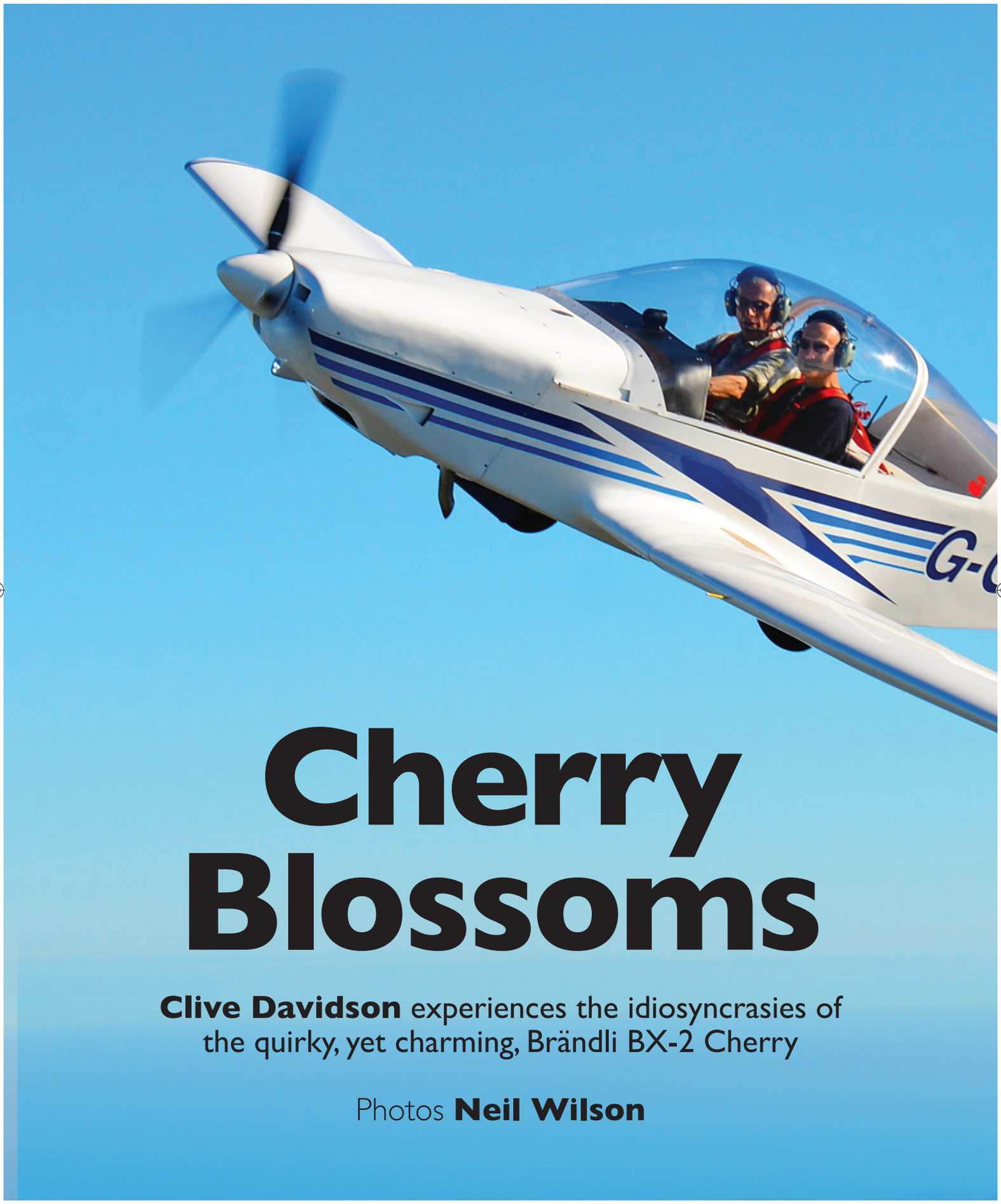

Cherry Blossoms

Clive Davidson experiences the idiosyncrasies of the quirky, yet charming, Brändli BX-2 Cherry

Photos **Neil Wilson**

Flight Test

My first acquaintance with the Brändli BX-2 Cherry came on August Bank Holiday when I saw it in the line-up of visiting aircraft at Henstridge. Neil, our resident photographer, explained that it was an aircraft that our editor was keen to cover, and I was certainly drawn to its compact size and sleek lines. I particularly noted a line of vortex generators on the left-hand side of the fin. I thought to myself, "Now, that's interesting!"

The canopy was striking as well, very large, rather like a Eurostar's, and a peek underneath revealed it had a retractable undercarriage, which is always intriguing on a lightweight aeroplane.

Unfortunately, the owner wasn't about, but we were to meet him a month or two later when he very kindly brought his very interesting machine back to Henstridge for a flight test and photo shoot.

When I say "he", I'm being very rude. "He" is in fact Dave Roberts, not only the owner of G-CGTE but also the builder of this delightful Swiss homebuilt, only the second of the type to be built in the UK. It's scarcity here is undoubtedly due to the fact that this is a plans-built aircraft, which demands a deal more tenacity than a kit to complete.

Dave spent 13 years on the build, from 1998 to 2011, which included a major modification in substituting the usual Continental 65hp or 90hp engine with the rather more contemporary 100hp Rotax 912. Dave considered the plans to be very good, although the comments and helpful hints therein are written in German. Armed with a technical German dictionary, these later began to make much more sense. *Natürlich*!

Successful design

The prototype Cherry goes back farther than you might think. It was designed and built over three and a half years by Swiss engineer Max Brändli and, powered by an A65, flew for the first time in April 1982. The design has proved popular in mainland Europe with more than 100 recorded completions. The first, and until Dave completed 'TE, the only UK example was G-BXUX built by Kent-based Mike Fountain and flown in 1999.

Of mainly wooden construction, the removable wings have tapered outer sections with ailerons, and inner constant chord sections fitted with flaps. They incorporate foam cores and are covered in glassfibre, rather like the Rand KR2 or WAR replica fighters. The undercarriage can be built fixed or retractable, the latter being by far the most popular choice – both Mike Fountain's and Dave Roberts' aircraft are equipped in this way.

The most popular engine fit has been the C90, with a

Left The vortex generators down the left side of the fin. In association with changes to the thrust line they resolved a serious handling issue resulting from a change of engine.

Below Main gear and wheel well. The mechanical retract system is simple and unlikely to cause any operational issues.

Bottom The cockpit is larger than it appears and the panel houses a mix of glass and analogue instrumentation.

handful of aircraft using the BMW 1100 or 1200cc twin boxer motorcycle engine. Dave's choice of the 912ULS involved a great deal of work as a new engine mount had to be designed and constructed and practically everything firewall forward modified to suit.

Unfortunately, undesirable handling traits raised their head when the engine change modification was being flight tested by LAA Test Pilot, Dan Griffith. This resulted in further modifications being required, as outlined by Francis Donaldson (see page 41).

Weights and loadings

The aircraft's empty weight is 321kg, with a maximum all-up weight of 550kg. So, with Dave at 80kg and myself at 72kg, that is 473kg, full fuel of 90 litres would add an additional 64.8kg, allowing us to carry 12.2kg of baggage on the parcel shelf behind the seats. Dave says he has no need to take more than 75 litres (54kg) on board and at an estimate of 16 litres an hour fuel burn, even that will give us an endurance of approximately five hours 40mins – good by any standard. All these combinations worked out OK for CofG, and juggling fuel for up to the max allowable baggage of 20kg is also possible.

That expansive canopy slides forward with a single catch being located on its trailing edge at top centre, thus allowing us to enter from behind the wing on to the walkway and then step into the cockpit via the seat. The pairs of white powder-coated rudder pedals are not adjustable for leg length but fortunately suited me, and a gentle prod of each exhibited a slight rock of the nose from its direct steering. Reassuringly, the harnesses are the four-point variety.

A mix of glass and analogue

A quick scan finds the headset jacks on the extreme edge of the burr wood instrument panel and, a nice touch, the red fuel tap is centrally sited low on the instrument panel mid-section. The rest of the panel is dominated by the Dynon directly in front of the P1 position, the remaining instruments are by VDO.

To the left of the Dynon is the the familiar high numbered and colour caution ranged RPM gauge for the Rotax. Those on the right are the oil temperature and pressure gauges, the fuel pressure and volts, coolant and Cylinder Head Temperature. To the right of the centrally mounted fuel sight tube are the Altimeter and ASI in knots. Beside these are the Trig Transponder and VHF 8:33 radio. Further right, by the fresh air outlet, is a 'cigarette lighter' power point for an omnipresent iPad.

Back to the lower central upright where, accompanying the fuel selector, there's a black-topped button to check the three undercarriage green lights on the horizontal panel abutting the instrument panel at its base.

This is also where the rotary mag key switch and the engine starter engaged indicator are located. The small, knurled trim wheel responds as standard, wind back to trim back. It is connected to the all-flying tailplane's dual trailing edge anti-servo tabs, adding feel to the system as

well as trim. Despite low stick forces and a slippery airframe, I found the trimmer always gives good feedback, and is very user-friendly.

On the top of the centre console, to the right of the throttle, are two knobs: the silver knob is the carb heat and the larger rotating grey one is to lock the canopy once it is closed. To the right of the centre console is the choke. To complete the set there's a compass on the upper panel lip, complete with correction card.

The control sticks have a good circular throw and a lovely feel, and the ailerons can be seen to rise more than they dip down, good differential. Watch the ailerons as flap is lowered and you will see they droop slightly as well, further enhancing handling and giving extra lift during the slower flight within the circuit. These are all bonus points.

The flap lever, brakes and undercarriage selector are found lying between the two seats, each having a different shaped handle for a specific job. The brake lever sits stubbily upright and forward near the mag switch. It's handy to grab and needs a progressive backward tug to engage the brakes – it looks somewhat like the handle of a kitchen knife.

The flap is a conventional "Austin 7" type lever, depress the white button and select either 20°, 40° or 60°. Actually, Dave only tends to use the first stage as the air resistance when trying to select anything beyond 20° is a bit of a struggle... nay, it's near on impossible! But the action is smooth enough and the fully-down position is handy when climbing up onto or stepping off the wing, if not in flight.

The third lever is the undercarriage selector, the undercarriage limiting speed being a reasonably high 92 knots. When released, the lever is brought forward to activate the lowering of the tricycle undercarriage. Notice that I said that with such ease, but sitting in the right-hand seat, I do not perhaps, have such a good mechanical advantage for the 180° throw of positive pressure required after disconnecting the vertical triangular locking device to press the bar up over, forward and home in a smooth and necessary flowing action.

Confirmation all three wheels have travelled, and the wheels are down and locked is by three tiny, but oh-so important, green lights. When up and locked there are no red lights.

The undercarriage workings can be seen if the cockpit seats are lifted and are relatively complex. The aileron rods as well as the flap activators can also be clearly seen. All that activity going on beneath the seats! Incidentally, the main undercarriage does offer some "feel" when in motion, adding reassurance with a clunk as well as the disappearance of the green lights as they retract fully.

There is no noticeable trim change, as might be expected, as they are tucked away but upon seeing some of the air to air images I was slightly surprised to see the edge of the main wheels canted down, not quite fully tucked away. This though, is their standard position and the greater amount of the combined wheel and tyre drag is eliminated, tucked away within the undercarriage wheel wells.

> "The canopy slides within rails and is moved by pulling or pushing on a central handle rather than tugging on one side. Its optical quality is superb"

Dave's experience

I wondered how Dave had prepared for the event of flying his machine. He had started first on microlights in 1992, with the delightful and responsive CFM Shadow, aided by Fiona Luckhurst. He then converted to the challenge of a tailwheel Thruster – "a bit slow and draughty". A conversion to Group A followed at Gloucester, flying Cessna 150s, a PA28 and a C172.

In all, a fair amount and breadth of experience with about 230 hours logged but by the time he tackled his Cherry there had been quite a gap in currency – 12 years in fact.

Did he find the Cherry difficult, unusual or different? His reply was in the affirmative, but fortunately Steve Moody is also an LAA coach and helped Dave get to grips with the character and idiosyncrasies of a slippery machine with a retractable undercarriage – as well as undertaking the initial test flying. He also upped his work load by taking him into short, awkward strips – that's what friends are for! Dave then revalidated his licence with Jon Cooke, LAA's Head of Coaching.

The Cherry's canopy is of such a size that the back edge extents behind the pilot and passenger to provide a vista of unparalleled aspect. During construction, Dave bought a canopy from a firm near Toulouse and this reduced the workload in fitting.

There is no up-and-over framework to mask the forward and three-quarter rear view, the canopy slides within rails and is moved by pulling or pushing on the central handle rather than tugging on one side. Its optical quality is marvellous, and the cockpit width is such that pilot and passenger are not rubbing shoulders, or short of personal space. This is a very comfortable cockpit in which to sit, operate the aircraft and enjoy the view.

Incidentally, the aircraft can be de-rigged, the wings slide out of their tunnels and the all-flying tailplane can be disconnected and placed within the cockpit. Dave hasn't yet de-rigged Tango Echo, but it is always an option should the aircraft need an extended rest from the air.

Taxy and take-off

Having cleared the area and confirmed there was nobody contemplating walking close by, Dave started the Rotax 912 and, being still warm from the transit flight down, little or no choke was needed and we soon had the needles in their correct bands.

Taxying is a joy, the more than ample visibility, direct nosewheel steering, and handbrake operated hydraulic disc brakes give assurance that you are in total control of the aircraft. The nosewheel to mainwheel base is quite short coupled, and should you end up with full rudder deflection to turn, the turning circle is the minimum you might ever need. However, it takes anticipation not to stop with full lock applied, which would make it awkward to pull forward and straighten using power against the natural cant and turn in of the nosewheel.

The only slight detraction is the common Rotax but, in my view, awful throttle, which is spring loaded to go to full power in the event of a cable break. The trouble is that you must keep the friction control on when taxying as you dare not let go of the throttle.

I estimated we took about a 350-400 metre ground roll with a five to eight knot, 30° to the right headwind. She was stable during acceleration and rotated cleanly after what I estimated to be a nine second count into a 65-knot rotation and climb, with an applied pressure of slight right rudder deflection for balance. We appeared to be ascending at around the 700ft per minute mark, which was quite respectable.

Opposite top Gear down, nicely flared and coming into land. The controls are light, predictable and effective.

Opposite middle Owner/builder Dave Roberts with his pretty and very useable Rotax 912ULS powered BX-2 Cherry.

Opposite bottom The quite enormous size of the canopy is evident here. It slides smoothly forward allowing easy cockpit access from behind the wing.

Below left The brake lever, standing vertical; the retract lever at extreme rear which comes up and forward in a 180 degree arc; and the difficult to use flap lever – the car handbrake squeezed down the side of the right hand seat squab.

Having turned left and southerly, levelling off at 1,500ft and above the highest local objects – the aerials at what used to be RAF Bulbarrow, a G navigation station and the range of hills now used by the Wessex Hang Gliding and Para Gliding Club site at Bell Hill when the wind is from the north. You invariably see their brightly coloured wings scrabbling low as they work the hill. Perhaps they will surprise me one day? Maybe today, as there is always that potential for them to be above the skyline. We have such an expansive vista in this aircraft that surely I will spot them if they are there?

Trimmed in the cruise at 4,700rpm we have a healthy indicated 115kt from the ground adjustable Wood Comp Classic prop. The speed for straight and level reduces to 80kt with 4,000rpm, and with a brief foray to a max application of 5,500rpm we approach the mid to high 120s. The upper end of the scale – the never exceed speed (Vne) – is set at 149kt.

General handling

The undercarriage limiting speed is 92kt, the same as Va (max manoeuvring speed) and the ASI white arc for the flaps is 15kt lower at 77kt, but as mentioned before the forces are high, so we restrict ourselves to the first stage of 20°.

The longitudinal stability (pitch) of the Cherry threw up no problems as it may be trimmed in the normal manner for climbs, a range of cruise speeds and in the approach configuration. However, I discovered something I had not met in many moons – it had been hinted at with the vortex generators on the left side of the fin. Looking at directional and lateral stability with crossed controls, i.e. left rudder held against right aileron and keeping the aircraft flying level but in an inefficient side-slip, at trimmed low and high cruise speeds, releasing rudder direction will demonstrate directional stability.

The nose generally points forward into the direction of flight, and this the Cherry did promptly, from both left and right side-slips, placing the nose back where you hoped it might be.

Cross controlled again and wishing to investigate lateral stability, with right wing low this time aileron was released by letting go of the stick, and invariably the wing rose from the cross controlled side-slip, showing a positive reaction and good manners.

Where the Cherry showed an unusual characteristic was when having let go of the stick from crossed controls with the left wing low and a large bootfull of right rudder, the wing stayed low with the rudder holding the nose out to the right. It remained low! But by just releasing the opposing rudder pressure and using a small aileron deflection we were back with wings level, straight and level. It had been at this point that in testing Dan had had

a departure. Clearly he and Francis had solved her initial unruly behaviour and given her a far friendlier nature.

The stall and approach

Stalls, both clean and with 20° flap and landing gear extended, produce reduced aileron effectiveness as the stall is approached, and a shudder with low fluctuating airspeed and a high rate of sink. It is easily countered with stick forward, no matter what the attitude has degraded to. The speeds I recorded were 48kt clean and 37kt with everything dangling, but I suspect there is a degree of position error.

An example of the oft-quoted rule of thumb that the approach speed is taken to be 1.3 of the flap and gear down stall is inaccurate and potentially dangerous, is that 1.3 of the clean stall speed only gives us an approach speed of 48 knots. In actuality the correct approach speed is 65 knots, significantly faster.

The final trick up the Cherry's sleeve is a warning device called the SmartASS, manufactured by a small British company called Smart Avionics (*https://tinyurl.com/yc2wytf6*). It allows Dave to make his approach at the nominated speed of 65 knots while receiving airspeed information audibly, and he finds it helpful not having to scan inside the cockpit.

Should he inadvertently let the speed drop then there is an audible warning. (*David Joyce wrote an article covering this and similar pieces of cockpit warning kit in our LA June 2014 issue entitled 'Could you be the next statistic?' Please drop the office an email if you would like a pdf copy. Ed.*).

A well-flown approach and flare allowed a gentle hold off and touchdown with elevator authority allowing the nose to be held off comfortably.

The gentle, and tactile braking lever action reminded me of a Monowheel Europa and was both effective and simple to use. Having cleared to the north side of Henstridge's 25, we stopped and raised the flaps. Dave then showed me something I should have learnt long ago – how to shut down the Rotax without it appearing to be seizing, one mag off first, throttle right back, pause… second mag off. A much less fraught experience!

It was an extended build for Dave, with major input required from LAA Engineering, but the Rotax powered Cherry has turned out to be a delightful little aeroplane with a fair clip of a cruise speed that Dave is intent on using this year as he heads across the Channel to explore France and Germany.

Dave, have a great time aloft and many thanks for my two flights, they were a very enjoyable and enlightening experience, cheers! ■

Left The low frontal area must certainly add to the good cruise speed performance.

Below left The underside is very clean, although the wheels do protrude slightly into the airflow. Note also the all-flying stabiliser with anti-servo tabs.

Modifications to BX-2 Cherry G-CGTE

By Francis Donaldson

During the LAA flight testing of the 912 Rotax powered Cherry, as a modification of the original Cherry type which normally has a small four cylinder direct-drive Continental engine, it was found that with the more torquey Rotax with its gear-reduced propeller drive, the aircraft had a tendency to enter a sudden and rapid spin to the left when carrying out power-on stalls. To investigate the reason for this, the aircraft was fitted with wool tufts on the wings, rear fuselage and fin, and external mini cams on the wing tips to record the behaviour of the wool tufts as the aircraft entered the stall regime. It was found that as the aircraft slowed, as with most propeller driven aircraft the rudder was being deflected progressively more and more to the right to keep the aircraft in balance.

The tufts showed that at the point of stall, the flow over the fin and rudder separated. It was quickly surmised that with the breakdown of flow over the fin and rudder, the side-force being generated by the fin was collapsing, which in turn caused the aircraft to yaw rapidly to the left and precipitate a spin. Vortex generators were fitted to the fin to try to delay the onset of fin stall and so prevent the sudden yaw developing, but further tests showed this wasn't effective.

LAA Engineering then suggested modifying the engine mount and cowlings to introduce a few degrees of right sidethrust, which would lessen the amount of right rudder needed at low forward speed and so prevent the fin having to work so hard to keep the aircraft in balance. This proved to be successful, the amount of right rudder needed being markedly reduced and in combination with the vortex generators, the airflow remained attached to the fin up to and including the point of wing stall, preventing the sudden left yaw and ridding the aircraft of the undesirable sudden spinning tendency.

BE-2 CHERRY SPECS

SPECIFICATIONS

General characteristics

Capacity 2
Length 5.31m (17ft 5in)
Wingspan 6.98m (22ft 11in)
Height 1.7m (5ft 7in)
Empty weight 320kg (705lb)
Max takeoff weight 550kg (1,213lb)
Powerplant 1 × Teledyne Continental C90 4-cylinder horizontally opposed air-cooled, 67kW (90hp)

Performance

Maximum speed 260km/h (162mph; 140kn)
Cruise speed 220km/h (137mph; 119kn)
Range 800km (497mi; 43 nmi)
Endurance 7h
Rate of climb 3.0m/s (590ft/min)