Walter D. Nitz built this RotorWay Exec helicopter working on it part time over 18 months. Current kit price is $29,559.

KITS

ROTORWAY EXEC

Style and polish, collectively

The thought of building your own aircraft from a kit—and then flying in it—is difficult enough for many pilots to accept, but even some kit-builders turn into skeptics if the aircraft is a helicopter. Helicopters are more mechanically complex than most homebuilt aircraft, and many of the components, such as the transmission, rotor hubs and blades, are not easily fabricated or readily available from builders' traditional suppliers. That, combined with the relatively small population of rotorcraft-rated pilots and a history of unsuccessful designs, has resulted in a dearth of choices for people interested in constructing their own helicopters.

One company that has been in the business of designing and selling helicopter plans and kits for a remarkable 19 years is RotorWay Aircraft, Incorporated, in Chandler, Arizona. The company's newest kit model, the Exec, represents the aesthetic and mechanical refinement of at least four different designs. The Exec is a stylish two-place helicopter with an all-aluminum, two-blade main rotor and liquid-cooled, aluminum, 152-horsepower piston engine.

B. J. Schramm, the founder of RotorWay, began selling plans for a single-seat helicopter called the Scorpion in 1967. About four years later he introduced a two-seat version called the Scorpion Too. Both were powered by Evinrude marine engines. In 1974 RotorWay began building its own 133-hp, four-stroke, four-cylinder engine, the RW-133, for the Scorpion 133. About six years ago RotorWay developed a new helicopter kit design, the Exec. Initially, the Exec was powered by a 145-hp RW-145 engine. The 152-hp RW-152 now is standard.

The Exec is similar in size, weight and performance to the Robinson R22. Empty weight of the Exec is 830 pounds, and gross weight is 1,320 pounds, for a useful load of 490 pounds. Standard fuel capacity is 17 gallons (112 pounds). With two people and full fuel, the Exec has just over two hours endurance. The hover ceiling in ground effect is 7,500 feet with two aboard and 4,500 feet out of ground effect. Maximum airspeed is 100 knots, and normal cruise is 82 knots.

The kit, which can be purchased as a unit for $29,559, or in seven separate packages, includes all the parts needed to build the Exec, plus a tool kit, seats, engine instruments and even a battery. The only items the builder supplies are flight instruments and avionics, paint and carpeting, if desired. Ground-handling wheels, a stainless steel exhaust system, skid pants, custom upholstery, luggage compartment, floats and an agricultural spray rig are available as options.

The Exec is a mechanically sophisticated helicopter, yet the kit can be assembled with no more difficulty than most kit aircraft. Critical components including the main and tail rotor hubs and blades, transmission and engine are prebuilt at the factory and require relatively minor finishing work and assembly on the part of the builder. The airframe is tack-welded by RotorWay but can be ordered fully welded for an additional charge.

Walter D. Nitz, an electrical engineer, has been a modeler since childhood, but he had never built a full-size aircraft before buying an Exec kit. Nitz spent evenings and weekends assembling the kit over an 18-month period. A perfectionist (he even designed a soft headliner that incorporates the RotorWay logo), Nitz was rewarded for his labor by having his Exec named grand champion rotorcraft at the 1985 EAA fly-in.

Some mechanical aptitude and experience are necessary to build an Exec, Nitz believes, but he has unqualified praise for the completeness of the Exec kit and the thoroughness of RotorWay's plans. A builder receives a set of 500 "see-do" photographic illustrations of the assembly process, plus detailed step-by-step assembly instructions. RotorWay supplies operation and maintenance manuals for the airframe, engine and blades. Life limits of critical parts are listed along with a progressive maintenance schedule.

MARK R. TWOMBLY

RotorWay has developed a new, optional main-rotor hub for the Exec. On the standard hub, collective (main-rotor blade pitch) control is provided by a push-pull cable system. The optional hub uses a more conventional sliding swash plate and elastomeric rubber-and-brass-bonded thrust retention bearings. The effect is to reduce the amount of cyclic control required to maintain a stable attitude. Main rotor blades on the Exec have aluminum spars, which also form the leading edges, and aluminum skins shaped in an asymmetric airfoil. The asymmetric shape provides more lift at lower pitch settings and improves autorotation characterisitcs.

Engine coolant is routed through a radiator (made from two Volkswagen Rabbit radiators) mounted beneath an engine-driven fan. Heavy-duty industrial V-belts transfer power from the engine to the transmission, which turns the main-rotor shaft and the tail rotor. Three long rubber belts that snake through the aluminum monocoque tail boom connect the transmission to the tail rotor. The belts are supported by pulleys mounted on bulkheads in the boom.

Most of the components on the Exec are built by RotorWay. Castings for the engine, water pump and other aluminum parts in the helicopter are made in a RotorWay-owned non-ferrous foundry adjacent to the RotorWay center south of Phoenix. The foundry also does subcontract work for several major helicopter and aerospace manufacturers. RotorWay machines and assembles the engine and drive train components and molds the fiberglass cockpit panels.

The RotorWay complex also includes the Sky Center, where customers attend ground school and flight training classes. RotorWay recommends that, after completing construction of the helicopter, the builder attend a week-long school at the factory. The student learns to hover and maneuver in ground effect and also attends ground school classes covering rigging, preflight inspection, routine maintenance, weight and balance, rotor system tuning and cockpit procedures. (The cost of the ground school and flight training may be included in the price of the Exec kit depending on the contract between RotorWay and the customer.) RotorWay also offers advanced flight training for out-of-ground-effect maneuvers such as climb-out, cruise and autorotation. The rotorcraft/helicopter rating issued on the basis of training and a checkride in an Exec does not permit the pilot to fly other helicopter models without first completing transition training.

Nitz, who had a single-engine airplane rating before obtaining a rotorcraft rating, has logged about 110 hours in his Exec, which he hangars in a garage a couple of hundred feet from his house on seven acres northwest of Detroit. The Exec is unusually quiet, and Nitz is blessed with neighbors who don't mind a view that encompasses a windsock, a small helipad and a pilot with his own helicopter. Nitz's ship is not equipped with dual controls, which are an option, but he demonstrated its smoothness and controllability by maneuvering in a low hover all over the cleared portion of his property.

Nitz learned to hover at RotorWay's Sky Center but completed his rotorcraft flight training in a Hughes 300 at an airport near his home. He has since flown an R22. Although he could not be considered an entirely objective source, Nitz claims the Exec is as stable and easy to fly as any certificated piston-powered helicopter. *—Mark R. Twombly*