

Sculpture in motion  
**Fournier  
RF-4D**

*A graceful, strong, aerobatic motor-glider with delightful handling.*

*Story by Bob Grimstead Photos by Karen Grimstead.*





Sink rate in glider mode is 256 fpm at 56 kt. Facing page: a recoil starter restarts the engine in the air, but on the ground you have to swing the prop by hand. Undercarriage is a single retractable wheel.

**I**SN'T THIS AEROPLANE beautiful? It is a Fournier RF-4D: a graceful aircraft crafted by visionary French painter, musician and sculptor, René Fournier. Although initially conceived as a motorised glider (one of the first) it is aerobatic, with delightful handling, and strong (stressed to 13g and tested to destruction at no less than 13.8g). Constructed by hand from nature's composite (wood) with the skill and efficiency of a German company – Sportavia-Putzer – it burns a miserly ten litres of fuel per hour while cruising at 100 knots. Now ask yourself, if this aircraft is so good, why are there not thousands of them?

Actually, 155 were made (plus 89 earlier RF-3 and 225 more two-seaters) but in their day, they were comparatively expensive. In 1968, an RF-4 cost \$5,500 but by 1972 this had risen to \$8,500 – this at a time when a brand new, two-seat, Bellanca-built Aeronca Champ sold for just \$4,995. Nevertheless, more than forty years after its creation, there are still hundreds of this almost mythical family flying all around the world, with a couple of score or more in the UK. They are not only used as self-launched gliders, but as dedicated aerobatic machines and highly-efficient personal transports, as well as for pure fun flying. See: [www.fournieruk.com](http://www.fournieruk.com)

My life as a Fournier pilot started in 1970, after leaving commercial flying college with the frighteningly tiny total of 237 hours, and a

fortnight's leave before joining BOAC, then Britain's national long-haul airline. Having 250 hours would push me two years up the pay scale. So I found Sportair, a Biggin Hill club that rented out its Fourniers at a mere £4 per hour, or £15 for a day's use with the pilot paying for fuel. I got those thirteen hours in just two November days. But I got so much pleasure from them I continued flying Fourniers for several years and actually won a competition in one – the only time I won anything in an aeroplane.

I later joined the Tiger Club's Turbulent Display Team, bought my own Turbulent, and had lots of fun. Our leader, John Taylor, left to form the Unipart Fournier duo with Brendan O'Brien. Subsequently other team members joined him to become the Skyhawks display trio, streaming smoke from their RF-4 wingtips and flying balletic routines to the music of Pink Floyd. I admired and envied them, but chose the commercial airline life, going off to fly Boeing 747s around the world for British Airways.

Twenty years on, I am retired, living in Australia, flying now just for pleasure, and finally hoping to get my own aerobatics up to display standard. And a local Fournier was for sale – a 1968 example that had been imported into Australia in 1982 with another RF-4 and a two-seat RF-5. Rebuilt, re-covered in Polyfiber just over a decade ago and resprayed blue and

white, it looked lovely and flew nicely, albeit slightly lethargically in Australia's high summer temperatures. I just had to buy it.

The Fournier's airframe is brilliantly conceived. There is not a spare ounce of mass, no fitting is bigger than it needs to be, and each component integrates with the others in innovative and highly efficient ways. Built of pine and spruce, with Finnish birch plywood and Dacron fabric covering, the massively strong structure weighs a mere 628 pounds. The long, 11.2:1 aspect-ratio wings' laminated pine spar and ply leading-edge D-box form the trusty and oft-used NACA 23015/23012 aerofoil. This wing section was originally perfected for sailplanes, and its convex undersurface is good for inverted flight.

The bicycle undercarriage incorporates a single, retractable 500 x 5 main wheel with rubber bungee suspension and a steerable solid tailwheel with compressed rubber suspension. These are supplemented by two skinny underwing outriggers (roller-blade wheels on nylon rods) to keep the wingtips off the ground.

The engine is a French Rectimo-modified 1,192 cc 1960s Volkswagen Beetle car motor with single ignition and no carburettor heat, since the air intake continuously breathes warm air. Rectimo claimed it produced 39 roaring, snorting, thundering horsepower in ISA at sea level (or, at least, it might have, 1,000 hours and 36 years ago). Mine mustered 35.1 hp on a



dynamometer – making it more Shetland pony power than horsepower.

You start the engine by standing ahead of the left wing and flicking the propeller from behind. This is much easier than hand-starting any other aeroplane; it usually fires on the second turn after six priming rotations. Then you climb back over the leading-edge into the two-foot-wide, grey-painted cockpit. This is snug, but not tight, with a comfortable, g-resistant, semi-reclined seating position and a proper five-point aerobatic harness. The side-hinging canopy latches and locks on the left, but can be jettisoned with a lever on the right. Its postcard-sized clear view panel on the left incorporates a scoop for pilot cooling, which is further enhanced by air vents behind your calves, fed by leading-edge inlets. A small baggage compartment behind the seat holds the radio's battery, and will also take a soft overnight bag or a one-person tent and sleeping bag.

By your right thigh is the undercarriage lever. To raise it, you pull a trigger on its small locking handle and then slide that backwards. The wheel swings halfway, bringing the long lever upright, and you just pull it down to lie flat beside you. Extension is the exact opposite. The limit speed for operation is sixty knots, although flight is OK up to  $V_{ne}$  with the wheel down. Two spring-loaded wheel-well doors are pushed out of the way by the extending wheel, snapping shut when it retracts. Under the belly, either side of it, two hardwood runners should support the airframe when I forget to lower the wheel.

There are no flaps, but another lever on your left extends a row of curved spoilers above each wing. A third lever to the right of the central black plastic main wheel cover operates the recoil starter; connected by cable to a small cog which engages with a big one on the propeller's back-plate, this flips the prop over just one revolution, so it does not work on the ground,

but is perfect for airborne restarting.

A small instrument panel holds the usual flight dials in the centre, with engine gauges around its edges. To the left are the red stall light and a yellow one with a buzzer for undercarriage warning, which sounds with either the throttle closed or the airbrakes extended. There is no green 'Down and Locked' light as there was on British examples, because it is unnecessary. Below these are the plunger throttle and lockable brake lever. Over on the right are choke and fuel-cock knobs, while the float-and-bent-wire fuel gauge is in the fuel cap, out on the forward decking, where it is always in your line of sight. An alternative aerobatic fuel cap incorporating a ball valve prevents fuel trickling out during prolonged inverted flight.

Taxying is easy enough, but sometimes takes a knack, especially in strong winds. The aircraft tilts disconcertingly from side to side on its monowheel during turns, but you soon get used to this. The brake is deliberately ineffective; the steerable tailwheel is your only directional control, although, with care, you can apply power against the brake with some forward stick to blow the tail around. In a really strong wind, you might have to turn through  $270^\circ$  one way to go the other, or even get out and lift the tail around, as I had to when new to the aeroplane, but I have since coped with thirty-knot winds. Visibility is exceptionally good, despite your low seating position.

The most important pre-take-off check is ensuring the canopy is locked – performance is greatly reduced without it (yes, it has been done, indeed, there have even been open-cockpit 'cabriolet' conversions, and I hope to incorporate this modification myself next summer). The take-off is quite straightforward, although acceleration is fairly gradual. All the controls come to life immediately and, thanks to that puny power, there is little need for left rudder (like most European motors, that VW turns the opposite way to American engines).

## FOURNIER FAMILY

RENE FOURNIER SOUGHT an ultra-efficient, single-seat light plane. He hand-built his first design (the RF-01) over three years in a disused Cannes laundry, flying it in 1960 with a 25 hp Volkswagen engine. In 1962, the French government provided finance for Pierre Robin to build two production prototypes of the developed RF-2 at Dijon. This was powered by a 39 hp Rectimo 4 AR 1200 Volkswagen conversion. Further improvement led to the RF-3, certificated in 1963. With Compté Antoine d'Assche, Fournier formed Société Alpvavia at Gap-Tallard, and they built 89 production RF-3s.

The pair felt the RF-3's handling and strength could be improved, so a complete redesign produced the RF-4, stressed to +13/-6g. Alpvavia could no longer undertake mass production, so an alliance was formed with the German company Alfons Putzer KG, to incorporate Sportavia-Putzer GmbH at Dahlemer Binz and build the RF-4D (D for Deutschland). 155 were completed.

To improve its soaring performance, an RF-4 fuselage was later mated to the fifteen-metre wings of a Scheibe SF-27M sailplane to make the SFS-31 (4 plus 27) Milan, of which twelve were made. The RF-4 became so popular for aerobatics that a further version was produced, with a bigger, 1700 cc engine and cropped wings. Sadly, only one of these RF-7s was built. Fournier simultaneously developed a tandem two-seat derivative, the RF-5, powered by a Limbach SL1700 VW conversion, and 126 were made. Later, 99 more of an improved version called the RF-5B Sperber were completed, with longer wings and a slimmer rear fuselage.

Fournier went on to design the RF-6, which developed into the composite Slingsby T67 and military T-3A Firefly trainer (used by the RAF and USAF), of which over 260 have been sold worldwide. He followed these with the four-seat RS180 Sportsman, the all-metal tandem RF-8 (also derived from the RF-4), the side-by-side RF-47 and RF-9, and its composite development the RF-10. This went into production in Brazil as the Limbach 2000 powered Ximango (fifty sold) and Rotax 912 powered Super Ximango (eighty sold), which recently replaced the Fournier-derived T-3A Firefly as the USAF's primary trainer. How remarkable that Fournier designs today train the military pilots of both Britain and the USA.

In a strong crosswind, it is often best to start at the runway's downwind edge, holding the tailwheel on the ground for good steering response, although this is easier than a crosswind landing, since the slipstream helps rudder effectiveness. Taking off with a strong wind from the right is the more difficult case; ☺



Cruising at 100 kt gives four hours endurance. Below: 35 hp Rectimo VW engine. Spoilers are an essential landing aid.



you have to be quick to apply drift once you are airborne, to prevent being blown away downwind. The crosswind limit in the manual is fifteen knots but I have flown in more than that.

With such a low wing-loading, the aircraft floats into the air at around fifty knots after a run of 300 or 400 metres (unless it is very cool), for a 55-knot initial climb until the wheel is up, after which you can accelerate to 70. All the controls are light and responsive; the elevator in particular is delightfully sensitive. This can cause some overcorrection initially, especially when retracting the wheel, which requires a change of hands on the stick.

Thanks to the low span-loading, the climb rate is around 500 fpm, although the manual quotes 690 in ISA. It sometimes takes me as much as twenty minutes to stagger to 6,000 feet on a hot day, but this is not a full-on contest machine, so I take advantage of any convenient thermals – there are usually plenty when it is hot. Turning into the lift and circling tightly at fifty knots, those long wings will often lift us at well over 1,000 fpm.

### GREAT FUN TWIZZLING

The thing that most impressed me on my first Fournier flight was the outstanding visibility from that panoramic perspex canopy. You can see not only all around, including directly behind you, but also almost straight down over

that skinny wing, both ahead and behind. It was also a little strange to be propelled by a tiny Volkswagen's dugga-dug-dug rather than a jet's whoosh or a Lycoming's thrum.

The delightful handling, with light and well-harmonised controls, also impressed me, although the roll-rate is inevitably fairly leisurely. Some rudder is needed for turns as the adverse yaw is quite marked. Control pressures do rise with increasing speed, but only slightly, and all axes remain pleasantly light at all speeds up to the  $V_{ne}$  at 135 knots.

The Fournier's stall is viceless, with or without power or spoilers. The aeroplane's negligible drag means it takes a while to slow down enough to reach the break, which comes at 40 knots clean, 41 with spoiler, and is preceded by the warning light around five knots higher, and minimal, high-pitched buffet. Recovery merely requires reducing stick back pressure; moving it forward will only cause a greater height loss. Power on, a slight wing-drop sometimes accompanies the stall, but control in all axes remains good right up to the break. The height loss is generally little more than 100 feet, with or without power (the manual says '65 feet').

Steep turns are most enjoyable; the speed drops off very slowly in banks up to 60°. You can roll to greater angles but then you lose height because of the limited power. Nevertheless, it

## PRAISED BY PILOTS

RENOWNED DISPLAY PILOT and broadcaster Brendan O'Brien wrote (in *Aeroplane Monthly*) that the Fournier RF-4 was his favourite aeroplane. Ex-Skyhawks Fournier display team leader John Taylor said: "The Fournier is in a class of its own." Former display pilot Matthew Hill said, "The Fournier is a strong old bird. One pulled 7g and showed no signs of complaining at all. If for any reason it goes quiet, you can look ahead for a place to land rather than underneath you! Fourniers are now much in demand because they are very quiet and have low fuel consumption."

UK display and corporate pilot and aviation journalist Peter Turner said, "Glad to hear you have bought an RF-4. You will love it. It is one of the nicest aeroplanes I have flown."

South African display pilot Peter Goldin said, "My Fournier is one of the sweetest flying planes and very pretty. It can do many aerobatics (about fifty per cent of my flying). I once pulled 7.7g, and there was no damage at all. It goes cross-country at reasonable rate, sips fuel and glides a long way. I once climbed it to 18,300 ft by a large cumulonimbus, cut the motor and glided about fifty miles home."

The first UK Silence Twister builder Peter Wells said, "The Fournier RF-4 is widely regarded as the finest single-seat light aircraft ever made..."

can be immense fun, twizzling around on the spot at four or five g, and watching the upper wing skin wrinkling under the loads.

The maximum cruise power of 3,300 rpm gives just below 100 knots TAS, at the miserly consumption of under ten litres per hour, giving you nearly four hours endurance from the 38-litre tank. Reducing to sixty knots, this frugal motor sips fuel at just four litres per hour for a near ten-hour endurance, or a 550 nm range. And that is precisely how I clocked up those necessary thirteen hours, 35 years ago!

Back in 1970, Fourniers entered many air races. One won the Dawn to Dusk contest in a single day by flying 1,234 miles in 14 hr 21 min, averaging 99 kph and using just 116 litres of fuel. American airshow pilot Mira Slovak flew his RF-4 all the way over the Atlantic for an air race (in which he won his class, taking 175 hr 42 min) and then all across America. After crashing it, he did the whole thing a second time with a replacement aeroplane! That Fournier, N1700, now hangs in the Seattle Museum of Flight.

Mine does the most delightful, gentle, elegant aerobatics, although its very basic fuel system (a gravity-fed carburettor) means the engine stops under the slightest negative g, but the airframe is so clean she only slows a little and hardly at all if you follow a slightly downward path through each manoeuvre. She burns around a



Cockpit has undercarriage lever on the right, spoiler extender on the left, recoil starter, centre right, handbrake and throttle on left. Note separate upright and inverted slip ball, g-meter.



gallon per twenty-minute full-throttle session. How many other aerobatic aircraft cost less than a fiver per sortie?

Loops, slow rolls, barrel rolls, quarter-clovers, Cuban eights and reverse Cubans are easy if you start above 100 knots, but stall turns are rather more difficult. One buddy, Jon Marten-Hale, told me, "I tried dozens of them, but all I got was a face full of dirt from tailsliding and dropping through the vertical. First I climbed sideways, then I stopped completely and then I fell to earth! I tried rudder at every speed – all that changed was the amount of sky." My ex-Skyhawk friend Matthew Hill advised, "Only go to the right. Pull quickly to just less than the vertical (so the engine does not stop), check, then hit full rudder at 48 knots. A bit of opposite aileron helps." He was right, so now nine out of ten of my stall turns are fine. The tenth one will hover a bit before completing the turn.

The Fournier spins nicely and quite quickly,

to both the left and right, recovering predictably in three-quarters of a turn. I have only flown eight-turn spins, but South African airshow pilot Peter Goldin told me, "The most turns I have done is fourteen. My head was still going around when I recovered, but it was the quickest way down from 12,000 feet over the airfield, so why not?" He also performs flick rolls and a lomcovak-like tumble in his RF-4, but I am not yet that brave.

A quarter vertical upward roll is entirely possible and, with a 'humpty-bump' pull over and another quarter roll on the down line, makes a useful turnaround manoeuvre. Another useful Fournier turnaround I have yet to perfect is the half-flick to the inverted and pull-through.

Inverted flight is easy (although of course the engine stops). To definitely kill the propeller and make it more spectacular, I turn off the fuel just before pulling into a half-loop and then push gently off the top as the nose intercepts the horizon. I have timed the inverted glide at

exactly 500 fpm at sixty knots, allowing a useful single inverted downwind pass, following which I roll erect, turn through 180° and make a gliding approach to land and finish my display.

Which leads back to the Fournier's original role – gliding. I have done a little soaring in mine on days with strong thermals, but former owner Damien O'Reilly soared with it all the time, both in thermals and ridge lift. His final, cumulus-lifted, four-hour engine-off flight used just four litres of fuel on a wonderful summer's day.

You kill the engine and restore a wonderful silence by turning off the fuel, and then opening the throttle and reducing speed to just above the stall to stop the propeller. Positioning it horizontal with the hand-start lever minimises the drag, giving a useful 1:20 glide ratio at 62 knots, or a sink rate of 256 fpm at 56 knots. This is far from competitive in modern gliding, but it makes the Fournier a good trainer. An infinite variety of glide angles can be achieved merely by leaving the engine ticking over, and cracking open the throttle a bit when you can't find lift (which, I confess, is how this nervously neophyte glider pilot mostly does it). Although its power-on ceiling is 19,685 feet (itself tremendously impressive on a mere 39 hp) an RF-4 once held a world-class record by climbing to 36,800 feet in mountain wave.

Normal descents are made at sixty knots with the gear up and throttled back to just before the warning horn sounds, although the steepest descent is achieved at 95 knots with throttle closed, wheel down and spoilers extended



(sideslipping if necessary, to nearly double the descent rate). There is little yaw or pitch trim change with power or spoilers, but the elevator trimmer, operated by a small lever on the right coaming, is effective if a trifle sensitive.

Circuit work is undemanding, visibility couldn't be bettered, and it is easy to place the aeroplane where you want it, although you must pay attention to height control with those sensitive elevators. The only important thing is to slow below sixty knots, drop the wheel, and check it is safely locked by throttling back to listen for the horn, then pressing the test button to be sure. Your final check? The wheel is down when the lever is up, which is far from ergonomic.

The optimal smooth air approach speed is 55 knots, adding five knots for rough air or strong winds. Approaches are usually made glider-like, power-off, with gradually increasing spoiler, and aiming to be properly positioned with full spoiler at 200 feet. This is not difficult, although the spoilers are effective, so your final approach angle is surprisingly steep. It is important to grasp the spoiler lever firmly; they always seem intent on jumping either out or in, whichever you do not want!

The spoiler lever controls your descent angle just like a throttle – back for steeper, forward for shallower – so very accurate touchdowns can be achieved. If you seem to be landing short, you merely ease the lever forward, reducing spoiler deflection and extending your landing point without changing speed, power, or trim. If you really muck it up, you retract

them, put the lash to those Shetland ponies and gently go around. You become so practised at gliding approaches, a real forced landing ought to be easy.

With spoilers fully extended, the flare starts a little earlier than you might expect; at first that light elevator can lead to overcontrolling. An experienced tailwheel pilot might initially find a smooth touchdown difficult because the Fournier's ground angle is considerably less than its stalling angle, so if it is stalled on for a 'three-point' landing the tailwheel touches down first and the main wheel hits teeth-jarringly hard (ask me how I know this). Nosewheel pilots shouldn't find this a problem; a proper touchdown is easily achieved by holding the correct attitude then lowering the aircraft to the ground.

With their very slow touchdown speeds (below forty knots) Fourniers can be inclined to weathercock, so I generally land on the runway's downwind edge, lowering the spoilers slightly and easing the stick fully aft as soon as she stops flying, for optimum tailwheel steering. On soft ground, if you let the upwind wing lift a little, the downwind outrigger wheel digs in, helping you keep straight.

Finally, you must hold on to that spoiler lever once you are on the ground. If you let go, they can pop back in, and you pop six feet above the runway with decaying airspeed. The only solution on a short strip is to open the throttle and go around. If you do that, either leave the wheel down or, if you retract it, do not forget to lower it again. I reckon leaving it down is safest.

## SPECIFICATION

### FOURNIER RF-4D

#### ■ Dimensions

Wingspan	36 ft 11 in/11.26 m
Wing area	121.6 sq ft/11.30 sq m
Length	19 ft 10 in/6.05 m
Height	5 ft 2 in/1.57 m

#### ■ Weights & loadings

Equipped empty	628 lb/285 kg
Mtow	860 lb/390 kg
Fuel, standard	8.4 imp g/38 lit
Max wing loading	7.11 lb/sq ft
Max power loading	22.05 lb/hp
g limits	+6/-3g

#### ■ Performance (manufacturer's figures)

Vne	135 kt
Max speed	106 kt
Max cruise	97 kt
Economy cruise	87 kt
Stall	40 kt
Take-off to 50 ft	270 m
Landing from 50 ft	230 m
Max climb s/l	690 fpm
Service ceiling	19,700 ft
Range	366 nm
Endurance	9 hr 30 min

#### ■ Engine & propeller

Rectimo 4AR 1200 Volkswagen conversion, producing 39 hp at 3,600 rpm. TBO: 1,500 hr. *Propeller:* Hoffman 1.32-metre diameter, two-bladed, all-wood, fixed-pitch.

#### ■ UK contacts

UK Fournier Club at [www.fournieruk.com](http://www.fournieruk.com) or contact Dave Bland at [dave@dustmonkey.freeserve.co.uk](mailto:dave@dustmonkey.freeserve.co.uk)

➕ Pros: lovely handling, brilliant visibility, great gliding, inexpensive aerobatics, cheap touring.

➖ Cons: tricky ground handling, lazy hot weather climb, single seat, not for short strips, long wings need a wide hangar.

Once you are firmly on the ground, the rather poor brake needs plenty of force, even at taxi speeds. However, the main wheel is so far forward there is no fear of tipping the aeroplane on its nose, so it can be pulled as hard as you like. Landings rarely use more than 250 metres.

I am hopelessly biased but I cannot improve on these words I first wrote 35 years ago: 'The Fournier is a nice little aeroplane, versatile, economical and a delight to fly. It quickly becomes a part of the pilot.'