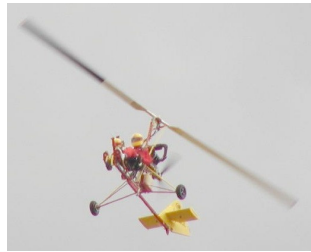


# THE GYROBEE



**GYROBEE N392JL**

The original GyroBee was an ultralight gyroplane deigned by Dr. Ralph Taggart in the early 1980's based on Martin Hollman's ultralight "Honeybee" gyro. The GyroBee is stable, fun to fly, and performs well. It's designed to use a 40 to 50 hp 2-stroke engine, and 23 to 25 foot diameter rotor blades.

N392JL is a scratch-built version of the GyroBee registered as amateur-built experimental with the FAA. It weighs 310 pounds empty, climbs at 500 fpm, the top airspeed is 70 mph, cruise is 60 mph, and the min. level airspeed is 15 mph.

Dr. Taggart maintains an excellent web site devoted to the GyroBee which features complete building documentation available for FREE download. Go to: <http://taggart.glg.msu.edu/gyro/gbee.htm>



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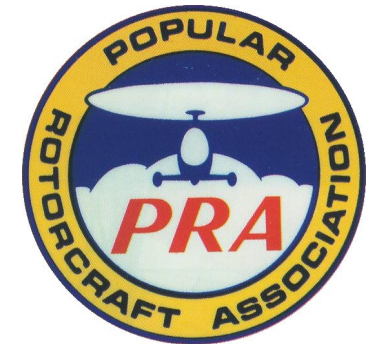
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<http://groups.yahoo.com/group/prachapter30/>



# GYROPLANES

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# THE GYROPLANE

## What is a Gyroplane?

The word "gyroplane" is an official term designated by the Federal Aviation Administration (FAA) describing an aircraft that gets lift from a freely turning rotary wing (rotor blades), and which derives its forward thrust from an engine-driven propeller. Historically, this type of aircraft has been known as the "autogyro" and the "gyrocopter." The early names and variants were filed as trademarks.

## Gyroplane History

The autogyro is an invention of Juan de la Cierva, a civil engineer born in Spain. The first successful flight of an autogiro was made at Getafe Airdrome, near Madrid, Spain, January 9, 1923.

The autogyro concept proved itself in the 1930's and 1940's when the Post Office Department used these craft for mail delivery from the roofs of post offices for nearly ten years. Kellett and Pitcairn gyroplanes flying in Camden, NJ, Philadelphia, PA, Chicago, IL, New Orleans, LA, WASHINGTON, DC and other cities performed hundreds of flights carrying thousands of pieces of mail.

During the late 1950's and early 1960's three commercial gyroplanes were developed and manufactured by private companies. The Umbaugh (later the Air and Space 18A), the Avian (a Canadian design of that same period that reached FAA certification, but was never produced) and the McCulloch J-2, each having two seats, were FAA type certified. The designers of these three aircraft, however, did not fully use the gyroplane technology created by their 1930's predecessors. In fact, to make certification easier, they used rotor head and blade technology from the helicopter industry (omitting the most valued component of that technology, the collective pitch control).

Pitcairn and Kellett (and others such as Goodyear

Rubber, Autogyro Company of America, Buhl, Alfaro, etc.) had learned things about gyroplane aerodynamics, disk loading, power loading, etc., that were overlooked in these three designs. The twist in the rotor blades of a helicopter, for instance, is backward from what would be useful in a gyroplane. Disk loadings were too high and power loadings were too low. As a result, they did not perform well and the companies failed. The Umbaugh and the McCulloch each delivered about 100 units.

Also during the 1950's, Igor Bensen, a colleague of Igor Sikorsky, developed a homebuilt kit gyroplane for amateurs. He called it the "gyrocopter." His idea for this open-frame model came from a German observation gyroplane towed behind U-boats during the war. Homebuilt kits, most of which seat one person, are very popular today.

## How do they Work?

Gyroplanes derive lift from freely turning rotor blades tilted back to catch the air. The rushing air spins the rotor as an engine-driven propeller thrusts the aircraft forward. Early gyroplanes were powered by engines in a tractor (pulling) configuration and were relatively heavy. Modern gyroplanes use a pusher propeller and are light and maneuverable. With the engine in the rear, the pilot has unobstructed visibility.

A Gyroplane can fly more slowly than airplanes and will not stall. They can fly faster than helicopters but cannot hover. Since the rotor blades on the gyroplane are powered only by the air (autorotation), much like a windmill, there is no need for a tail rotor for anti-torque. The gyroplane is a stable flying platform. This is not so with helicopters, which pull the air down through engine-powered rotor blades making it possible to hover, but also making the aircraft very complicated and expensive to fly. Due to their inherent simplicity, gyroplanes are less expensive to build, maintain and are easier to operate than helicopters.

Gyroplanes in flight are always in autorotation. If power fails in a gyroplane the autorotation continues, and the aircraft settles softly to the ground from any altitude. The procedure to land after a power failure is the same procedure as a normal landing, which requires no landing roll. Thus the gyroplane is a safer aircraft for low and slow flight, as compared with both helicopters and airplanes. The ability of gyroplanes to fly faster than helicopters and slower than airplanes makes it something of a hybrid, having the good qualities of the other two types of aircraft with little of the bad.

The single attraction of helicopters over gyroplanes is their ability to hover, which is necessary in some situations such as rescue or in sling load work. In air surveillance and point-to-point flying, not being able to hover is not a disadvantage because some gyroplanes feature "jump takeoff" capability, thus can take off and land vertically without having to hover. Helicopters flying at low altitude and out of ground effect avoid hovering whenever possible because it's too dangerous in the event of an engine failure. To fix surveillance on one spot, proper procedure for all rotorcraft is to circle in a slow orbit.

## Want to Learn More?

A good starting place to learn more about gyroplanes is the Popular Rotorcraft Association (PRA). The PRA was founded in 1962 as a voluntary, non-profit organization dedicated to the advancement of knowledge, public education and safety in the building and flying of privately owned non-commercial rotorcraft. The PRA was established to unite all people interested in developing and promoting rotorcraft for personal flying. "Rotorcraft" is a monthly magazine published by the PRA. Visit the web site: [WWW.PRA.ORG](http://WWW.PRA.ORG) to begin exploring the world of experimental rotorcraft!