

Last of the Breed

The sole Bulldog 200 lives on as an example of how a four-seat tourer should handle, if not how it should be built and marketed

Words Dave Unwin Photos Keith Wilson

The month's test aircraft is – in the true sense of the word – unique, as it is the only Bulldog 200 ever made. It is also the last of the breed, and its story is not only fascinating but a damning indictment of the British GA industry.

Firstly, let's look at its pedigree. The Bulldog was sired by the Pup (usually it's the other way around) which was built by Beagle Aircraft. Beagle was allegedly an acronym of British Executive General Aviation Limited, and the brainchild of Peter Masefield, former Managing Director of the Bristol Aeroplane Company. Masefield's masterplan was to develop a range of all-British GA types, including a light twin. To help achieve this, the Auster and Miles companies were acquired, and some key design staff from Bristol moved

over when Beagle was established in 1960.

The company's first products were civil conversions of ex-military Austers and new versions of the basic Auster design, such as the Terrier and Husky. These were followed by the Airedale, a four-seater of the Auster type, modernised (I use the term in the loosest possible sense) and incorporating a tricycle undercarriage. Apparently (and as its name implies), the aircraft was a real dog, being overweight, underpowered and very old fashioned, particularly when compared to the much more modern all-metal, all-American competition, such as the Cessna 172 and Piper Cherokee. Only 43 Airedales were produced, several hundred short of the financial breakeven point.

The firm then began work on Masefield's dream machine; the light

twin. Unfortunately, there were three different design teams working on the project, and they all had their own ideas. The result was more engineering mishmash than masterpiece. Known as the Beagle 206X, the prototype was overweight and underpowered (sound familiar?) and needed a huge amount of re-engineering and investment before it achieved certification. Even though the company was in a terrible state financially (developing the 206 had cost £3 million, the equivalent of £60 million today) Masefield decided to broaden the product base with a new single-engine design – the Pup, which would be available in both 100hp and 150hp versions.

Although initial flight trials of the Pup went well (the 100hp version is possibly the nicest-handling light aircraft ever built, albeit under-powered) and flight ➔



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testers of the day gave the aircraft rave reviews, things were far from satisfactory. The firm was still losing £1 million per year (and that was when a million pounds was a lot of money) and Pup owners soon started reporting several significant faults, including engine mounts cracking, fuel tanks leaking and doors opening in flight.

Beagle's parent company, Pressed Steel Fisher, wanted out, so Masefield talked the Labour Government into taking it over in 1966. Sadly, things failed to improve, and when he asked for another £6 million, Tony Benn, the Minister for Technology, responded by cutting off any further subsidies. Beagle was in the doghouse and it was all over for the Pup, barely three years after the prototype had first flown.

When Beagle went into liquidation in January 1970 about 150 Pups had been built, and just under 130 had been delivered. Production peaked at the rate of 15-16 per month and when the business folded there were orders for a further 276 aircraft. If you're wondering why things got so bad when it had orders for over 270 aircraft the answer is simple: the company was selling each aircraft at below cost! This not only doomed Beagle but all the other UK light aircraft manufacturers as well – after all, how could they possibly compete?

Anyway, before it went bust Beagle had designed and flown a new military trainer, the Bulldog. The Swedish Air Force had ordered 58, which prompted Scottish Aviation to acquire Beagle's assets and get the Bulldog into production. The gamble paid off and ultimately some 320 Bulldogs were produced for several air forces, with the RAF taking 130. Emboldened by this success, in 1974 Scottish Aviation announced an all-new retractable four-seater which would be produced in two variants: the Bulldog 200 (aimed at the military market) and a civil version.



The 200's undercarriage doesn't have the widest track, but it does its job well

Now, having started with the Husky, Terrier and Pup, and progressed through the Bulldog to the Bassett you might have expected the marketing department would continue the canine connection with a bigger dog – logic might suggest 'Bullmastiff'. Instead, they called it the Bullfinch (and yes; I know what you're thinking). In September 1975, it was anticipated that the unit cost of a Bulldog 200 would be around £30,000, but barely a year later the proposed price for the civvie Bullfinch had increased by an astonishing 50%, to £45,000!

Scottish Aviation took the test aircraft to the 1976 SBAC show at Farnborough, registered as a Bulldog 200 but painted as a Bullfinch (complete with dummy rear seats made of plywood) and it made a favourable impression. However, a weak

economy and the aircraft being overpriced and overweight but under-powered (is there a pattern developing here?) doomed the design, particularly when a 1976 Comanche 260B only cost around \$34,000. Its easy to imagine an American saying "How much for a Bullfinch? You've gotta be bulldusting me!" Consequently, only one Bulldog 200 was ever built, and after logging barely 27 hours it was left to languish in the back of the hangar at Prestwick.

Dukeries Aviation owner Dave Bonsall spotted it in a very sorry state in 1980, when he was scouting for Pup parts. He bought it 'as is' for a bargain price, made it airworthy and flew it back to Netherthorpe, where it remained ever since, and where I meet it, on a cool autumn morning.



Drag reducing fuel filler covers – and an extensively riveted airframe



The kind of tail design that puts spin recovery ahead of jet aircraft styling!

My initial impressions are that it is quite an attractive aeroplane, from the tip of the very pointed spinner to the top of the swept-back fin. It's essentially exactly what the name implies, a slightly stretched 100 series Bulldog, fitted with a retractable undercarriage and the tailplane set slightly higher. The lengthier engine cowling and fuselage 'plug' aft of the canopy makes it about a foot and a half longer than a 100 series Bulldog, and it is powered by the same engine – a 200hp Lycoming AEIO-360 air-cooled flat-four, spinning a two-bladed constant-speed Hartzell prop. I couldn't help but wonder if 200hp was going to be enough for an aircraft designed with a maximum all-up weight (MAUW) of 1,180kg.

Fuel tank in the fin?

The fuel system is also the same as the Bulldog's – four removable metal tanks (two in each wing) with a combined capacity of 145 litres. Intriguingly, the brochure that Dave Bonsall kindly gave me mentions that an extra thirteen litres can be carried in the fin tank, although this was not fitted to 'OG. Quite why you'd even want thirteen litres of fuel back there will forever remain a mystery (possibly to give it a more aft C of G when flown two-up for spin training?) The fuel tank filler caps are faired flush by hinged covers – an excellent safety feature is that they cannot be closed if the filler caps are not correctly fitted.

The wheelbase is not particularly long at only 1.7m, although as the mainwheels retract inwards the track of 2.03m is reasonably wide. The trailing-link main undercarriage looks very robust, the main wheels being fitted with hydraulically-actuated disc brakes. The current arrangement is quite different to the original design. For the first few flights, the 200 had a steerable nosewheel, doors for all three wheel-wells and the undercarriage utilised electrically actuated screwjacks. It wasn't a very good system – apparently the nosewheel steering was rather vague, the doors were badly designed and the nose leg was prone to jamming. The nosewheel steering was deleted by the fourth flight, while in more recent times Dave replaced the electro-mechanical retraction gear with a far-superior hydraulic system of his own design. None of the wheel wells now have doors.

The wing is a conventional, single-spar two-cell structure made from light alloy

and was originally designed for 'g' limits of +6/-3. It uses a NACA 63-615 aerofoil, and has about 6° of dihedral and an elegant taper. As it was envisaged that it could be used for weapons training and as a light strike aircraft, there are hard points incorporated into the wings. These are stressed for loads up to a total of 290kg, and could carry two 7.62mm FN machine-guns in pods, rockets or bombs.

There is a large landing light in the leading edge of the starboard wing, while the beefy-looking pitot is suspended a fair way aft of the port wing's leading edge. The trailing edge consists of slotted ailerons and electrically-actuated slotted flaps. These have three settings, 'up', 10° and 45°. While moving around the aircraft I notice that the Bulldog does share several traits with its bigger, twin-engine cousin, the Bassett. As you'd expect on an all-metal aircraft of stressed-skin construction, there are a lot of rivets. And when I say, 'a lot' I'm not exaggerating: it seems to have a disproportionately large number of rivets holding all the stretch-formed sheets together. It also has a

considerable amount of double-curvature panelling and double skinning, which must have made it expensive to produce. However, pluses are that it is probably

aerodynamically more efficient and certainly aesthetically more pleasing than most aircraft in this class.

Moving towards the tail I note the large ventral fin incorporates a tail bumper, that the constant-chord tailplane is quite large, (probably because the aircraft is relatively short-coupled) and that the elevator trim tab spans the entire starboard elevator. There is also a large rudder trim tab.

Another major change that Dave made to the airframe is that he completely redesigned the canopy. The aircraft originally featured a large bubble canopy that pivoted back and up on two arms →

It could be used for weapons training... there are hard points incorporated in the wings



The nosewheel retracts rearwards



Trailing-link mainwheels tuck in under the belly



Nice to have a DV panel, but not one sited here!



Gullwing doors in place of the original tilting canopy

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(similar to the T-67 Firefly). However, although it looked great and must have afforded good access to the rear seats and a truly superb field of view, it apparently had a disconcerting tendency to lift in flight, leaving large gaps around the frame and threatening the structural integrity of the fuselage. The cabin now has a metal-skinned roof, with gullwing doors and access to it is good but not great. It's a relatively easy step up onto the generously-sized non-slip wing root walkway, but although the doors open wide and are held up by gas struts they're not that big. I take the left seat; it seems set quite low in the fuselage and has a fixed base (although the seat back rake can be adjusted). The rudder pedals also adjust.

Unsurprisingly, the controls and instrument panel are very similar to the 100 series

Bulldog, with the notable exception of it only having a single throttle.

Both elegantly curved control columns carry pip-pins; which

serve different functions. The port side is for the control lock, the starboard side allows that stick to be quickly removed.

The instrument panel seems slightly deeper than the 100 series. It has a centre-mounted sub-panel for the undercarriage lever and button, three silver toggle switches for the master, alternator and fuel pump and a row of small red toggles for the avionics. Also on the sub panel is the rotary switch for the mags and starter button, some warning lights and the undercarriage position indicator. To the right of the sub-panel is the flap selector and to the left is the parking brake. This reminded me of the

type of handbrake fitted to many old cars, as you pull it out and then twist it to lock.

Unsurprisingly the panel does have a military look about it, with the primary flying instruments arranged in the time-honoured 'sacred six' layout. I like the old-style turn needle – much better than modern turn co-ordinators. The Basic T flight instruments are delineated by a white line and there's a yellow line around the engine instruments, which are all grouped in a column in the centre. They consist of (from the top) a large manifold pressure gauge/fuel flow meter, then a tachometer, below which is oil pressure and temperature. The fuel gauge is below the DG, with the fuel selector on the floor immediately behind the P1's stick.

The centre throttle quadrant is carried in a console that extends aft between the seats and consists of (from left to right), throttle

friction, the throttle itself (a nice big chunky T-handle), prop and mixture levers. Annoyingly, the last two are not only the wrong colours but also the wrong shapes. Aft of

the throttle quadrant is a large wheel for the elevator trimmer and its co-located position indicator and a large knob for the rudder trimmer. Both trimmers are mounted logically. Between the seats is the emergency hydraulic hand pump and behind the seats is a truly huge baggage bay, as the rear seats have been removed. Since going on to an LAA Permit the MAUW has been trimmed back to 1,111kg and as a two-seater with a useful load of 290kg it's quite capable, being fast and comfy, with a good range. The seats even fold flat, allowing you to sleep in it quite comfortably.

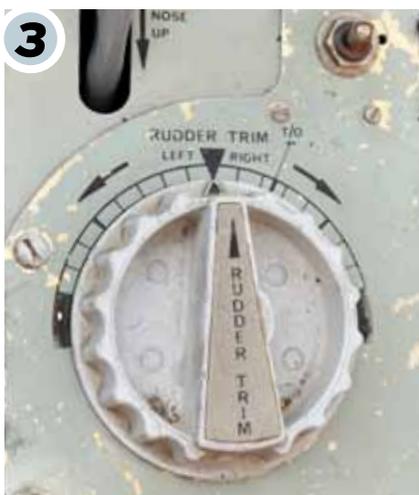
With the five-point harness (which looks like it's come from a Martin-Baker ejection

The controls and instrument panel are very similar to the 100 series Bulldog



Dukeries Aviation has made a nice job of installing glazed cabin roof, even if the trim is rather spartan. A steel hoop protects the occupants in the event of a roll-over





1 An instrument panel and cockpit generally laid out in best ergonomic style, reflecting years of hard-won British Service experience – note how the essential blind flying instruments are grouped in a standard T pattern, the ASI being positioned close to the pilot in command's line of sight, and the engine instruments are located centrally (outlined in yellow) **2** beautifully engineered fuel selector, placed just aft of the stick and logical in operation **3** centrally mounted rudder trim wheel, again both well engineered and intuitive in the way it operates **4** just aft of the rudder trim – and a modification to the original Scottish Aviation design – the lever for the emergency hydraulic hand-pump and **5** the neat sub panel that houses the undercarriage selector – a lever with an appropriately wheel-shaped knob, with indication lights alongside, switches for the essential electrical services and a rotary mag switch



When the wheels disappear, the Bulldog takes on a new and altogether more attractive shape

seat) locked and the doors seated on the two engaging pins and then latched (the handles are from an old Minivan door) we're ready to start. However (and as much as I like a DV panel) there's something about 'OG's that's not quite right. I think it's set too high up and too far forward, and find it quite obtrusive.

Starts instantly

The engine starts instantly, and I am soon ready to taxi out. It is a very easy aircraft to taxi as the field of view over and either side of the nose is good, the brakes are powerful and progressive and the nosewheel castors nicely. The wind is favouring Runway 24, which has a slight upslope component. Nick Riddin is riding shotgun and recommends a rolling take-off, rather than lining up and stopping. This is a good clue that getting airborne could well be 'interesting'. The ambient conditions are a gentle breeze from the south-west, with the OAT of 18°C giving a negligible density altitude of about 300ft. On the downside, we're taking off uphill, on grass and in an aircraft with relatively small wheels – not the best combination. With about half fuel

For a four-seat tourer... the handling is nothing short of superb

and no baggage I estimate we are about 80kg below the MAUW.

The takeoff goes pretty well as expected. The acceleration is OK but not outstanding and I rotate at fifty knots and lift off at sixty, having used a fair chunk of the 553m run available. Another of this unique aircraft's idiosyncrasies reveals itself now, as having established a positive rate of climb and selected undercarriage 'up' I then press and hold the small, square red button directly beneath the undercarriage selector to actuate the hydraulic pump. It's not difficult, just different.

With the undercarriage and flaps retracted the rate of climb is around 1,200fpm and I soon begin to appreciate that – just like all the other Beagle designs that I've flown, although there are quite a few areas where the Bulldog 200 is found

wanting, 'control and stability' isn't one of them. In fact, for an aircraft designed as a four-seat tourer the handling is nothing short of superb, being as good as any and better than most. Indeed, I'd say that it is possibly the best handling aircraft that I have ever flown in this class. The ailerons are a delight, being crisp, powerful and light, with low breakout forces and minimal 'stiction'. It's not as nice as a 100hp Pup, but then very few aircraft are. The elevator is effective and well balanced, and although I'd initially thought that the rudder was possibly a tad on the heavy side I soon get used to it. The trimmers are nicely geared. Overall, the harmony of control is outstanding for a machine designed as a four-seat tourer, and is much better than comparable US tourers. It would've been fun to try a few basic aerobatic manoeuvres and examine the spinning characteristics but since the aircraft was put on an LAA Permit to Fly aerobatics and intentional spins are prohibited.

Stability is good around all three axes, being strongly positive in pitch, positive in yaw and neutral in roll. An examination of ➔



While it looks svelte, the Bulldog 200 is no speedster, cruising at 128kt TAS at 23in mp/2,300rpm...

the stall characteristics irrespective of the flap position reveal there is adequate pre-stall buffet, while the stall is benign. The IAS at the stall is about 55, flaps up, and around 46 flaps down. Recovery is effortless – simply release the backpressure. This Bulldog's bark is much worse than its bite.

The cruise performance was a little disappointing. Setting 23in mp (manifold pressure) and 2,300rpm at 4,000ft gave an IAS of only 120kt for a TAS of 128kt, which the fuel flow meter indicated to be around 38lit/hr. A more economical power setting is to set the throttle and prop to 20/20 then ease the mixture lever back until it lines up with the rivet just forward of the ICO detent. Now the fuel flow is a much more acceptable 32lit/hr.

Back at Netherthorpe the excellent handling continued into the circuit, with the aircraft very speed-stable and only slight changes in pitch trim when the flaps and undercarriage are extended. The limiting speed for the first stage of flap is usefully high at 135kt, although conversely the undercarriage operating speed is quite low at only 100. Turning downwind at the circuit height of 800ft agl, Nick recommends 15in mp before setting the undercarriage selector to 'down' and pressing the button for the hydraulic pump. As the wheels lock into place I set the flaps

...but it does look good in the air and is, of course, absolutely unique!





SPECIFICATION

SCOTTISH AVIATION BULLDOG 200

■ DIMENSIONS

Length	7.59m
Height	2.54m
Wingspan	10.29m
Wing Area	12.40sq m

■ WEIGHTS AND LOADINGS

Empty weight	821kg
Max AUW	1,111kg
Useful load	290kg
Wing loading	89.59kg/sq m
Power loading	7.45kg/kW
Fuel capacity	145 lit

■ PERFORMANCE

Vne	170kt
Cruise	(TAS) 140kt
Stall	55kt
Climb rate	1,160fpm
Service ceiling	18,500ft
Range	540nm

■ ENGINE AND PROPELLER

Lycoming AE10-360-A1B6
air-cooled flat four, producing 200hp
(149kW) driving a Hartzell two-blade
constant-speed propeller

■ MANUFACTURER

Scottish Aviation

to 'Inter' (10°) and then bump the throttle back up to 17in, before turning final and going flaps 'Full' (45°) I know it's a bit of a cliché – but the Bulldog really does feel as if it's on rails. Netherthorpe is not overly long and when Nick says "Use 65 on final" that's what I am able to do, nailing the ASI needle – Not 64 or 66 but 65. It's a fairly calm day with a steady wind, but the way the Bulldog maintains a trimmed speed is really impressive. Push the prop up on short final, a smooth flare and it practically lands itself. I'm very happy with my first landing, and the second one is even better. This really is a fine-handling flying machine.

After a very enjoyable session testing Dave and his brother Mark's immaculate Comanche (see *Pilot Spring 2017*) I take the Bulldog aloft again for the air-to-air photos. This time I fly from the right-hand seat (so I can more easily see the Cessna 172 carrying photographer Keith Wilson and his pilot, Phoenix Aviation's CFI Mick Lee) and I must say the curved stick and chunky throttle does seem more natural when flown right-handed. Unlike the Comanche shoot (which, for a variety of reasons was quite hard work) this is great fun, and as we close on the camera ship the Bulldog

200 shows again just how nicely it handles. The field of view is fine and it proves very easy to position for Keith's camera – certainly much easier than it had been in the Comanche I'd flown 45 mins previously. In fact, we get the shoot finished very quickly. I've often said that a good formation session soon shows up any handling inadequacies, and although I'd prefer a bit more power, in every other respect it performs superbly. It really does handle quite precisely.

Could have been a contender

While this unique machine was a fascinating aircraft to test, it pretty much explains the demise of the UK GA aircraft industry in a nutshell. At a glance, it looks fantastic – designed to meet various military roles and also appeal to the civil market, what's not to like? With four seats and big fuel tanks it should be a fine tourer, while the strength of a +6/-3g airframe makes it suitable for aerobatic training (only two-up, obviously). You can even carry machine-guns and rocket launchers on the integral hardpoints! Finally, with the original bubble canopy it looked great. It should've been a real-world beater, until you dig a

little deeper. The decision to stress the airframe to +6/-3 and make it capable of carrying up to 290kg externally obviously required a strong structure – and strong structures are inherently heavy. A Comanche 260B has a useful load of 549kg; the Bulldog 200's is little more than half that. In fact, even the most cursory examination of the flight manual soon confirms that despite the proposed four-seat cabin, this was never a four-person aircraft. The 1976 brochure claims an empty weight of 820kg and a maximum of 1,180, and the more numerate amongst you will have already realised that a 360kg useful load isn't actually that useful for a four-seater. In fact, with four average size blokes on board and no baggage you're barely able to carry 55 litres of fuel. Take away the VFR reserve (say 20 litres) and you've got less than an hour of playtime.

Scottish Aviation intended the Bulldog 200 to be a Jack of all trades but, as is so often the case, it turned out to be master of none. And that's a real shame, because if it had a 260hp AE10-540, a greater maximum all-up weight and a more useful useful load it really could've been everything that they hoped it would be. ■