KIT AIRCRAFT PROFILE

THE SCORPION

When you get the notion for vertical motion.

For some of the same reasons that people yearn to fly—the sense of adventure, the challenge, the desire to be different—some people need to build their own aircraft. Taking individuality a step further, some people build helicopters.

Probably the most popular kit-built helicopter is RotorWay Aircraft's Scorpion 133, designed by RotorWay President B.J. Schramm and introduced in 1971. It was preceded by the Evinrude-powered Scorpion Too, the one-seat Scorpion and the progenitor single-place Javelin, begun in 1958.

Unlike other kit-built aircraft (the Weedhopper ultralight excepted), the two-place Scorpion has an engine designed especially for it. The 133-hp RotorWay RW 133 powerplant is a four-cylinder, four-stroke, horizontally opposed, water-cooled model and operates on 92-octane automotive fuel. A 165-hp, turbocharged version is available for an additional $1,750.

The two-blade Scorpion features a coordinated twist-grip throttle (which adjusts power automatically in response to changes in collective input); a semi-rigid main rotor hub; a two-blade aluminum tail rotor; fiberglass cabin enclosure; and steel-tube airframe. The multiple-triangulated sections of the airframe are designed to increase rigidity and safety.

The Scorpion's main drive train uses a two-stage reduction system. According to the manufacturer, the V-belt drive permits controlled rotor-blade slippage during start-up and absorbs engine torsional vibration during operation, and the second-stage chain drive allows high torque transfer with a minimum loss of efficiency. The tail-rotor drive is a three-tandem-belt system that the company claims absorbs rotor vibration and eliminates the need for a tail-rotor gear box.

Optional on the Scorpion are dual controls, ground-handling wheels, doors and the turbocharged engine.

Last May RotorWay introduced the Exec, which looks like an elongated, two-blade version of the Hughes 500D, the so-called Flying Egg. The Exec uses a 145-hp RW 145 engine, seats two and has an equipped useful load of 468 pounds. At present, all performance figures on the Exec are estimates. Maximum cruise speed and maximum speed are estimated at 91 knots and 107 knots, respectively. With a 19-gallon optional fuel load (14 standard), the Exec's range is expected to be 175 nm, carrying two persons and operating at optimum cruise power. Doors are standard equipment; dual controls and wheels are optional.

The RotorWay helicopters are available in six groups of 32 different component sets. Prices are $16,675 for the Scorpion and $21,895 for the Exec, purchased as complete kits. Bought separately, the groups, which vary in cost, are more expensive.

The kits contain everything necessary to complete the aircraft, according to the company, including the engine. However, there

ROTORWAY SCORPION 133

Kit price $16,675

Construction	Steel tubing and fiberglass
Specifications	
Engine	RotorWay RW 133 133 hp @ 4,500 rpm
Main rotor diameter	25 ft
Length	21 ft
Height	7 ft 3 in
Cabin width	4 ft
Height from ground to top of cabin	4 ft 6 in
Empty weight	780 lb
Useful load	420 lb
Payload with full fuel	360 lb
Gross weight	1,200 lb
Fuel capacity	10 gal
Performance	
Cruise speed	70-80 kt
Range Standard	104 nm
Turbocharged	100 nm
Rate of climb Standard	800 fpm
Turbocharged	1,200 fpm
Hover in grd effect Standard	5,500 ft
Turbocharged	9,000 ft
Service ceiling Standard	10,000 ft
Turbocharged	16,000 ft

Based on designer's figures.

is no airspeed indicator in the instrument package, which does have engine and rotor rpm indicators, oil temperature and pressure gauges, water temperature gauge and an hour meter.

A company spokesman said that the Scorpion averages about one year of part-time effort to complete, using the usual hand tools. Also desirable are a bench drill press, a metal-cutting band saw and an oxyacetylene welding outfit.

More than a box of bolts, the RotorWay helicopter packages are aimed at producing helicopter pilots and mechanics, as well as rotorcraft. The base price includes components, instructions, engineering assistance by telephone or mail and classroom instruction in theory, maintenance and construction techniques.

Basic flight training also is covered in the base price. Two or three one-week sessions are conducted at the Scorpion Sky Center at the company's headquarters in Tempe, Arizona. RotorWay said that most students (nearly 1,000 have taken the training) solo hover within one week.

One Scorpion customer, Buddy R. Age, AOPA 585522, attended the first session at the Tempe center and found it "thorough," although the Arizona heat prevented flying except early in the morning. Age, a fixed-wing private pilot, noted the costly airfare from his home in Snow Hill, Maryland, and suggested the company needs more convenient flight-training facilities.

B.J. Schramm has the answer. The company plans to open regional flight training centers throughout the U.S. These subsidiaries of RotorWay will complement the franchised RotorWay Service Centers the firm also expects to open in each state within the next three years. The service centers will advise and assist customers with construction, such as welding, and maintenance of their helicopters, providing tools and some rigging and overhauling services.

One of the selling points of a kit-built aircraft is the savings in maintenance costs—and in a helicopter that is a very important selling point. RotorWay teaches the customer how to keep those million moving parts maintained and rigged, as well as how to fly the ship. Schramm estimated (very roughly) the operational cost of the Scorpion to be $35 an hour, compared to about $100 per hour for a certified piston helicopter and $150 per hour for a turbine.

RotorWay promotes the Scorpion as a pleasure aircraft and that is why Age bought his Model 133. "I always wanted an airplane," he said, "but every time I wanted to buy one, I would buy a boat instead. Then I sold my boat and bought this."

While another of the Scorpion's selling points is that it does not require an airport, few people have helipads in their backyards, and he does not foresee being able to use the aircraft in his television service business.

For three years, Age has worked on the aircraft off and on, with help from his father on the welding. He estimates that they are about 80 percent finished; one week of work from the two of them could complete the Scorpion, he believes. Age earned a jet mechanic's diploma in the Air Force, but claims no special mechanical abilities.

His advice is, "You must know your blades and your metal." He tore all the teeth off of his first metal band saw because he used it at too high a speed. He also said precision reamers were a necessity.

The RotorWay concept takes a page from Heathkit. For do-it-yourselfers who want something distinctive—but who do not want too many surprises—the Scorpion could be the course for a different hover. —*AB*

Fully enclosed doors (not shown here) are standard on the Exec, which has the same drive train and rotor system as the Scorpion, as well as a simplified cyclic system and lighter controls.