

Economical  
two-seat  
rotorcraft  
aims for  
certification  
late this year



Robinson R-22 aims to compete in price range of four-place lightplanes, carries two at 100-mph cruise speed.

## EVERYPILOT'S HELICOPTER?

Designer Frank D. Robinson and simplified control system which incorporates single stick with two handles. Also, a mechanical linkage between collective and throttle controls eases pilot's workload in flight.



by DON DOWNIE / AOPA 188441

■ Put a two-place helicopter in the price range of a Cessna Skyhawk and you open up a yet-untouched market. Keep the cost down by the simplest possible design, make it just large enough for two full-sized people, use an existing aircraft powerplant and you have the Robinson R-22.

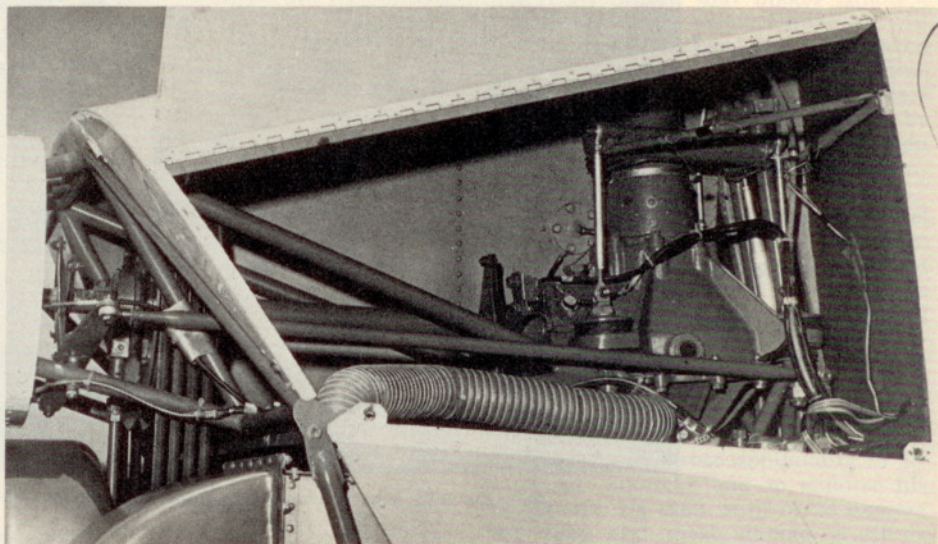
With over 50 hours of test flying logged on the production prototype, designer Frank D. Robinson expects FAA certification by the end of this year and hopes to sell a minimum of 500 production units annually. The production prototype is now flying at Torrance (Calif.) Airport and production tooling is underway in Hawaii as design details are "frozen."

Low costs and operating economies are achieved by making the aircraft as small as possible, reducing the number of parts to a minimum, designing for production and mating the package with a proven aircraft powerplant. A total of six patents are pending on the new economy helicopter that cover such items as a novel dual control stick and simplified flex couplings in the rotor-drive systems.

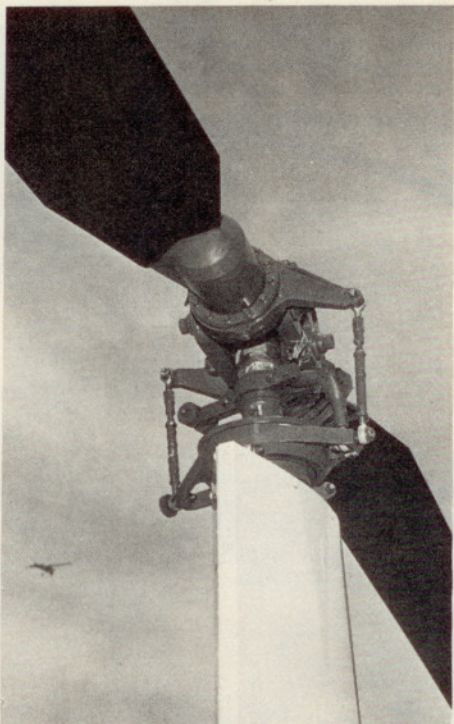
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The R-22 is designed around the 2,000-hour TBO of the 115- and 150-hp Lycoming O-235 powerplants, installed in the same manner as a fixed-wing aircraft.

"The only thing we're not expecting to go 2,000 hours is the tail rotor blades," explained the designer. "They're designed for that flight life, but in normal helicopter operation someone is always knocking them off. Each of our tail rotor blades weighs only seven-



Noise from transmission has been minimized through use of anti-vibration mounting, insulation and high-overlap gears. This, plus engine muffler, is said to permit easy conversation without headsets.



Tri-hinge main rotor head almost eliminates stick shake, according to the designer. Built-in "droop eliminator" and eight-foot rotor height provide walk-under clearance.

tenths of a pound, is economical to build and easy to replace."

Robinson estimates that his new design has 50% fewer parts than existing helicopters and incorporates high volume production techniques. Aside from normal engine maintenance, the only adjustment required at the present time is to check tension on the four V-belts every 50 hours. These belts have a calculated minimum life of 2,500 hours. No idler pulleys are required and the novel rotor clutch engages automatically 40 seconds after the engine is started.

Main rotor blades on the R-22 have a .1-inch-thick stainless steel leading edge that is considered ten times as resistant to erosion as existing blade designs. A honeycomb stiffener and aluminum blade section is bonded to the steel section in one operation.

The 17-gallon, gravity-feed fuel tank gives a range of 225 miles at a published cruising speed of 100 mph. However, the R-22 has already been flown as fast as 128 mph in calibration tests. High cruise performance is credited, in part, to the small frontal area of the helicopter.

The standard 115-hp unit is expected to hover in ground effect at 6,000 feet while the higher-performance model, using a derated 150-hp Lycoming, is ex-

pected to hover at over 8,000 feet out of ground effect. Add \$5,000 for the larger powerplant.

One of the many novel design features on the R-22 is found in the landing gear system where the "spreader bar" beneath the fuselage is an aluminum tube, one-and-one-half inches in diameter. This tube is designed to bow downward during severe landings and protect the engine compartment.

While expensive, high-test steel is used in critical structures, as many components as possible are designed for economy. The cooling fan, for example, is a commercial "squirrel cage" with special end plates. It also acts as a flywheel for the rotor system.

Mechanical linkage (Robinson calls it "correlation") between the collective and throttle controls eliminates many power changes. Pilots can take their hands off the collective control both in cruise and hover, according to the designer, to adjust radios or whatever.

The R-22 design keeps the disposable load (people, fuel and baggage) as close as possible to the center of gravity to permit "indiscriminate loading" so that a pilot as light as 100 pounds can fly solo without ballast. Such a configuration calls for the engine to be as far forward as possible, the lightest possible tail cone to be used and the battery to be placed in the nose.

One of the usual problems in light helicopters has been noise from the gear box mounted directly behind the pilots. Robinson has solved this by using precision, high-overlap gears with a 35° rather than conventional 30° spiral angle. A splash lubrication system uses standard heavy truck oil. The transmission is rubber-mounted in the aircraft to reduce vibration and inch-thick sound-absorbing material is placed on each side of the aft bulkhead of the cabin. A muffler is standard equipment on the engine. Originally, a complex intercom system was planned, but the cabin noise level is claimed low enough to permit easy conversation without headsets.

The R-22 uses low-inertia rotors, compatible with the light-weight, low-cost design, that permit quick rpm acceleration. The tri-hinge rotor head coupled with a "droop eliminator" has virtually eliminated "stick shake." At spin-up speeds below 100 rpm, the R-22 has a hinge restraint system to keep the rotor blades from drooping. Above 100 rpm, the system disengages automatically. This plus a rotor height of eight feet is said to provide excellent head clearance when walking under the blades.

The designer is particularly satisfied with the simple control stick design, a "cut and try" design that permits easy entry to the cabin and eliminates the need for twin sticks protruding from the floorboards. The single top-mounted stick has two handles and can be lifted out of the way for entry and exit. The movable stick also makes it possible for individual pilots to rest their "flying" hand on their knee for comfort. Robinson reports that it is an excellent arrangement for "follow through" on checking out new pilots.

## ROBINSON R-22

Basic price approx. \$20,000

### Specifications

Engine—Lycoming O-235, 115 hp @	2,800 rpm
Rotor diameter	25 ft 2 in
Length (including rotors)	28 ft 9 in
Width (including skids)	6 ft 5 in
Height	8 ft 9 in
Passengers and crew	2
Cabin width	3 ft 8 in
Cabin height	5 ft 8 in
Empty weight	720 lb
Useful load	510 lb
Payload with full fuel	396 lb
Gross weight	1,230 lb
Power loading	10.7 lb/hp
Fuel capacity (standard)	19 gal (usable)

### Performance

Rate of climb	1,500 fpm
Cruise	100 mph
Range (approximate, no reserve)	250 sm
Service ceiling	14,000 ft
Hover ceiling in ground effect	6,500 ft
Hover ceiling out of ground effect	5,200 ft

Robinson joined with C. K. LeFiell, veteran fabricator of aerospace products, to form the company. LeFiell developed his original interest in rotorcraft while building a do-it-yourself helicopter kit. He now resides in Hawaii and is preparing production tooling there.

The R-22 is the result of nearly 19 years of light helicopter engineering by Robinson. "I've been working on this particular ultra-light economy package in my spare time for more than a dozen years. It's been a full-time project for the past three years."

The company has 10 full-time employees and calls on the specialized part-time talents of an equal number of Southern California experts. Present production plans call for a California base, although a number of foreign companies have expressed interest in the new model. Development has been on a low-key basis with no announcement of the aircraft until well after initial flights. There is still no brochure on the rotorcraft.

Robinson foresees his initial market in the training field. Although he offers no closer price estimates other than "comparable with the approximately \$20,000 Skyhawk," he feels that rental costs also should be comparable with that airplane. He is quick to point out the ready availability of ex-military helicopter instructors. The designer also sees the small, quiet helicopter for home-to-office personal transportation in many semi-congested areas.

Just as it has been the dream of many fixed-wing pilots to have a hangar and a STOL strip in the backyard of their suburban ranches, there may be the possibility of R-22s parked in the driveways of much smaller houses for commuting from home to office. □