

An easy entrance to freewheeling fun.

By the sheer weight of numbers, the Bensen Gyrocopter has claimed the title as the most popular design ever offered to homebuilders. More than 1,500 have been built in the past 24 years.

Created by Dr. Igor Bensen, the gyrocopter is a hybrid of rotorcraft and autogiro technology. It best can be described as a propeller-driven go-kart with a free-wheeling rotor. The basic kit for the most recent model, the B80, includes the rotor, instruments and controls and all materials needed to assemble the airframe; it costs \$2,995.

Thrust for the B80 is provided by a 72-hp McCulloch target-drone engine turning a pusher propeller. The engine costs about \$3,000, and a kit containing a propeller, engine mount hardware and cowls is \$1,500.

Lift is created by an unpowered, 21-foot rotor, which gains inertia from the relative wind as the gyrocopter moves forward. Because the rotor is not powered, the gyrocopter does not have the helicopter's capabilities of controlled vertical ascent and descent.

A ground roll of about 600 feet is needed to accelerate the gyrocopter to an airspeed (about 17 knots) sufficient to spool up the rotor to flying speed. However, for \$373 extra, the builder can install a clutch-operated, flexible drive shaft that transmits engine power to pre-rotate the rotor to flying speed while the gyrocopter remains stationary. Takeoff distance is cut to about 200 feet.

Unlike earlier Bensen Gyrocopter models, the B80 is all-metal and requires no welding. Most of the assembly is accomplished with cadmium-plated bolts and nuts. Bensen said anyone with average mechanical aptitude can assemble a B80 in 300 to 600 hours, using a drill press and hand tools.

Until this summer, Bensen Aircraft Company offered complete kits to build a B8 gyroglider (an unpowered gyrocopter towed behind an automobile), a B8W hydroglider (a float-equipped gyrocopter towed behind

BENSEN B80 GYROCOPTER	
Kit price* \$2,995	
Construction	All metal
Time to build (est)	300 hr
Specifications	
Engine 72-hp McCulloch 4318AX	
Rotor diameter	21 ft
Length	11 ft 4 in
Height	6 ft 3 in
Seats	1
Empty weight	247 lb
Useful load	253 lb
Gross weight	500 lb
Fuel capacity	
Standard	6 gal
Auxiliary	18 gal
Performance	
Takeoff distance (ground roll)	600 ft
Rate of climb	800 fpm
Maximum speed	78 kt
Cruise speed	
75 percent power	52 kt
50 percent power	39 kt
Range	
75 percent power	87 nm
50 percent power	130 nm
Service ceiling	10,000 ft
Landing distance	20 ft
Autorotation speed	17 kt
* Engine not included in materials kits.	
Based on designer's figures.	

a boat), a B8MW hydrocopter (a gyrocopter on floats) and a B8M gyrocopter, which has wooden rotors and tail surfaces and a welded engine mount. However, kits for these aircraft were discontinued because, as Bensen said, "there was no market for them." The company is developing a new model, the B8HD gyrocopter, which will have a five-hp hydraulic motor to power the rotor.

Only a gyroplane student pilot certificate is needed to fly a gyrocopter. The Federal Aviation Regulations require no previous flight experience or instruction to obtain this rating. An applicant needs only to demonstrate three touch-and-go landings while the gyrocopter is towed, engine-off, behind a ground vehicle and taxiing maneuvers with the engine running. However, instruction in at least some of the fundamentals of flying a gyrocopter can be obtained at any of Bensen Aircraft's 30 dealerships. The dealers have two-seat gyrogliders that can be used to familiarize builders with the operation of rotor and rudder controls.

Bensen strongly recommends a check-out in a gyroglider before attempting powered flight in a gyrocopter. He especially recommends a check-out for fixed-wing aircraft pilots, because the reflexes developed in flying airplanes are not compatible with those needed to handle a gyrocopter in flight.

Above all, Bensen stresses that his gyrocopters should be built in strict adherence to instructions and that pilots should follow the guidelines he has established to transition gradually from ground maneuvers to full flight. Bensen believes that unauthorized design modifications and haste in putting newly completed gyrocopters into the air are the major reasons for the large number of accidents involving gyrocopters.

National Transportation Safety Board records show that from 1971 through 1975 there were 79 Bensen Gyrocopter accidents, including 19 fatal accidents that involved 13 students, three private pilots, two commercial pilots and one ATP.

Five of the fatal accidents occurred after rotor strikes on propellers and rudders. The instruction manual for the Bensen Gyrocopter specifically warns that abrupt pull-ups or dives can cause "excessive flapping motion"—flexing of the rotor.

Bensen pointed out that no accidents have been caused by mechanical failure in the gyrocopter's airframe and that the Bensen Gyrocopter is among only nine homebuilt aircraft designs that have received a Seal of Quality from the National Association of Sport Aircraft Designers.

At the age of eight, Igor Bensen fled with his family from their native Russia to escape the Bolshevik bloodbath. He earned an undergraduate degree in mechanical engineering at the Stevens Institute of Technology and both a Ph.D. in psychology and a doctorate in divinity at the University of Indiana.

Bensen conducted research in electronics for General Electric for 11 years. He also was involved in GE's jet propulsion research for the Hughes Flying Crane helicopter.

In 1951, Bensen joined Kaman Corporation as manager of its K225 gas-turbine helicopter project. He left Kaman two years later and formed his own company to compete for a military contract for a ramjet transport helicopter. Bensen designed the high-efficiency propulsion and rotor system (hepars) helicopter, but the military withdrew its proposal when the Korean War ended.

"When the war folded, we started scrambling to survive," Bensen said. He turned to the aircraft homebuilding market with the intention of offering inexpensive and safe machines that could be built and flown by anyone. His first effort was a series of gyrogliders that could be equipped with wheels, floats or even the hull of a rowboat.

Bensen introduced the first powered gyrocopter, the B7M, in 1956. It was equipped with a 40-hp Nelson sailplane engine. Over the years, several variations of the original gyrocopter design have been offered. Bensen planned to offer a six-engine gyrocopter, but McCulloch refused to supply the engines.

The military has shown some interest in Bensen's designs. The Air Force had considered building gyrocopters into the jumpseats of its aircraft escape vehicles. According to Bensen, the Navy is considering the use of remotely controlled gyrocopters as expendable aerial surveillance vehicles.

But, to Igor Bensen, the potential military applications of his gyrocopters are not as important as their ability to make the experience of flight easily accessible to everyone. "The gyrocopter is not a toy," Bensen said, "but it is an awful lot of fun to fly." —*MML*