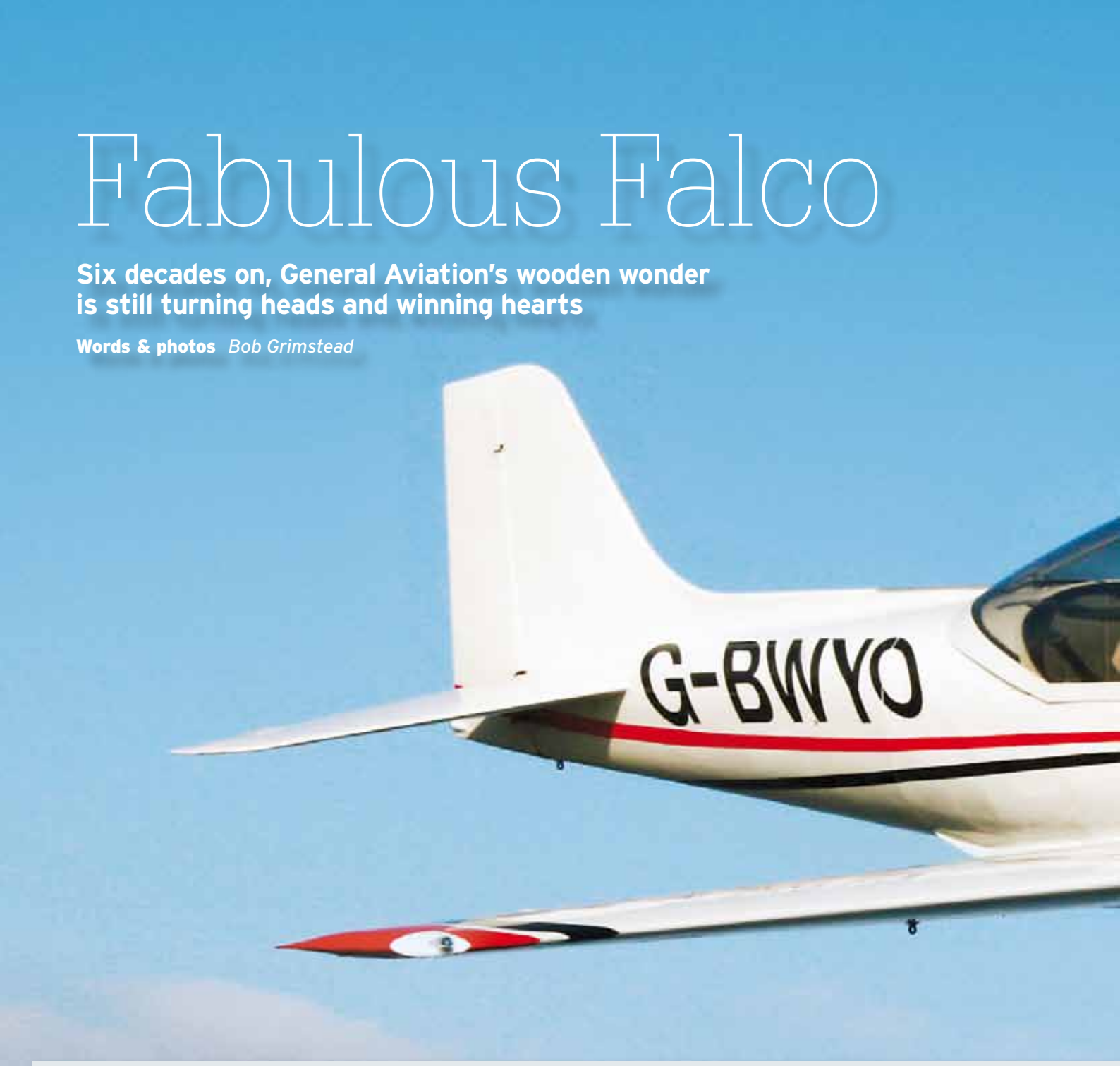
Fabulous Falco

Six decades on, General Aviation's wooden wonder is still turning heads and winning hearts

Words & photos *Bob Grimstead*



Sensuous to behold, delightful to handle, fast, frisky, frolicsome and just the tiniest bit feisty, a Frati F8L Falco is the Angelina Jolie of aeroplanes.

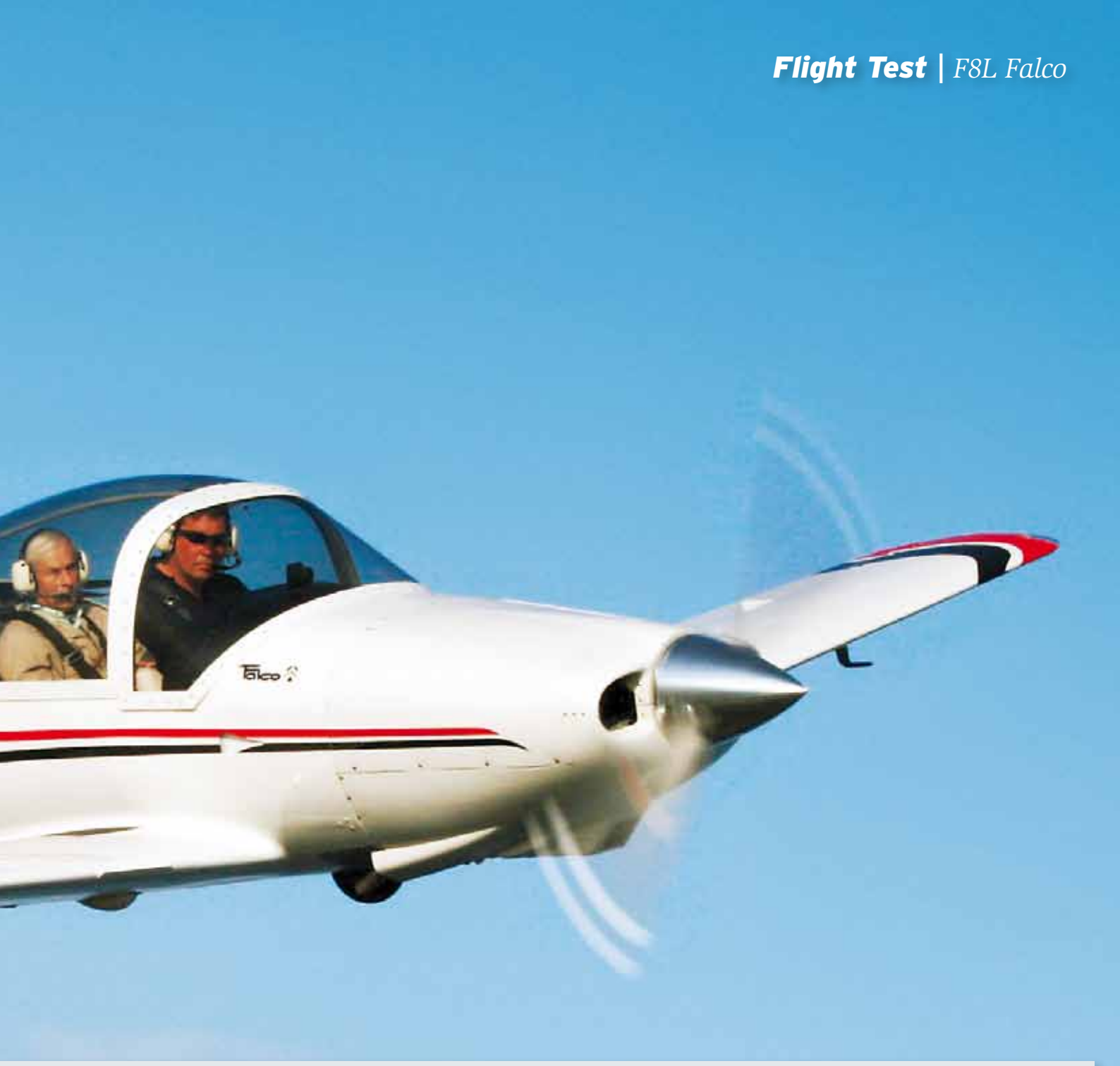
Bar-room pundits who sneer at airframes not banged together in tin-bashing factories or mass-moulded from plastic can turn the page right now. This Italian beauty is constructed from natural, ecological materials, predominantly Sitka spruce and birch ply, albeit covered with Dacron fabric or lightweight glasscloth. The cognoscenti among you may read on…

Originally conceived in the 'sixties by famous Italian aeronautical designer Stelio Frati, some early Falcos were production-manufactured, but all the later ones have been amateur-built. Not 'home-made' you understand, because no such artwork consuming anything from 2,000 to 5,000 hours of skilled craftsmanship over periods ranging from two to ten years could ever merit that slur, but rather 'hand-carved' by lovers of the very utmost in kitplanes.

Visualise a beautiful aeroplane, created by a famous designer, made available to all by an energetic American, and combining Italian styling, European handling and hot-rod performance. Imagine this cosmopolitan paragon flying long distances at high speeds and in comfort, and yet operating from comparatively short airstrips and performing intermediate level aerobatics. Even better, this mythical aircraft is available not only production-built or craftsman-completed (albeit nowadays only pre-owned) but also as a homebuilder's kit, or even, for the impecunious or truly dedicated, merely as a set of plans.

For years I had read about, seen and admired many beautiful Falcos, and I've wanted to experience one of these true Italian thoroughbreds since the very first time I saw its photo. Thanks to my former colleague Rich Sims, I eventually got that chance. I always expected that I would enjoy my acquaintance, and I was right.

Before we take flight, let us savour the aesthetics and mechanics of this curvaceous work of art. Head-on in the air, its cross-section is little more that that of two men sat shoulder-to-shoulder with wings and a tail appended, but close-up on the ground it seems a normal size, and perfectly



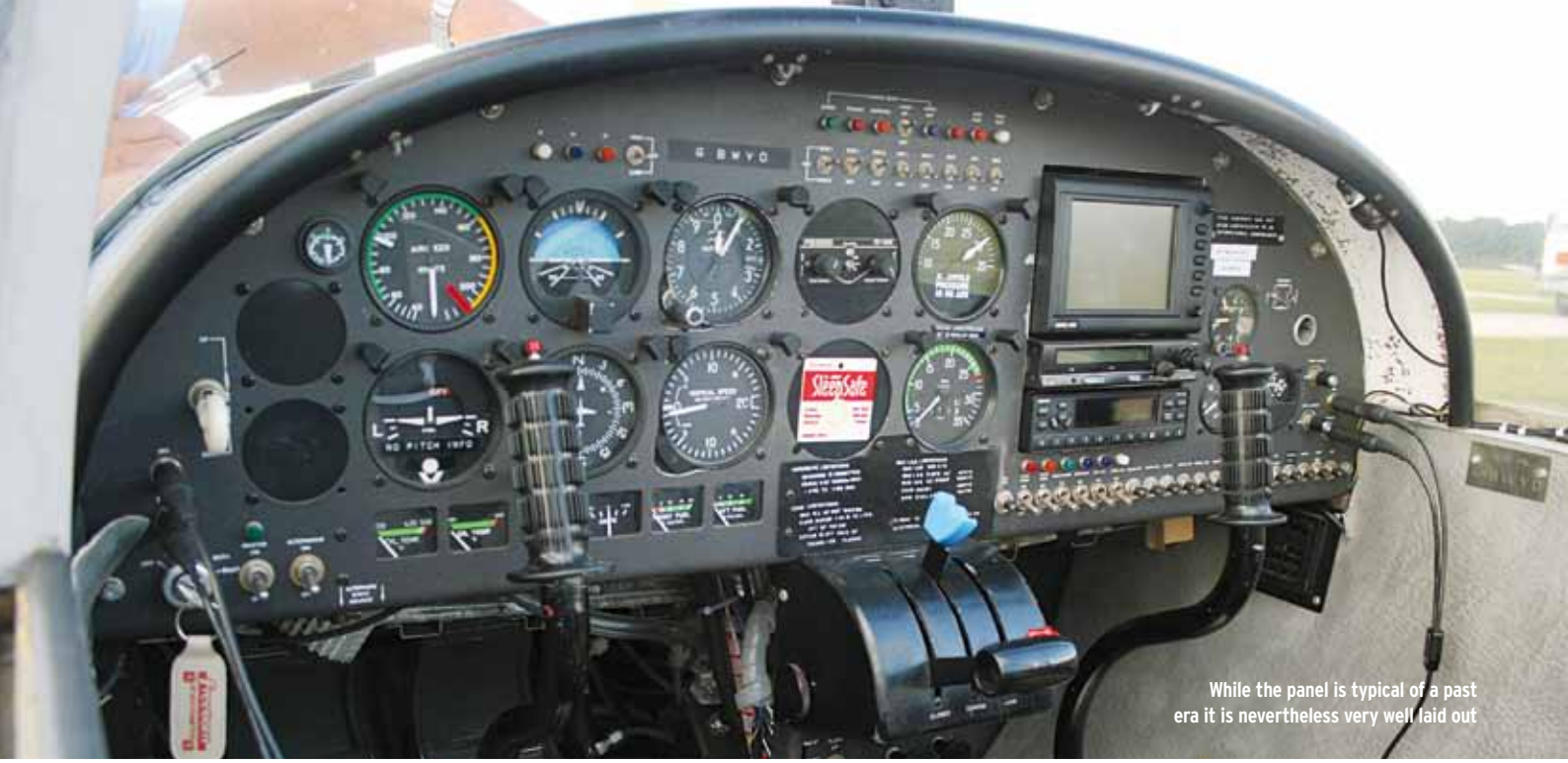
proportioned. Despite being sixteen years old, G-BYWO's exterior is still smooth, although it does show the inevitable scuffs of a well-used 700-hour airframe.

The structure is conventional semi-monococque, its fuselage bulkheads and stringers skinned with plywood little thicker than the aluminium sheet of more prosaic airframes. The elegantly tapered wing has a relatively thin, laminar flow, NACA 642212.5/210 aerofoil, with five-and-a-half degrees of dihedral for lateral stability and three degrees of wash-out for good stalling manners. The trailing-edges are all fabric-covered Frise ailerons and slotted flaps, each taking up about fifty per cent of the span and having neatly faired hinges. All controls are ply-covered, although metal-skinned surfaces are available as an option, and none of them needs aerodynamic balances. Interestingly, while of course all the usual control surfaces are mass-balanced, on this speedy aeroplane so are the flaps!

The tricycle undercarriage has comparatively small wheels, with 5.00 by five main tyres and a 4.00 by five nose-wheel. There are proper oleos on all three legs, with a normal telescoping and steerable nose-leg whose structure is incorporated into the engine mount for strength. The mains have trailing-link suspension for smoother landings, and it is sensible to check the leg locks are mechanically over-centred during the walkaround. The main legs retract inwards electrically and have doors, although the wheels themselves remain uncovered – like a Boeing 737's, they rely on slightly domed hub-caps to minimise drag. The nose-leg retracts rearwards into a forward extension of the centre console and this one has no doors at all. An optional leg door is said to be worth seven more knots on a standard airframe, but this example – built by Yorkshireman Stan Harper – has a non-standard, chin-mounted air intake for its carburated engine. So it's probably not worth bothering about the leg's minimal drag in the wake of that.

Engine access is perfect, with just four Camloc fasteners securing each lift-up cowling half. Raising these enables you to check everything under the bonnet.

Cabin entry is quick and easy, with wing-root walkways on both sides. Step up, slide back the canopy, step down, and ➔



While the panel is typical of a past era it is nevertheless very well laid out

you're in the surprisingly spacious cockpit. Behind the occupants is a roomy, full-width baggage area with plenty of space for weekend bags for two and a generous 40kg weight limit. The rear fuel tank is beneath it. Fastening the five-point harness immediately tells you this is a proper aeroplane. Waggling the control column confirms it, for the pushrod/cable operated elevator and ailerons generate very little friction (the rudder is simply cable-operated).

Despite showing their era, I thought the instruments and controls were very well laid out. I always prefer a throttle/pitch/mixture quadrant to plungers, and I was glad to see that the carburettor heat knob was well away from those three, on a sub-panel below (although next to an identical cabin heat control). Also sensibly separated are the flap switch beside it and the landing gear selector on the far left instrument panel. However, this would clearly require a quick hand-swap or cross-over soon after take-off.

Engine starting is carburettor-easy (the standard Sequoia Falco powerplant is more usually a fuel-injected IO-320, and occasionally the 180hp IO-360). Ensure the red, four-position fuel selector below the throttle quadrant is pointing to the front tank, flick up the battery switch on the far left sub-panel, select the fuel pump on, slide the throttle forward and back a couple of times to prime the manifold, twist the key and away she goes.

This example's empty weight is 550kg. It has two fuel tanks; the front holding eighty litres and the rear 72 for a total of 152. We had a full front tank and 25 litres in the rear, making 105 litres, giving us a slightly forward centre of gravity and taking our weight to 795kg, or 97 per cent of the 820kg maximum. This fuel load would have allowed Rich and myself to go nearly 600nm! Full fuel would have limited the occupants to 162kg, or to me and my wife plus a generous 30kg of baggage, for a bladder-busting 800nm-plus range.

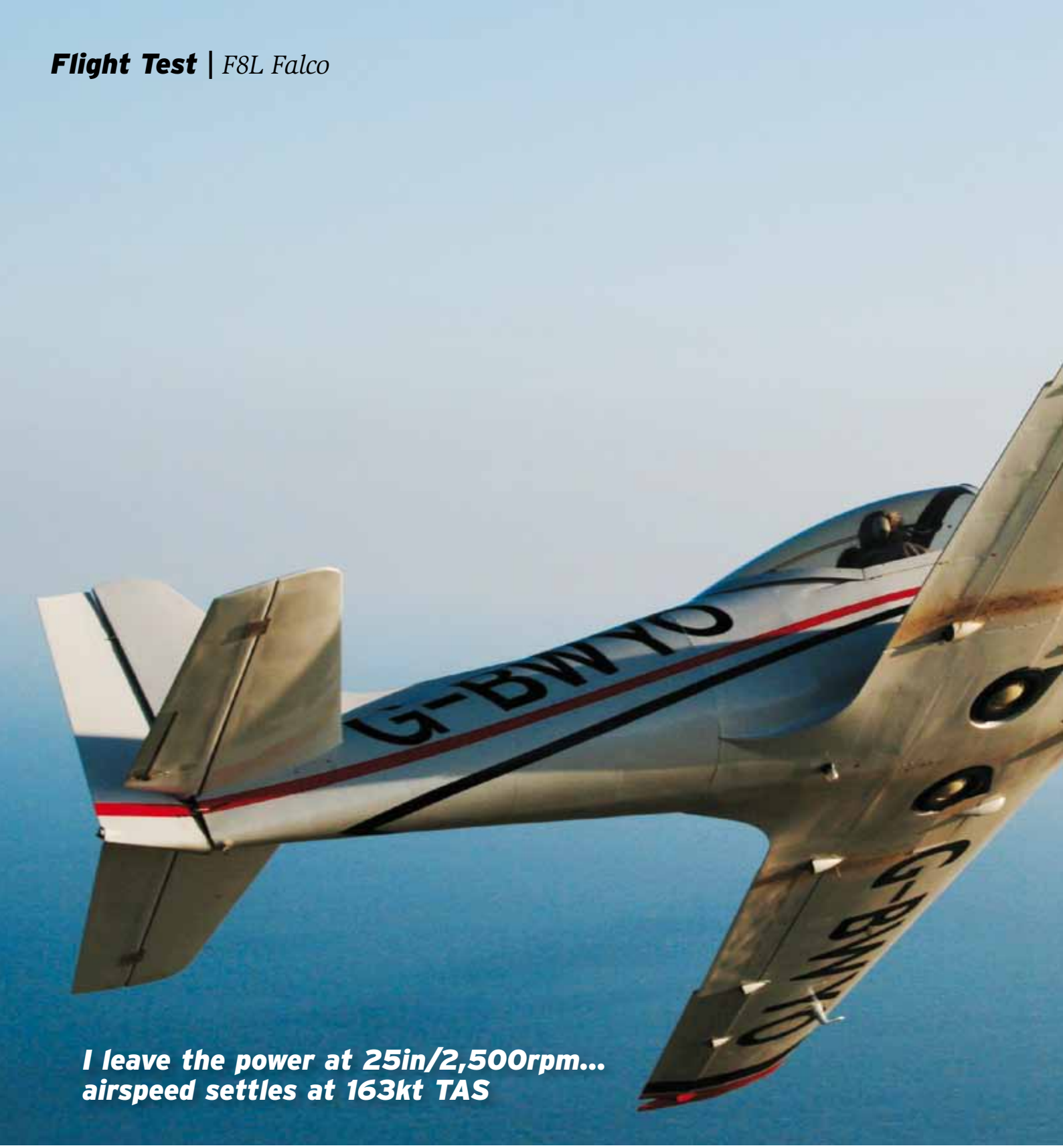
Bending well forward to reach the floor-mounted centre console, I release the parking brake and ease open the throttle. Taxying is made super easy by the high seating position, low nose and panoramic visibility from that cavernous canopy (a lower, sleeker one is available as an option). I believe that anything less than differential brakes coupled with nose-wheel steering is inadequate, but this little lovely has both. The aeroplane pitches back and forth a bit on its short wheelbase over Goodwood's undulating grass, but the positive steering and nicely progressive brakes make directional control a doddle.

Sensitive in all axes, the stick needs but a breath of pressure for immediate results

Engine checks are quite normal, including cycling the propeller pitch. Although there is a flap deflection indicator by the selector switch, it is low down on the forward console and difficult to see. It's easier to get the correct twelve-degree take-off setting by easing the control column fully sideways and motoring the flaps until they are aligned with the down-going aileron. Other than switching on the back-up electric fuel pump, there's little else to do but cinch up our straps and open the taps.

The engine's snarl is conspicuous, the acceleration is impressive, the torque-steer is significant and the aforementioned pitching becomes quite a bucking on Goodwood's Runway 24 before, at around sixty knots, one particularly big bump chucks us into the air like a Harrier from its ski-ramp. However, the take-off run is so short (little more than 500 metres at 20°C, even with my cautious throttle opening) that this is but a brief discomfort. From the moment we become airborne, it is apparent that this aircraft is exceptional. It feels not just instinctive to fly, but truly a living thing in the way of only a very few, very special aeroplanes. Sensitive in all axes, the stick needs but a breath of pressure for immediate results, and it's best to rest forearm on thigh, controlling with mere wrist and finger movements. Merely dabbing the brake pedals before retracting our wheels results in a significant wiggle, while changing hands to raise the undercarriage requires some care, lest I throw us all over the sky in the process.

The gear takes twelve seconds to retract and causes no trim change. Its three indicator lights high up under the glareshield's centre are difficult to see without ducking your head. Because all three wheels are interconnected and driven by a single electric motor and freewheeling jack-screw, there is only one green down-and-locked light. There are also an in-transit light and a red warning one, the meaning of which I didn't fully understand. Additionally there is a horn which sounds if the wheels are retracted when the throttle is nearly closed, a switch to isolate this, and a circuit-breaker serving



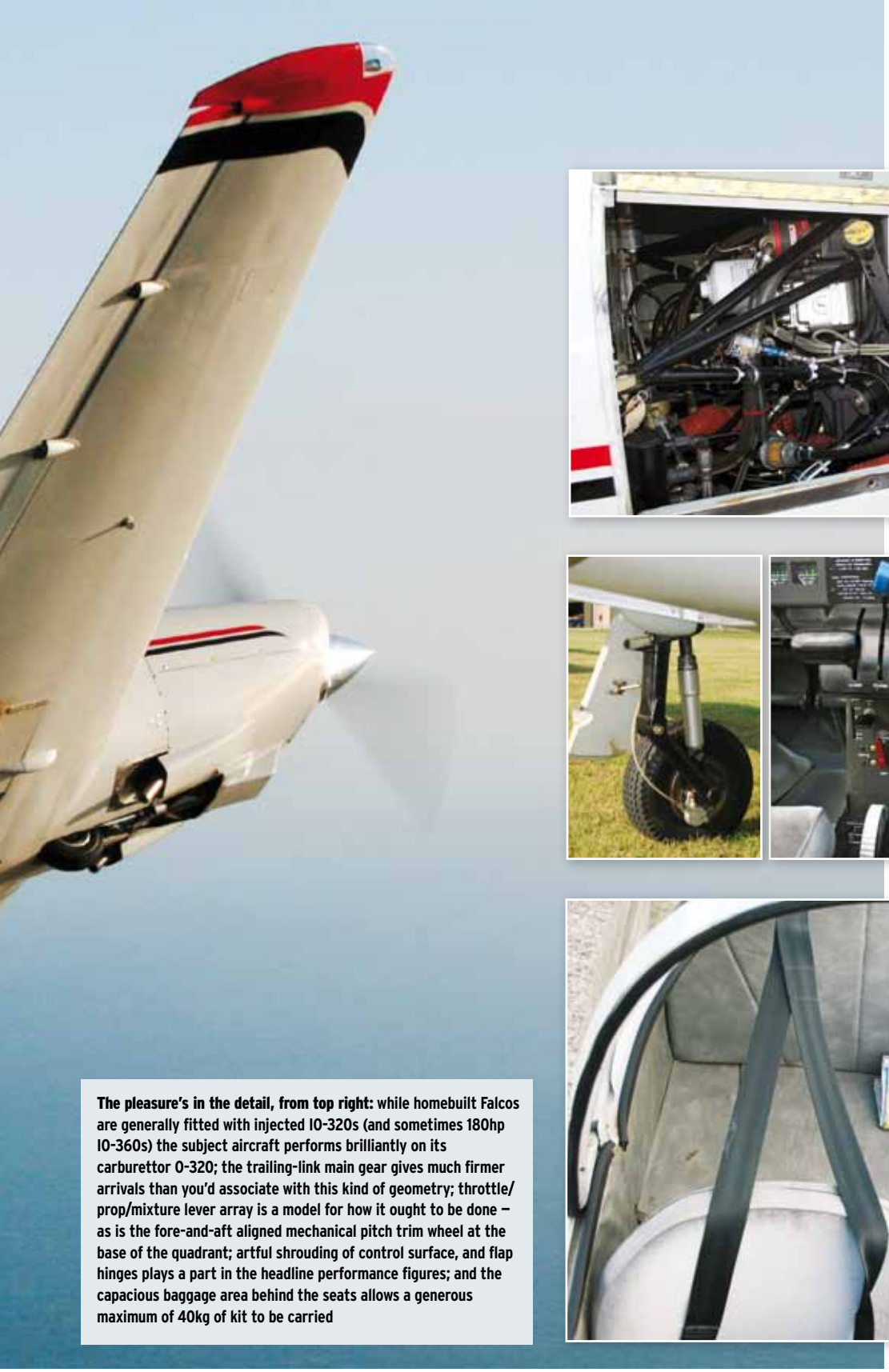
I leave the power at 25in/2,500rpm... airspeed settles at 163kt TAS

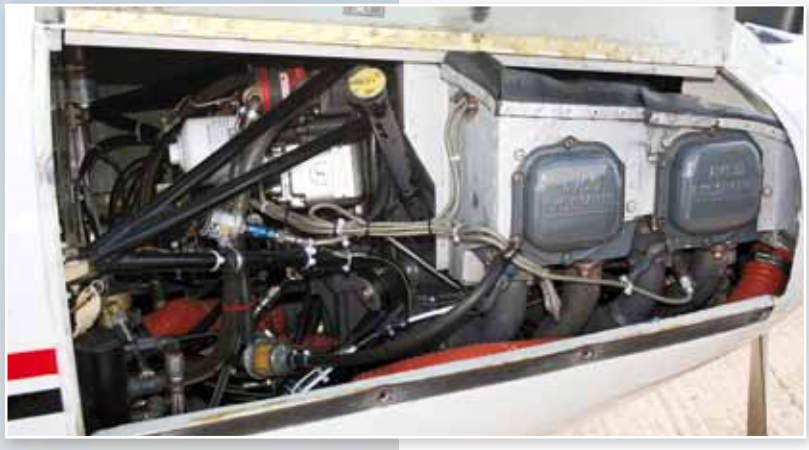
the same function, but there are no mechanical or visual aids to confirm safe undercarriage extension.

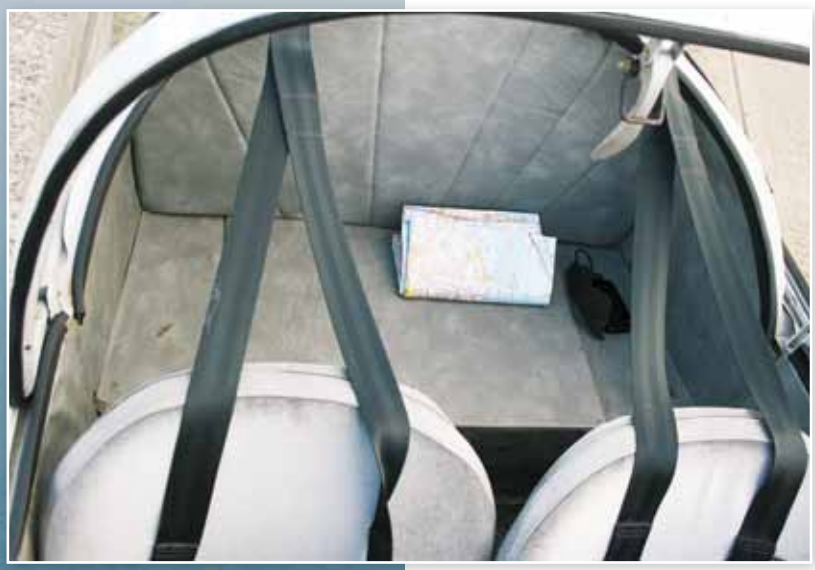
Retracting the flaps also causes no trim change – another impressive characteristic. As you would expect in a comparatively short airframe with a relatively powerful engine, significant right rudder pressure is required to keep the slip ball centred in the climb. Increasing airspeed to ninety knots and reducing power to 25 inches and 2,500rpm results in a less strident engine note, less rudder, better forward visibility and improved cooling, although the climb rate is significantly more than 1,000fpm. Oh yes! I'm already loving this aeroplane!

Allowing the Falco to climb to 3,000ft before levelling out, I leave the power at 25in/2,500rpm and reach down between us to the perfectly-geared elevator trim wheel, rolling on a few turns and a couple of tiny tweaks to keep us level. After a few minutes the airspeed settles at 153kt IAS (163kt TAS) and I am further impressed by the lack of significant airflow noise. I also like the way its small, slim wing slices though what little low-level turbulence there is today.

There is a tiny, one-per-rev vibration though, almost inevitable from this high-compression engine, but well damped by the wooden airframe. Reducing power to 23in/2,300rpm still gives us a useful 140kt IAS (150 TAS) with reduced noise, vibration and consumption (about 27 lph), although I did continue needing a tiny squeeze of right rudder to stay in balance.





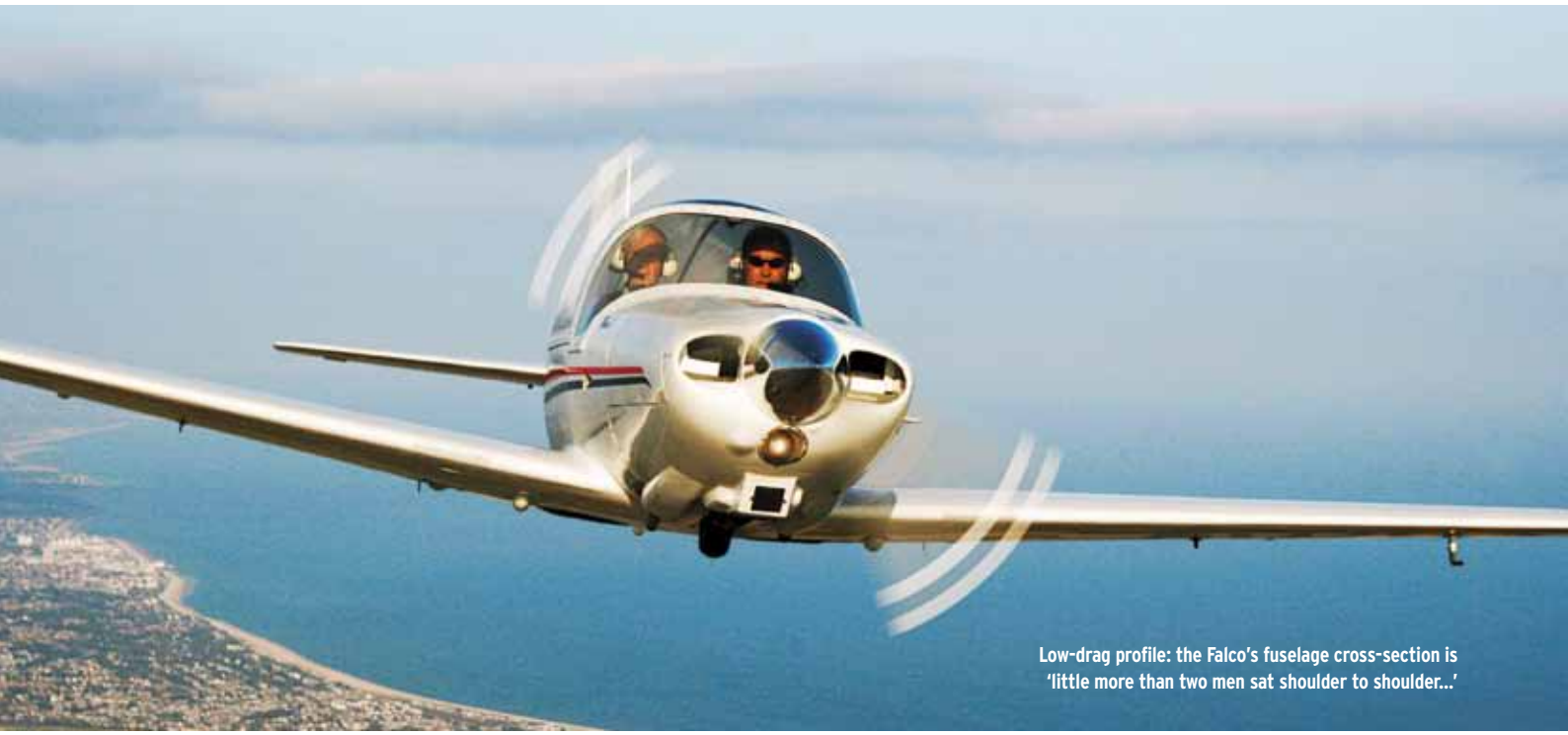


The pleasure's in the detail, from top right: while homebuilt Falcos are generally fitted with injected IO-320s (and sometimes 180hp IO-360s) the subject aircraft performs brilliantly on its carburettor O-320; the trailing-link main gear gives much firmer arrivals than you'd associate with this kind of geometry; throttle/prop/mixture lever array is a model for how it ought to be done – as is the fore-and-aft aligned mechanical pitch trim wheel at the base of the quadrant; artful shrouding of control surface, and flap hinges plays a part in the headline performance figures; and the capacious baggage area behind the seats allows a generous maximum of 40kg of kit to be carried

Thanks to the low cockpit sills, all-encompassing tinted canopy and small, low-set wing the visibility is superb, and fighter-like comparisons are inevitable. As befits its tapered wings, the Falco's roll acceleration is instantaneous and the developed roll-rate is pretty high, but what's even more impressive is the way a roll stops the instant you release the stick. Pitch and yaw stability are positive, although spiral stability is closer to neutral and, as you would expect from an Italian aeroplane, the control harmony is near-perfect. Of course, just a hint of rudder gives nicely balanced turns.

At this point in an air test I usually investigate low-speed handling, but I have to admit to an uncharacteristically overwhelming boyish impulse that results in a quick HASELL check and some joyous aerobatics. First I set 25in/2,500rpm (seventy five per cent power) and dive a little for a ballistic (aileron) roll: pitch up just fifteen to twenty degrees – this is a very clean airframe – check, clamp the rudder, squeeze the stick over to the left, and before we know it we're upright again. Another to the right (against the torque) is equally quick, effortless and delightful.

Dive a few more degrees to the 160-knot V_a, ease back the stick, glance at the wingtips ensuring they're level, see-saw the rudder, and look way up and back over your head for the horizon as you ease off the backpressure. Inverted, a glance at ➔



Low-drag profile: the Falco's fuselage cross-section is 'little more than two men sat shoulder to shoulder...'

the ASI reveals a comfortable fifty knots, and throttling back (this is a clean, unfamiliar airframe remember) on the down-vertical finishes the loop nicely through our wake. I fly another for the sheer pleasure of it. One nice aspect of this unfamiliar (to me) constant-speed propeller is that I don't have to keep one eye on the tachometer when going downhill, although with such a clean airframe you do have to guard against the nose getting too low with a resultant rapid speed increase.

Barrel rolls in either direction are equally easy from 160 knots, as are quarter-clovers rolling upwards. With this slippery airframe I decide to leave downward-rolling quarter-clovers for another day. Because it has a carburettor and lacks the optional header tank for inverted flying, this engine quits pulling under less than zero G. But, of course, the aeroplane doesn't just stop in mid-air, so more advanced manoeuvres appear feasible. More important is that with just a standard breather, the engine will spew oil under negative G. In a wooden airframe this is particularly undesirable, although a competent homebuilder should be able to fit an extension tube along the belly (and submit the appropriate LAA modification approval, of course) to keep the airframe oil-free.

Although the Falco's repertoire is necessarily a tad restricted, I have rarely enjoyed basic aerobatics so much as in this light, responsive and nimble aeroplane with its virtually unlimited visibility. Interestingly, our five minutes of gambolling result in accelerometer readings of only +3.4/-0.8g. My exuberance assuaged, I reluctantly fly straight-and-level at low power for a few minutes to let the engine cool.

Unwilling to slow down

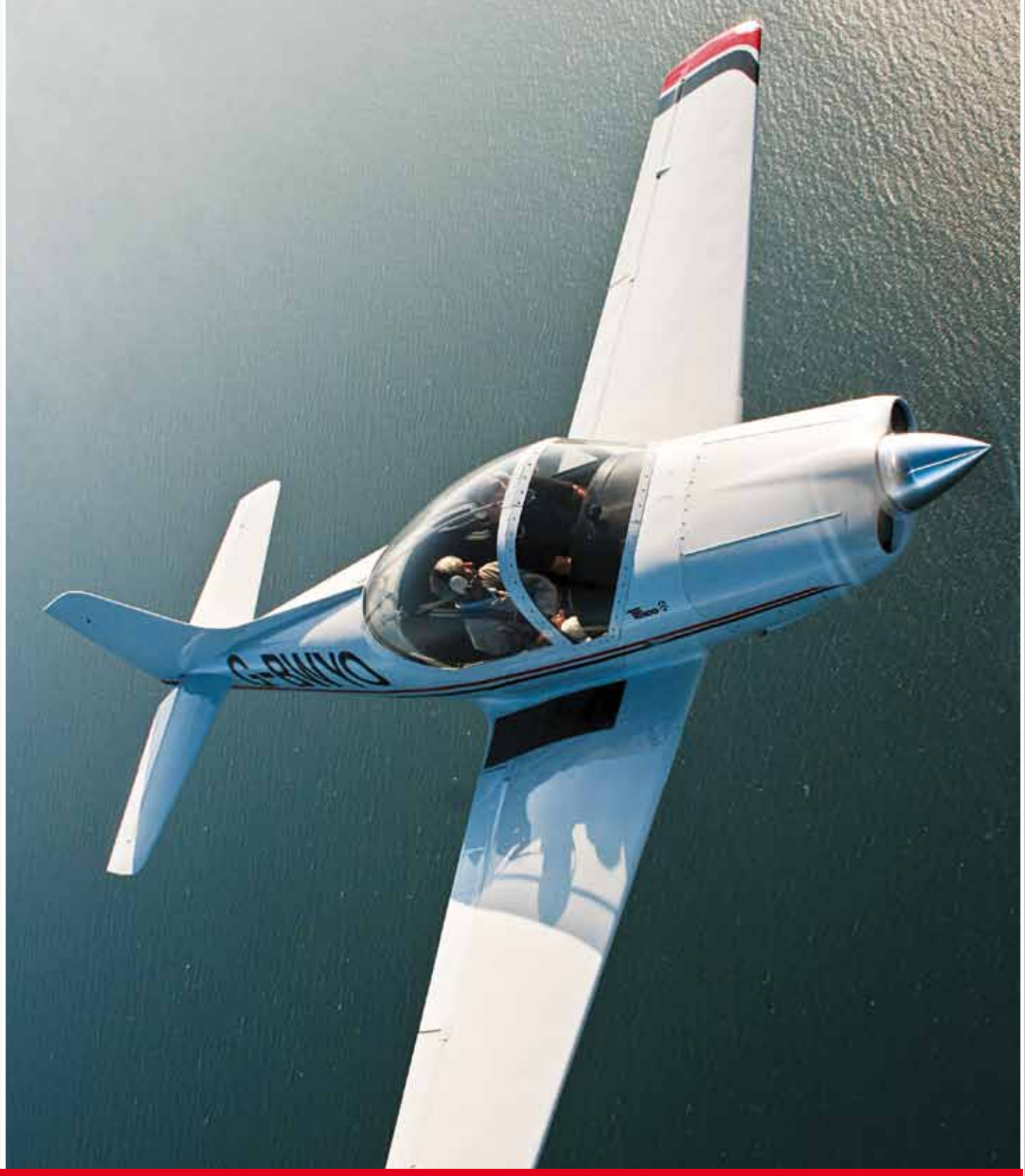
Such a clean airframe is inevitably unwilling to slow down, but by completely closing the throttle and reducing speed at the accepted one knot per second, I become aware that we are sinking as we get below about eighty knots – a function of the Falco's comparatively high wing-loading.

I eventually feel a very slight airframe burble at 67kt, followed a few seconds later by a proper g-break and a ten-degree right wing-drop at 62 knots. The nose is not especially high, the elevator force is particularly light, and exactly the same thing happens during my second clean stall. In both cases a power-off recovery

RESPECTED AND PROLIFIC DESIGNER

Italian Stelio Frati (1919-2010) was possibly Europe's most respected, and probably the most prolific, independent aeronautical designer. As a boy he was an enthusiastic aeromodeller, unofficially beating the world model glider endurance record. His career started in 1941 by working on sailplanes and a flying bomb, and lecturing on aircraft design at the Milan Polytechnic. Like all the best of his calling, Frati seems to have been obsessed with low drag from the outset, so most of his designs have retractable undercarriages, mainly sharing the same general, low-wing, side-by-side configuration, although the earlier types were predominantly wooden before he tended towards metal structures. In the early 'fifties Frati went independent, first producing the FM.1 Passero motor glider which achieved a remarkable 94mph with a puny 20hp Macchi engine, and then the F.4 and F.7 Rondones, two- and three-seat, retractable, low-wing cabin monoplanes one of which took records at 169mph. These were followed in 1955 by the F.5 Trento – a wooden, tandem jet trainer built by Caproni – and the F.6 Airone, a four-seat light cabin twin.

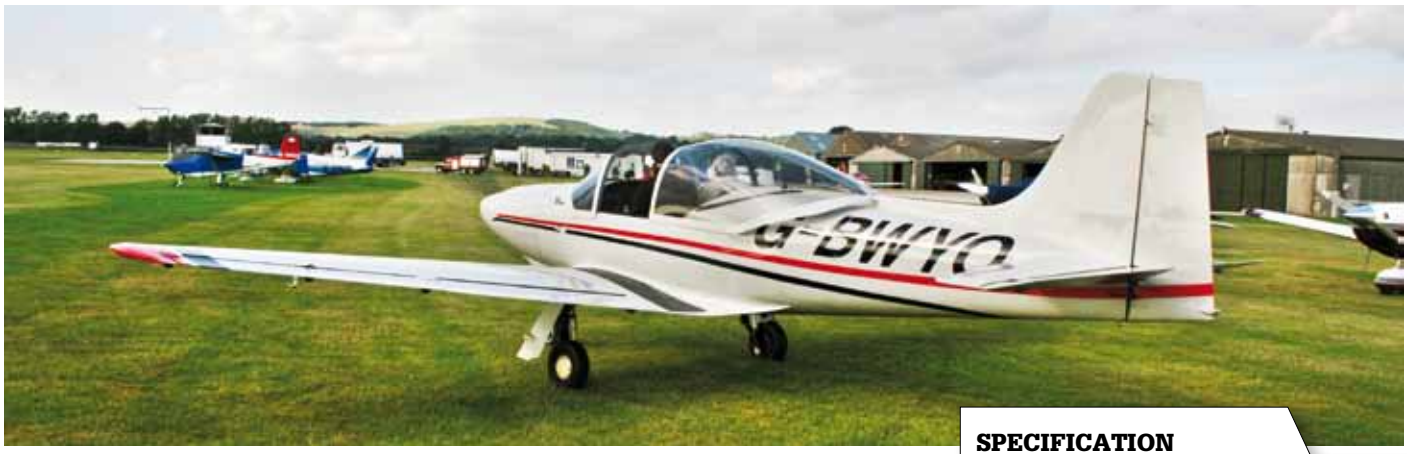
Frati's prototype Falco (meaning Hawk, rather than Falcon) flew on 15th June 1955 with the comparatively minimal thrust of a ninety-horsepower Continental C90. Ten subsequent Series I production models had bigger wings, better canopies, electric flaps and 135hp Lycomings. These were followed by 46 of the Series II and America versions, with 150hp Lycoming O-320s, slightly enlarged tails and ultimate load limits of +8.7g



at max weight and +9.4g with fuel restricted to 60 litres. Then ten Series IV Falcos built by Laverda got the higher-compression 160hp O-320-B3B. So there were just 67 production Falcos in all, making the later majority amateur-crafted.

Undistracted by the Falco's success, Frati went on to design a number of other types, his best-known and most numerous design (with more than 800 sold) being the legendary SF.260, developed from his all-metal Falco derivative, the 1964 SF.250. The SF.260 was mostly powered by Lycoming's burly, 260hp O-540 flat six, although a few later examples built by SIAI-Marchetti in Milan sported the 350shp Allison 250B17C turboprop engine.

Meanwhile, in 1978 kitplane maker Alfred P Scott acquired the Falco's design rights and, with David Thurston (of the eponymous Teal) re-draughted all the drawings to use Imperial (American) dimensions and hardware. The result was more than 125 beautifully detailed full-sized blueprints and hundreds more pages of comprehensive drawings. Initially Scott's company Sequoia Aircraft only sold those plans, with the first aircraft completed in June 1982. A year or so later Scott made 23-package kits available, the first of those flying in July 1984. Since then 1,065 sets of plans have been sold, many hundreds of batches of kit components have been shipped, and around 100 amateur-constructed Falcos have flown all over the world, with probably hundreds more still in progress.



gobbles up several hundred feet, thanks to that wing-loading.

Staying below the 108-knot undercarriage speed, I pop out the wheels, which make an unusual slight squealing noise during extension. Once they're down and locked, we're already below the 97-knot flap extension speed, and with 25 degrees set the buffet now starts at a hair over sixty knots and there is an abrupt twenty-degree right wing-drop at 56 knots. A second attempt produces the same results with a similar height-loss, despite this time using power for the recovery.

Watch the speed on approach...

Full flap (45 degrees) does not significantly reduce the stall speed, but does result in a sharp nose and right wing-drop, again at 56 knots, but this time with no warning whatsoever and immediately followed by a similar left wing-drop as I apply corrective rudder. During my recovery the Falco even shows signs of wanting to g-stall, so monitoring airspeed on the approach will be particularly important in this aeroplane.

Aware of this, its slipperiness, high power-to-weigh ratio and torque, I decide to practice an approach to land and go-around up here at altitude. Leaving the wheels and flaps extended, I add a little power and establish a steady descent at 85 knots, with good forward visibility over the lowered nose, and everything nicely under control.

Levelling off and letting the speed bleed back to near sixty, I firmly open the throttle, push promptly on the right rudder pedal and allow the nose to rise under the influence of power. I need lots of right rudder to stay in balance and, while the cowlings pitch up positively and the wheels retract fairly smartly, the VSI does not actually show a climb for several seconds, although I suspect this is more the a consequence of the usual VSI lag than any actual reluctance to climb.

Back in the real circuit I find the controls even lighter while flying downwind clean at 100 knots. However this responsive little aeroplane does not exhibit the pin-balanced feel of some more modern high-performance homebuilts, its stabilities are fine in all axes; it is just that it has very light and responsive controls, so any wobbling about is caused by the pilot.

Visibility is superb, even across-cockpit for a right circuit – as can be seen from these in-flight photos. Once the wheels and flaps are down, speed is reduced to 85 knots, power is increased, and forward visibility is further improved by the nose-down attitude. Like most Falco owners, because of their high drag, Rich routinely only uses 25 degrees of flap for landing, reserving the full 45° for short field operations.

A glance inside shows I am using fifteen to seventeen inches of power with fully-fine pitch on final, reducing this a bit to get seventy knots over the threshold. The Falco only needs the lightest stick pressure for its flare, although the control column does have to be brought all the way back for a proper, nose-high, minimum-speed touchdown, which occurs at about sixty. Despite its trailing-link main legs, our landings are all firm and every undulation of Goodwood's runway can be felt. As Rich says, "It hates a rough runway."

Opening the throttle produces brisk acceleration and lots of yaw, albeit easily countered by that effective rudder. Wheels and flaps up, I start a right turn and it's already time to throttle back and level off at 1,000 feet. What a nimble, delightful aeroplane this is! Regrettably, after four landings I could find nothing more to investigate, so I had to stop.

Rare and wonderful thing

Thank you Rich for letting me experience that rare and wonderful thing: a homebuilt conceived and developed by a properly trained aeronautical designer. As I had anticipated, the fabled Falco is beautiful, fleet, comfortable and aerobatic; the very epitome of Italian style and handling. I always knew I would enjoy my acquaintance, and I was right, it was an unforgettable experience. ■

SPECIFICATION

SEQUOIA F.8L FALCO

■ DIMENSIONS

Wingspan	8.00m
Length	6.63m
Height	2.29m
Wing area	10.0sq m

■ WEIGHTS AND LOADINGS

Equipped empty	550kg
Max takeoff weight	852kg
Standard fuel	151litres
Max wing loading	85.3kg/sq m
Max power loading	5.13kg/hp
Load factor	+6, -3G

■ PERFORMANCE

Vne	208kt
75% cruise	165kt
Stall, full flap	54kt
SL take-off dist	351m
SL landing dist	351m
Sea Level climb rate	1,140fpm
Max range	869nm

■ ENGINE AND PROPELLER

Engine: One normally-aspirated, air-cooled, four-cylinder, horizontally-opposed Lycoming O-320-E2A producing 160hp. TBO 2,000hrs

Propeller: Hartzell HCC-ZYL-1BF two-bladed, all-metal, constant-speed propeller

■ AGENT

Kits and plans available from:
Sequoia Aircraft Corporation,
2000 Tomlynn Street,
Richmond Va 23230, USA
Tel: 1 804 353 1713
Web: *www.seqair.com*