gives you two aircraft in one. It gives pilots of conventional GA aircraft the chance to try out gliding without the need for the infrastructure that goes with it. Glider pilots get an aircraft that can be used for touring when thermals are absent. The purist glider pilot may decide that a 28:1 glide ratio is not enough but it is pretty good for a motor-glider.

The MG is available with four choices of canopy – the original shape, the bubble top (as fitted to LX-CWT), the Hi-Top and the Hi-Top with the bubble canopy. The Hi-Top has a cockpit that is 2in higher

At the moment, both versions of the aircraft have the same maximum take-off weight and, given that the glider wings are about 90lb heavier, this at present reduces the useful payload. David is looking to rerun the calculations and hopes to raise the mtow to 1,450lb for the glider version, which would put it back on a level playing field with the standard Europa. As most of the increased weight is outboard of the fuselage, it is weight that will not affect the bending loads on the wing, so I can see how this reasoning may allow the increase in gross weight without further structural reinforcement.

If payload for touring is a factor, it should be remembered that the monowheel version of the fuselage is typically 40lb lighter than the trigear. This is mainly due to the sharing of the strengthened part of the fuselage between the single main wheel and the engine. The main legs of the trigear need a separate area of reinforcement, which adds weight. The monowheel also cruises about 5-7kt faster due to its drag reduction increasing range by about 5%.

From a touring point of view, I have always thought that a two-seat aircraft should have a minimum payload of 500lb if it is powered by a light efficient engine, and 550lb if it uses a Lyco/Continental (to cater for the necessary extra fuel burn). The standard Europa meets these requirements easily. Logically, if both sets of wings are available it would be sensible to use the shorter ones for touring, as the greater wing efficiency of the glider wing is slightly offset by weight and there is about a 10kt drop in cruise speed at the 75% power setting. Much of this lost efficiency would be regained if the motor-glider is flown at a slower speed where its wing is at its best.

How much?

In terms of cost, assuming that you are willing to take on a build, the numbers are similar to ready-built VLAs, which retail about £70,000. Airframe kits come out at £37,000 or £42,000 for slow- and quick-build respectively. This is £12,000 more than the standard Europa. On top of that, a firewall forward kit and engine will add another £16,000. You then need to decide on the propeller, avionics, paint and trim. If an owner of a standard Europa adds glider wings, it will cost £21,500, which is a slight discount as some of the wing parts are common to both. These numbers unfortunately don't include the dreaded VAT.

For those who would like the true character of the Europa but are put off by the skills required for the monowheel, the motor-glider version, with its better directional stability, might provide encouragement to revisit this unusual but clever landing-gear layout. The reduced weight and drag are significant and what starts off as an ugly duckling on the ground becomes a thing of beauty in the air. The monowheel motor-glider with gear retracted has a grace reminiscent of the albatross – a master of control and efficiency. ■

While that enormous wing means roll-rate is a little on the slow side, think of the fuel you can save when in gliding mode…

TECH SPEC

Europa XS Motorglider

DIMENSIONS

Wingspan 47ft 3in/14.4m
Length 19ft 2in/5.8m
Height 7ft/2.1m

WEIGHTS & LOADINGS

Empty weight 922lb/418kg
Mauw 1,370lb/621kg
Fuel capacity 15g/68lt

PERFORMANCE

Vne 127kt
Cruise (8,000ft, 75% power) 110kt
Stall 42kt
Rate of climb (at mauw) 1,000fpm
Glide ratio (propeller feathered) ..... 27:1 @ 53kt

COST

From £37,000 ..... slow build kit (not including VAT)

ENGINE

Rotax 912S

SEATING

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CONTACT DETAILS

01751 431773
www.europa-aircraft.co.uk