



ROTORWAY EXEC 162FA

We all know helicopters are immense fun and incredibly versatile, but they are just far too expensive for the average guy – right?

Sorry, but you are wrong, because the Rotorway Executive is a truly affordable rotorcraft. And, while all helicopters are manoeuvrable, this exhilarating little machine must surely be the most sprightly of the lot!

So, how does Rotorway make its helicopter so much less expensive than other, more common models? Easy – by getting you to assemble it yourself. Notice I said ‘assemble it’, not ‘make it’, because the eight box Executive kit comes remarkably complete, including 49 clearly labelled shrink-wrapped cards of minor parts. Indeed, all you need besides these is the paint and avionics.

Kevin Lunn, Rotorway’s Southern Pacific regional dealer, says you can operate a Rotorway Exec for just \$65 per hour, compared with the \$250 plus hourly hire rate for production piston helicopters, and he introduced me to his example with all the enthusiasm of a true convert. A former aero modeller who learned to fly on gliders, he later became an instructor before advancing to powered aircraft, and finally graduating to helicopters. Having always been passionate about model helicopters, once Kevin discovered Rotorways he never looked back. He now has over 500 helicopter hours, with more than 300 on Execs.

There is no substitute for experience, so Kevin deliberately worked at Rotorway’s factory for a while, making the components that builders would later assemble. Using his knowledge, he now runs a builders’ assistance program. Local purchasers can have their kit delivered to Kevin’s premises and stay with him for six weeks, taking advantage of his \$4000 investment in specialist tools and equipment, while he helps them build it.

Because Kevin is not a helicopter instructor he cannot provide basic training, so he recommends that purchasers

should already have a piston helicopter licence. He can then fly with them for the ten or so hours needed to become thoroughly familiar with the Rotorway. He will also spend a couple of days tuning and fettling a completed example, and fixing any early snags, to try and prevent the “50 hour syndrome”. For in the past (and particularly in the USA) many builders completed their kit, started learning to fly it, and either scared themselves by progressing too quickly, or found it too hard to master, and sold it.

Of course, the factory provides flight training to Exec owners, but Kevin seriously recommends that prospective builders learn on a production type like an Enstrom, Schweizer (Hughes) 300 or Bell 47 before graduation to their Rotorway. “After all, you wouldn’t learn to drive in a high performance kit car. You’d learn in something easy like a hatchback, and then transition to a sports car later.” He also does not recommend training on current model Robinsons, whose rotor governors give students a “lazy wrist”.

For safety, as it comes from the factory the helicopter is rigged to pitch up automatically into an autorotation if the engine fails. Unfortunately this forces the pilot to hold the cyclic forward throughout cruising flight. Kevin suggested that, after construction, some effort should go into properly tracking the rotors and re-trimming the stabiliser rigging. He is happy to assist with this process, and the effort should pay off with improved drag and reduced fuel burn. At first Kevin’s example had 1hr 40m endurance to empty tanks, but after careful tweaking it now goes for 1hr 55 on the same fuel.

Kevin assembled his current Exec 162FA in just six weeks, excluding its avionics and opulent paint scheme. The A in its designation stands for Australia, for this model incorporates a few enhancements for hot and dusty Australian conditions and to comply with some local regulations.

Otherwise, Kevin recommends that builders stick rigidly to the plans, leaving modifications until they are thoroughly familiar with their aircraft. His only personal alterations were sealing the engine's dipstick and fitting an external breather, to exclude oily odours from inside.

The aircraft has a gas welded 4130 chrome-moly steel tube framework which arrives as an entirely finished unit, so there is no welding to do. Likewise the rotor blades and head are complete, as is the wiring loom. The builder's job is mostly to assemble these, mostly prefabricated, components to that initial framework, and the structure is so compact that this can be done in a single-car garage. Kevin says: "You bolt on the landing gear, install the engine and stuff, drill out a few locating holes to the right size, fit the tail boom and then bolt the rest together." Well illustrated step-by-step manuals, plans and eight video tapes give detailed guidance, and Rotorway's claimed (but probably optimistic) build time is a remarkably short 300 hours.

The resulting airframe is small. No, I'll re-phrase that. It is very small. But the Rotorway Exec is not in any way cute or dinky, rather it is neat and compact like Colin Chapman's Lotus: light, purposeful and efficient, with minimum weight and frontal area, so it gets maximum performance from a low horsepower engine. The result is a sporty, nimble, nice handling, good looking helicopter, albeit with a limited load capacity and restricted range. Like all the best kit aircraft, it is compact on the outside without being too cramped inside. Kevin easily pulled it from its hangar unaided, and we could both look down into the cockpit from above.

Despite his cheery, relaxed manner, Kevin has a thoroughly professional outlook on the rotorcraft business. He is critical of the average pilot's ability and preparedness. "They mostly do not practice autorotations often enough, and many do not make a thorough enough preflight inspection. Done properly the preflight should take half an hour." There are no excuses with this easily inspected airframe,

the cockpit is minimalist, with gleaming, polished chromium primary controls, burnished aluminium floorboards and host of black faced instruments crowded into matt and gloss black panels.



Easily removed panels give access to all major components.

and Kevin led me through his own meticulous examination. Unscrewing a handful of Dzus fasteners, he whipped off a couple of panels to reveal all the major components clearly accessible beneath.

Just behind the cabin is the vertically mounted four cylinder, four stroke engine, Rotorway's own Porsche derived design of 2660cc (or 162 cu in) capacity. Producing 152hp (114kW), the whole package, including FADEC (Fully Automated Digital Electronic Control), dual electronic ignition, electronic fuel injection and liquid cooling system, weighs just 86kg. Using Chevrolet 350 pistons and conrods, and with a tuned induction, polished combustion chambers and sodium exhaust valves, it runs at 4200rpm and delivers power through four big, non-slip, aramid fibre belts to the sprag clutch and secondary drive which also turns both the alternator and water pump. From there, three parallel chains in a transparent lidded bath drive the main rotor at 520rpm.

Above the chain drive is the radiator header tank, while below the secondary drive is the fan cooled radiator. Behind that are the silencer and upturned exhaust. Twin saddle tanks either side of the main rotor shaft hold a total of 64 litres and, at the quoted 36 litres per hour consumption, give the aircraft a 156nm (290km) range at 78 knots.

The tail boom is an aluminium skinned monocoque bolted to the yellow painted main tubular structure. Within this run three single Kevlar belts in series, their pulleys progressively more tilted so the drive turns through 90 degrees. The two bladed, all metal teetering tail rotor fizzes around at 2500rpm. On its left is a boomerang shaped vertical stabiliser, and forward of that a horizontal stabiliser has two swept endplates.

Rotorway helicopters have both an asymmetric aerofoil, bonded all-aluminium rotor and an elastometric teetering rotor hub, eliminating many moving parts and giving good stability, augmented in forward flight by those stabilisers. Rotor control is via twin Teleflex cables, one under tension and the other in compression, both for redundancy and to eliminate slack from the system. Kevin mentioned that a replacement pair of Rotorway blades is priced at \$8000, whereas Robinson blades cost \$45,000. Similarly two tail rotor blades will set you back just \$490, against a Robinson's \$4500.

The low slung cabin sits on neat skids, to the rear of which are the easily fitted handling wheels. A neat, cylindrical 11kg balance weight slips on to either a tube 'stinger' under the tail or the forward right skid, depending whether you are flying dual or solo. The light, transparent doors hinge all the way forward, are each secured with three small bent-metal tabs, and can be left off.



Boarding is simple, using a foot-high step on the skid, but a particular technique is optimal. Put your head in first, follow with your backside, then swivel your legs in and lift the inboard one over the cyclic. It is a tight fit, but none of me actually touched any of the structure. Rotorway claims a Robinson matching 1.12m cockpit width, but I measured it at 1.02m at our shoulders, with a 1.47m length. The manufacturer claims the 162 accommodates pilots up to 1.95m tall, and I believe them. There is no baggage compartment, but the Australian version has a useful small document locker in the right cockpit floor, and a 12kg underbelly cargo pod is available.

Like the rest of the aircraft, the cockpit is minimalist, with gleaming, polished chromium primary controls, burnished aluminium floorboards and host of black faced instruments crowded into matt and gloss black panels. Everything is within easy reach, and visibility is excellent, with a clear arc right to the rear skid leg, although it is a little more restricted upwards and to the sides, where a pair of eyebrow windows help.

This is not a training aircraft, so the pilot sits on the left, slightly reclined, and securely held by a four point harness. The 40cm long cyclic moves over a wide 35cm fore-and-aft arc, with 33cm of side-to-side movement, while the extra long 55cm collective also has a generous 33cm travel. Both have a nice, light action with almost no friction, and the

chunky twist-grip throttle can just be fully rotated with a single twist of the wrist, although its friction is quite tight. The close set yaw pedals have 10cm of travel. The right collective, cyclic and pedals can easily be unbolted and removed if required.

Prominent on the central binnacle is the twin needle rotor/engine tachometer, flanked by the ASI and altimeter, and with a row of six coloured warning lights above it. In the centre are the radio and primary engine instruments, with secondary dials consigned to the left sub-panel. The lower, vertical part of the binnacle carries the electronic interference resistant FADEC engine and systems monitor, which incorporates 14 sensors, a back-up computer and annunciations for all malfunctions. Below this are VSI and fuel gauge with, behind them, the cabin air valve and red fuel shut-off handle. Master and electrical switches are in a roof panel, the compass sits central in the one-piece windscreen, and slip information is provided by the traditional wool tuft taped outside the canopy just above it.

Engine start was quick and easy, and the rotors were engaged by pushing in a yellow, shoulder height T-handle on the cabin wall behind and between us to tension the drive belts. In common with most small helicopters, you cannot miss the high revving engine's presence. A quick check of the FADEC failure mode gave a brief RPM drop, immediately regained when it was returned to normal. For this

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Rotorway 162FA Exec

Engine: One vertically mounted, four cylinder, liquid cooled, direct drive, horizontally opposed Rotorway RI 162F, producing 152hp (113kW) at 4200rpm. TBO 1000 hours. Standard fuel 64 litres.

Main Rotor: Two bladed, bonded, all metal, semi rigid, non folding, with asymmetric aerofoil and elastometric rotor hub, and running at 520rpm. TBO 1500 hours.

Performance (manufacturer's quoted): Sea level Vne 100kt, max S/L speed 100kt, normal cruise 82kt, sea level climb rate 1000ft/min. Service ceiling 10,000ft, hovering ceiling in ground effect 7000ft, hovering ceiling out of ground effect 5000ft. Max range (no reserve) 156nm (289km).

Weights: Equipped empty 460kg, max takeoff 680kg.

Dimensions: Rotor Span 7.6m, total rotor disc area 45.36m², length 9.0m, height 2.4m, cabin length 1.10m, width 1.47m. Seating 2.

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Kit Price: \$119,990 Aus.



demonstration we had 40 litres of fuel, giving us a takeoff weight of 670kg, or 99% of the 680kg maximum. Temperature was 20°C and the pressure was slightly low.

We used 24 inches power and some right pedal to lift off, and around 27 inches for hover taxiing. There was a little noticeable vibration during the rapid transition to forward flight, but probably not as much as with a fully articulated rotor system. Twenty-five inches gave us a 700ft/min climb at 70 knots in a nose high attitude (Rotorway quotes a 1000ft/min climb in ISA). I thought the visibility excellent except directly to the side, when I found the eyebrow windows handy, although I had to bend forward to use them.

Cruise stability is amazingly good – better than in any other helicopter I have flown: you can let go of both cyclic and collective for several seconds. The aircraft quickly accelerates and decelerates with a simple change of attitude, but at normal speeds up to the maximum cruise of 83 knots the vibration is also surprisingly low, although, as with any other two blade rotor system, it starts to become noticeable above 85 knots, increasing at over 95 knots, but still acceptable for short periods up to the 100 knot Vne, which is also the quoted top speed. Economy cruise at 23 inches trues out at 80 knots, burning 28 litres of premium unleaded petrol per hour, for an overall cost of around \$60 per hour.

The Rotorway's engine is no noisier than a Robinson's, but its greater rpm gives it a higher pitched, more intrusive sound, so you know immediately if it stops. Thanks to the Exec's comparatively heavy main rotor blades, you do not have to be as lightning quick to floor the collective as a Robinson pilot, although you do have to be prompt with plenty of left pedal and first aft then forward cyclic to establish the 55 knot optimum speed. Those massive blades have enough stored energy to make a proper full-stop autorotation landing, flaring from around 35 feet. (With their light blades, Robinsons must make run-on landings). Autorotations descend at around 1500ft/min, giving plenty of time to find a landing site.

Despite its abilities, and partly because of its small size, the Rotorway does have a few drawbacks. Its right skid low hover attitude and strong tail rotor drift can make sloping ground landings tricky, as is hovering with a significant tailwind. Although, as the photos show, this can be done in wind speeds of up to 15 knots, beyond which the aircraft runs out of aft cyclic.

When I tried hovering, I found it hard work. This very light and highly manoeuvrable little helicopter happily darts left or right, backwards or forwards; but staying stationary in one spot was tough. With his greater experience and lighter touch, Kevin made it look easy, and pointed out that I was over-controlling. Leave the cyclic alone, he said, and its significant hover stability helps it stay on the spot by itself.

He followed this by demonstrating a series of rapid hovering turns, breathtakingly fast accelerations and near instant quick-stops. The aircraft is light, with a low capacity, low inertia, high revving engine and a simple correlator, so lots of anticipation is needed with the throttle to keep engine and rotor rpm in their green arcs, but basic training in an appropriate machine, like a Hughes/Schweitzer 300 or Bell 47, is good preparation.

The descent and approach were normal, and despite some blade flap-back on landing there were no real problems. Only 18 to 24 inches power was needed for hovering in ground effect, leaving plenty in reserve. Touchdown comes right skid first; then you have to carefully lower the rest of the aircraft to the ground with lots of right cyclic.

Being a homebuilt, the Exec cannot be employed in commercial activities, but of course a farmer could use one for aerial mustering or stock management on his own property, and anyone can utilise theirs for hobby photography or similar non profit activity. I would like one just for the fun and exhilaration of flying this delightfully manoeuvrable little rotorcraft.

The Rotorway kit is straightforward to assemble. The Exec 162F is very good looking, highly responsive, very nimble and comparatively safe. Above all, it is immense fun – truly a sports car of the air.