ROBINSON R22 BETA

IFR22

A multimission trainer that's a pleasure to fly . . . and to own.

BY SETH B. GOLBEY

Helicopters are inherently unstable machines, so sophisticated autopilots are the norm for IFR-certified ships, and few are approved for single-pilot IFR operations. The work load involved in flying a helicopter, even in visual meteorological conditions, is several times that of an airplane's; the IFR work load is higher still. While civil helicopter pilots as a group spend little time flying on the gauges compared to their fixed-wing brethren, earning the helicopter instrument rating pays the same dividends in terms of precision, safety, and confidence. All this argues that a helicopter instrument student's training should be accomplished in a machine that will teach all the right lessons early on. That's precisely what Robinson's R22 Beta instrument trainer was designed to accomplish.

No, it isn't approved for flight in instrument meteorological conditions, but the R22 instrument trainer offers the same economy and reli-

PHOTOGRAPHY BY MIKE FIZER

ability to helicopter instrument instructors and students as its VFR version does to beginning rotorcraft pilots. The ship's simple maintenance requirements, low initial price and operating costs, and low noise footprint have made it a favorite among rotary-wing flight schools and private owners alike.

The IFR trainer is equipped for its responsibilities with an artificial horizon, turn coordinator, digital clock, and Bendix/King avionics package, including an encoding altimeter, horizontal situation indicator, ADF, nav/com, transponder, and marker beacon receiver. DME is optional. A single nav/com might seem like a drawback, but the KX 165 can display a radial from a second VOR station at the push of a button, so even intersection holds are not too difficult (or should I say, not significantly more difficult than usual?). The equipped price is $116,850, compared to $98,850 for the basic Beta and $107,850 for the Mariner (float-equipped) version; DME adds $5,100.

The basic empty weight of the instrument trainer is a light 874 pounds (just 39 pounds heavier than a regular Beta), which makes ground handling a snap for even a lone pilot, and the two-blade rotor system allows storage in a very small hangar (or garage). Maximum gross weight is 1,370 pounds. Useful load can include 115 pounds (19.2 gallons) of standard usable fuel, 63 pounds (10.5 gallons) of usable fuel in an optional auxiliary tank, and 420 pounds of pilot, passenger, and baggage, which is stowed under the two seats (50 pounds each, maximum). With full standard fuel and two 170-pound occupants, there's still room for 40 pounds of baggage, which is plenty for even a long cross-country trip.

My introduction to the R22 instrument trainer came in the course of a two-day flight from the Robinson Helicopter Company factory at Torrance Municipal Airport, just south of Los Angeles, to Tucson (Arizona) International. This was the first portion of a ferry flight to deliver the helicopter to its new owner, National Helicopter Services, a flight school located at Westminster, Maryland. We stopped for fuel at Barstow-Daggett, California; Lake Havasu City, Arizona; Buckeye (Arizona) Municipal; and Scottsdale Municipal, just north of Phoenix, where we overnighted.

While in Scottsdale, we also visited Arizona Wing and Rotor, Incorporated, which specializes in custom paint

schemes for R22s; the price is $1,295 for up to three colors over an all-white base (14605 North Airport Drive, Suite 340, Scottsdale, Arizona 85260; telephone 602/991-6863).

Each leg, except Buckeye–Scottsdale, took 1.7 hours, generally at an altitude of 500 to 1,000 feet agl. At normal cruise power settings, indicated airspeed hovered around 90 knots, and fuel burn ranged from 8.2 to 8.6 gallons per hour. Robinson figures fuel burn should be under 8 gph, but we were near max gross weight, the engine was brand-new, and air temperatures were high, so the extra fuel was well-employed in helping the engine stay cool.

The R22 has been criticized in some quarters (usually by people with very limited experience in the type) as being, well, squirrelly. I don't think that's a fair or accurate statement. The ship has the lightest disc loading and power loading of any production piston-engine helicopter, and it is highly responsive to control inputs. This takes some getting used to. You might not feel that a Vne of 102 knots qualifies the R22 as a high-performance aircraft, but helicopters by nature require the same level of pilot skill, proficiency, and precision that is characteristic of any highly maneuverable aircraft. In truth, the R22 flies very well throughout its flight envelope, which is generous. If flown conservatively—that is, within its operating limitations—it is safe and reliable.

We had a strong tailwind for most legs of our flight, which created some orographic turbulence, and, as I mentioned, temperatures were high. The outside air temperature read 104 degrees Fahrenheit when we landed at Buckeye in the late afternoon, which, combined with Buckeye's 1,024-foot elevation, offered a density altitude of over 4,000 feet. But even under these conditions, the R22 does not suffer by comparison to other normally aspirated piston-engine helicopters.

Flying the same ship in an environment more closely approximating standard-day conditions, it is easier to identify some of the reasons the R22 makes such a good trainer—much the same reasons a Cessna 152 does: It challenges students but doesn't overwhelm them. It is agile and maneuverable but doesn't tend to get out of hand. The flight controls are light, but they have more positive force-feel than, say, the hydraulically boosted controls of the Bell JetRanger. And it provides a good teaching

environment: surprisingly quiet, comfortable, and stable.

As an instrument trainer, the R22 provides a challenging platform. Because most real-world IFR helicopter flying is done with the aid of autopilots and stability augmentation systems, the R22, which lacks these devices, offers the student a "worst-case scenario." In other words, the student must become adept at physically maneuvering the ship solely by reference to instruments. For the instrument-rated fixed-wing pilot, the learning curve will be somewhat gentler because of familiarity with ATC systems and procedures; still, maneuvering a helicopter without outside visual references is quite unlike flying an airplane under those conditions. Cockpit work load management is one of the first, and most important, lessons.

Also to be recommended is the factory-designed training syllabus, which can lead a student through private, commercial, and instrument check rides clearly and comprehensively, with the emphasis—always—on safety.

It is also easy to see why R22s command such a loyal following among their owners. Much of this has to do with the thoughtful engineering of the machine. The controls are so well-balanced that there is no necessity for a powered trim system; a simple on/off control sets a spring that reduces the slight left stick force encountered during cruising flight. The patented rotor hub is simple and stout, comprising a central teetering hinge plus a coning hinge for each blade; there are no lag hinges, dampers, or hydraulic struts. The hinges use self-lubricated Teflon bearings. In fact, throughout the machine, grease fittings have been avoided in favor of flexures, Teflon-lined bearings, and sealed ball bearings, which, mechanics claim, are more durable. Maintenance-free flex couplings serve in place of universal

Robinson R22 Beta Instrument Trainer
Base price: $116,850

Specifications

Powerplant	Textron Lycoming O-320-B2C
	Normal rating: 160 hp @ 2,700 rpm
	Continuous rating in R22: 124 hp @ 2,652 rpm
	Five-minute takeoff rating in Beta: 131 hp @ 2,652 rpm
Recommended TBO	2,000 hr
Main rotor blade service life	2,000 hr
Length	28.66 ft
Height	8.75 ft
Width (fuselage)	3.67 ft
Width (landing gear)	6.33 ft
Main rotor diameter	25.17 ft
Tail rotor diameter	3.5 ft
Main rotor disc area	497.4 sq ft
Disc loading	2.75 lb/sq ft
Power loading	8.56 lb/hp
Seats	2
Cabin length	4.3 ft
Cabin width	3.6 ft
Cabin height	4.0 ft
Empty weight	874 lb
Max gross weight	1,370 lb
Useful load	496 lb
Payload w/full std fuel	381 lb
Payload w/full opt fuel	318 lb
Fuel capacity, std	19.8 gal (19.2 gal usable) 118.8 lb (115.2 lb usable)
Fuel capacity, std + opt	30.7 gal (29.7 gal usable) 184.2 lb (178.2 lb usable)
Oil capacity	6 qt
Baggage capacity	100 lb (50 lb under each seat)

Performance

Max demonstrated crosswind component	17 kt
Rate of climb, sea level	1,000 fpm
Max level speed, sea level	102 kt
Cruise speed/endurance w/20-min rsv, std fuel (fuel consumption), estimated	
@ 75% power, best economy 3,000 ft	96 kt/2 hr (49.8 pph/8.3 gph)
Hover in ground effect	7,000 ft
Hover out of ground effect (5-min t/o rating)	5,100 ft
Max operating altitude	14,000 ft

Limiting and Recommended Airspeeds

Vy (best rate of climb)	53 KIAS
Recommended takeoff and climb	60 KIAS
Recommended maximum-range cruise	83 KIAS
Recommended landing approach	60 KIAS
Recommended autorotation	65 KIAS
Vne (never exceed)	102 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

For more information, contact: Robinson Helicopter Company, 24747 Crenshaw Boulevard, Torrance, California 90505; telephone 213/539-0508. □

joints and gear couplings in both the main and tail rotor drive systems. The main rotor blades have thick stainless steel leading edges to protect against corrosion and erosion. There is no slop in the flight control system, thanks to the fact that Robinson uses push rods and bellcranks in all control runs. Wherever possible, simplicity is the key design concept: There is no vacuum pump or fuel pump, for example; all flight instruments are electric.

No scheduled maintenance or service is required between 100-hour inspections. All life-limited parts have an approved service life of at least 2,000 hours. The engine and airframe both have TBOs of 2,000 hours, at which time the helicopter must be returned to the factory for overhaul. During overhaul (base price: $44,000), the helicopter is disassembled, all life-limited parts are replaced, the engine is exchanged for a factory-remanufactured one, the main and tail rotor gearboxes are overhauled, all bearings and seals are replaced, all systems are fully inspected, worn parts are exchanged, any new upgrades since the time of original manufacture are incorporated, the interior is replaced, and the R22 is freshly painted and flight tested. The overhaul is performed on the regular assembly line. Robinson work-

ers treat each overhaul like a new ship, and, in fact, an overhauled R22 is virtually indistinguishable from a new one.

Operating costs are another of the R22's strong points. Insurance for a private owner with 150 hours of R22 time who has attended a factory safety course runs about $1,700 for liability and $3,800 for hull coverage annually on a new ship. Reserve for overhaul comes in at about $22 an hour. Direct operating costs are about $20 an hour. An operator who flew 800 hours a year (admittedly a high number), therefore, could get away for a very reasonable total operating cost of around $53 an hour, according to company figures. (That also assumes depreciation at a rate of only 3 percent a year.) For private operators who don't fly that much, flight schools, and owners of older ships, the costs would be somewhat higher. Even so, there's little in the rotary-wing world that can compete with numbers like that.

Robinson delivered 310 R22s last year—that's more than any other model of light aircraft produced in the United States—and overhauled or remanufactured an additional 57. Currently, the production rate is running at eight new ships and two overhauls a week, and there is a more than three-month backlog on new orders. The company expects to deliver even more aircraft this year than last. About two thirds of the company's production is exported; the R22 fleet in Australia is larger than that of any other type of helicopter.

The Robinson R22 is a challenging and rewarding helicopter to train in or to own—and that's why many former students buy their trainer when they graduate. Now, more than 10 years into production, it is a fully mature design, but one that Robinson Helicopter Company will, no doubt, continue to improve upon. Skeptics doubted that there was a market for a small, economical helicopter—if one could be built at all. The skeptics were wrong. The Robinson R22 represents one of general aviation's few real success stories of the 1980s. □

Robinson began flight testing its four-seat R44 prototype (see "The State of the Industry," March Pilot, p. 63) on March 31. A completely new design, according to the company, the R44 shares many of the features and design concepts used to keep maintenance and operating costs low in the R22. The R44's performance will be similar to that of the R22, but the larger ship is expected to be somewhat faster. Empty weight is expected to be 1,350 lb; max gross weight, 2,350 lb. The R44 will be powered by a 260-hp Lycoming O-540 engine derated to 225 hp. No price has been set, but the company hopes to market the R44 for less than half the price of current small turbine helicopters. Certification and production, according to Robinson, are two to three years away.