The Trailing Edge

October 2023

Qualitative Evaluation of a Gyroplane

Autogyro, Autogiro, Gyrocopter, or Gyroplane?

What do you call an aircraft that uses an unpowered rotor in autorotation to develop lift? Apparently, the answer depends on who signs your paycheck. The generic term is "autogyro", from the Greek for "self-turning". The first successful autogyro was built in Spain by Juan de la Cierva. His company, the Cierva Autogiro Company, trademarked the spelling "Autogiro". E. Burke Wilford decided that wasn't enough, and created the term "gyrocopter" for his aircraft. Trademarks being trademarks, the Bensen Aircraft company trademarked the term "gyroplane". Faced with this mess, the Federal Aviation Administration, in 14 CFR 1.1 declared that they would use the term "gyroplane" instead of the generic "autogyro".

Why Fly An Autogyro?

My father, **Lee Erb**, worked for Bell Helicopter for 29 years, plus a few more years elsewhere in the rotary wing industry. While he worked on helicopters, he always held a special fascination for autogyros. Autogyros have similarities to helicopters, but are inherently simpler. As such, autogyros were successfully flown first. By their very nature, autogyros were self-obsolete-ing, because every advancement to improve the autogyro naturally solved the same problem for helicopter development. As autogyros became more complicated, they became more like helicopters, which eventually made helicopters possible. Since helicopters could hover and autogyros couldn't, as a commercial product, helicopters were seen as far more useful, and the development of autogyros ceased. Years later, autogyros would reappear, but this time primarily as a rotorcraft for personal recreation, since even small helicopters are ridiculously expensive to buy and operate.

I think my Dad was mostly interested in the engineering aspects of the autogyro. I remember he built several balsa rotor system models, each between two and three feet in diameter, and would stand with them out in the wind to see how well they would autorotate. I was more interested in flying airplanes, and I always wondered what it would be like to fly an autogyro.

Back in the early 2000s, I saw an advertisement for what looked like a very interesting homebuilt autogyro. The construction methods were very similar to the airplane I was already building, so I ordered a set of plans to look over. I would then take these plans to Dad to look over, since he had way more rotorcraft experience than I did. He determined that it was using the commercially available Bensen rotor system, and that rotor system had a steel hub (not aluminum) so fatigue would not be a concern. After this review, he gave the project his blessing. I didn't start on it right away because I was still building the Bearhawk. After completing the Bearhawk, I spent several years addressing all of the niggling details that weren't quite right and doing other upgrades. By the time I got all of that sorted out, I realized that I should really finish paying off the first aircraft before I started building another aircraft.

Still, I wondered how it was different to fly an autogyro compared to an airplane. While at the 2018 Society of Flight Test Engineers Symposium, I was reading Bill Norton's *American Aircraft Development of WWII: Special Types 1939-1945*. A significant section of this book was dedicated to military attempts to find a use for autogyros. In general, autogyros proved to be expensive, have limited range, have limited payload, and didn't offer significant advantages when compared to small, two-seat light aircraft, such as the Piper Cub and other L-birds. It also mentioned that because the control stick was rigidly connected to the rotor system, a lot of the vibration from the rotor was fed back to the pilot's hand. This was so bad when the rotor was at less than flight RPM that the stick had to be locked in place when increasing from zero to flight RPM or when decreasing from flight RPM to zero. Even while in flight, the vibration would become very tiring to the pilot. At last, this book explained to me why autogyros didn't catch on for commercial or military applications when period pro-autogyro material just glossed over these issues. Then again, most airplanes of that time had bad flying qualities, so it wasn't that unusual.

With this revelation in mind, I decided that I should probably get a gyroplane rating before I started building anything, such that if I decided I didn't like it after all, I wouldn't have spent any money building an aircraft I didn't want. A quick Google search showed the nearest gyroplane training to me was in Santa Maria CA, about a 111 nm flight by Bearhawk. I filed that thought away, but didn't take any action.

In July of 2021, I was sitting at the Operations Duty Officer (ODO) desk, putting together the EAA Chapter 1000 newsletter. While editing the Kommandant's column, I read where he was at the Petaluma CA airport where he

"…slipped easily into the traffic pattern between a couple of school autogyros…". Huh? They have a gyroplane school there? Another Google search brought up their web page, and I noticed that they offered introductory flights for a reasonable price. Taking an introductory flight would at least give me experience to make an informed decision about continuing on with training. Long time friend Karl Major, who was the Operations Supervisor (Ops Sup) that day, was standing by the desk as I read this. I asked him if he would be interested in taking an introductory flight with me, and he said "Sure!". It's always more fun to share these experiences with a friend.

At the time, this was just talk, as in 2021 the "pandemic" was still raging, so we weren't going to be able to do anything about it right away. At some point in the future, I was visiting the Planes of Fame Museum at Chino CA, and noticed that right across the street was Adventure Air, an outfit offering gyroplane introductory flights and instruction. This was also somewhat closer, at only 77 nm by Bearhawk.

In early September 2023 I realized that the pandemic wasn't as big of a problem anymore, and after consulting with Karl, we set up our introductory flights on 6 October 2023, a Friday designated as a "Family Day" such that we were able to get away from the office without doing it on a busy weekend.

Are You Nuts? I Heard Those Gyro Things Were Unsafe!

Oddly enough, the autogyro got its start from an attempt to improve safety. A Spainard named Juan de la Cierva was bothered because an airplane he had designed and built stalled at low altitude, crashing and killing the crew. He reasoned that if the lifting surface was a rotor, the airfoils would continue to move relative to the air as long as the rotor was spinning, producing lift regardless of the airspeed of the fuselage. The major breakthrough was to hinge the rotor to allow it to flap, which solved the problem with dissymmetry of lift. Cierva built and sold "Autogiros" in Spain and England. Pitcairn Aircraft Company and Kellet Autogiro Corporation built Cierva designed Autogiros under license in the United States. The Yanks Air Museum at Chino Airport has the sole remaining Kellet KD-1A of seven built. Cierva focused on building the Autogiro specific systems, such as the rotor, and just purchased the basic airframe from other companies, such as the A. V. Roe Company (Avro). As a result, the fuselages were akin to those used for large biplanes, but the performance and payload of the Autogiro were similar to a Piper Cub or Aeronca Champ. Thus, the popularity of Autogiros was very limited because they were much bigger, heavier, and far more expensive than airplanes of similar capability.

The problem with public perception of autogyros came about from several homebuilt designs that appeared in the 1950s, the most common being the Bensen Gyro-Copter. These were advertised to the public in magazines such as *Popular Mechanics*. These Gyro-Copters could be flown safely by a well-trained pilot. However, many people built a Gyro-Copter and assumed they wouldn't need any flight training. They tried to teach themselves to fly, with predictable results. The Gyro-Copter had a high thrust line (to provide propeller clearance) compared to the center of gravity, meaning that a rapid application of power would cause a significant pitch-down, reducing the angle of attack on the rotor and reducing the rotor lift. This is referred to as the "power pushover". Because all of the flight control force comes from tilting the lift of the rotor, if the lift of the rotor is reduced to zero, there is no way to create a restoring control force, meaning that the Gyro-Copter is "out of control". This predictably led to many accidents. As the Experimental Aircraft Association was only founded in 1953, today's paradigm of high quality amateur built aircraft construction had not been formed yet, such that the build quality of many of these early Gyro-Copters was poor and airworthiness was suspect, also leading to well publicized accidents.

Modern autogyro designs have addressed the power pushover problem by placing proper horizontal stabilizer surfaces in the slipstream of the propeller. For the aircraft we flew, there was no noticeable pitch trim change as the throttle was advanced or retarded.

Getting to Chino

Karl and I departed Rosamond Skypark (L00) by Bearhawk around 0830. This was the first time the Karl and I had flown together in the Bearhawk since our encounter with extreme turbulence (https://www.kitplanes.com/mr-bearhawks-wild-ride/) and we did our best to suppress those memories. Winds were near calm at the departure and destination airports. We only climbed to 5500 feet since we didn't need more for terrain clearance and we would need to descend into the LA Basin. Even so, early on we had a 40 knot crosswind, which gave us a 19 degree wind correction angle, which confused Karl until I explained that the HSI showed heading, while the GNS-480 display showed track.

All of that wind made for a bumpy ride with large deviations on the way down the Cajon Pass, but Karl was able to handle it successfully. There was the usual rapid fire thrash with SoCal Approach, who passed us on to Ontario Tower, who passed us on to Chino tower. By this time, the turbulence had calmed down, and I was able to make an approach and landing on Runway 26R that I wasn't embarrassed by.

We pulled off the runway, stopped, and waited for a chance to call on a very busy Ground frequency. I announced our position and said we wanted to taxi to Adventure Air. They responded with “Where’s that?”. Later I would learn the secret was to say “Taxi to Eagles Nest”. I said it was in the hangars across the street from the museum. Ground gave us vectors around the construction area right in front of us, and then didn’t pay us any more mind. Apparently, we had exited the controlled movement area and they didn’t care anymore.

I taxied to my best guess at where the pin on Google maps said Adventure Air was located. I didn’t see any signage indicating that we were in the right spot. We shut down and I called them on the phone. They came looking for us and found us five hangar rows north of where we were supposed to be, but we had gone to where Google said we should be. Clearly Google doesn’t know everything. The Follow Me car came and guided us down to where we should be. If you are trying to find it yourself, the correct Google coordinates are 33.97941,-117.63856. The hangar row has a sign on the end of it labeled “B160”. You want the north side of that hangar row. If you are driving, drive in as though you were going to the Planes of Fame Museum, but pass by the museum, do a U-turn when you get to the flight line gate, then park your car along the fence. Call 310-570-9390 and someone will come get you.

Our Instructors

The Follow Me car that brought us in was driven by the Office Manager. As I was securing the Bearhawk, which consisted of placing the chocks, our first instructor **Pete Schutte** came out and started chatting up Karl. Karl started telling him what we were hoping to do, and Pete asked him which aircraft he wanted to fly. Karl picked the open-cockpit MTOsport 2017.

After I got the Bearhawk secured, instructor **Henry Boger** approached me and we went through the same discussion. I was more interested in the enclosed Cavalon.

I would later find out that Henry is the CEO of the place. Both of them have an aviation history as long as your arm, and I wouldn’t be surprised if they have two cards each for their pilot certificates just to get all of the ratings and type ratings listed. They listened carefully to what our experience levels were, and then we figured out a flight plan that would be the most productive. Best of all, both Henry and Pete were the embodiment of the type of flight instructors that Karl and I strive to be, so the training was really effective. I would be happy to take more flight training from either one of them.

The Gyroplanes

The fleet at Adventure Air consists solely of AutoGyro brand gyroplanes. The AutoGyro brand is based in Germany, and currently produces the only FAA certificated gyroplanes. All other gyroplanes available on the market are Experimental Amateur Built.

Part of the Adventure Air Fleet

All of these gyroplanes use a two-bladed semi-rigid fixed pitch teetering rotor, which is about the simplest rotor configuration possible. These gyroplanes use direct control, where the stick directly tilts the rotor hub. Lateral motion of the stick tilts the rotor hub to the side, tilting the lift vector and causing a roll to that side. Longitudinal motion of the stick tilts the rotor hub fore and aft. Lift from the fixed pitch rotor is modulated through rotor speed (RPM). Tilting the rotor hub aft increases the angle of attack into the rotor disc, which increases the driving force on the rotor blades. The blades speed up (RPM increases) and the lift of the rotor increases. Just like in airplanes, more lift means more drag, this time because the resultant force vector from the rotor is angled rearward.

AutoGyro Cavalon

I chose to fly the AutoGyro Cavalon, which was a two-seat side-by-side gyroplane. The right seat was considered the primary seat, as in many helicopters. I flew in the right seat, and my instructor Henry flew in the left seat. We flew with the side doors installed, which could be easily removed for flight without the doors. The doors opened upward, and were left open for ground operations and taxi.

The throttle quadrant and wheel brake lever, similar to the type shown below for the MTOsport 2017, were located on a console between the seats. Steering on the ground was provided by a steerable nosewheel controlled by the rudder pedals. Wheel brakes were provided on the main landing gear wheels which acted together (no differential braking).

AutoGyro Cavalon

Me with Yellow Cavalon N888LK

The powerplant was a Rotax 915is with 141 horsepower for takeoff and 135 horsepower for continuous operation. It employed dual electronically controlled fuel injection, using dual channel Rockwell Collins ECUs with dual ignition. The engine was turbocharged and could maintain rated power up to 15,000 feet. The cylinder heads were water cooled, with radiators provided for water and oil cooling. The Rotax 9-series engines had a short stroke and ran at high RPM with a geared output shaft. With a maximum RPM of 5800, typical RPM values were around twice those expected by people familiar with Lycoming or Continental engines.

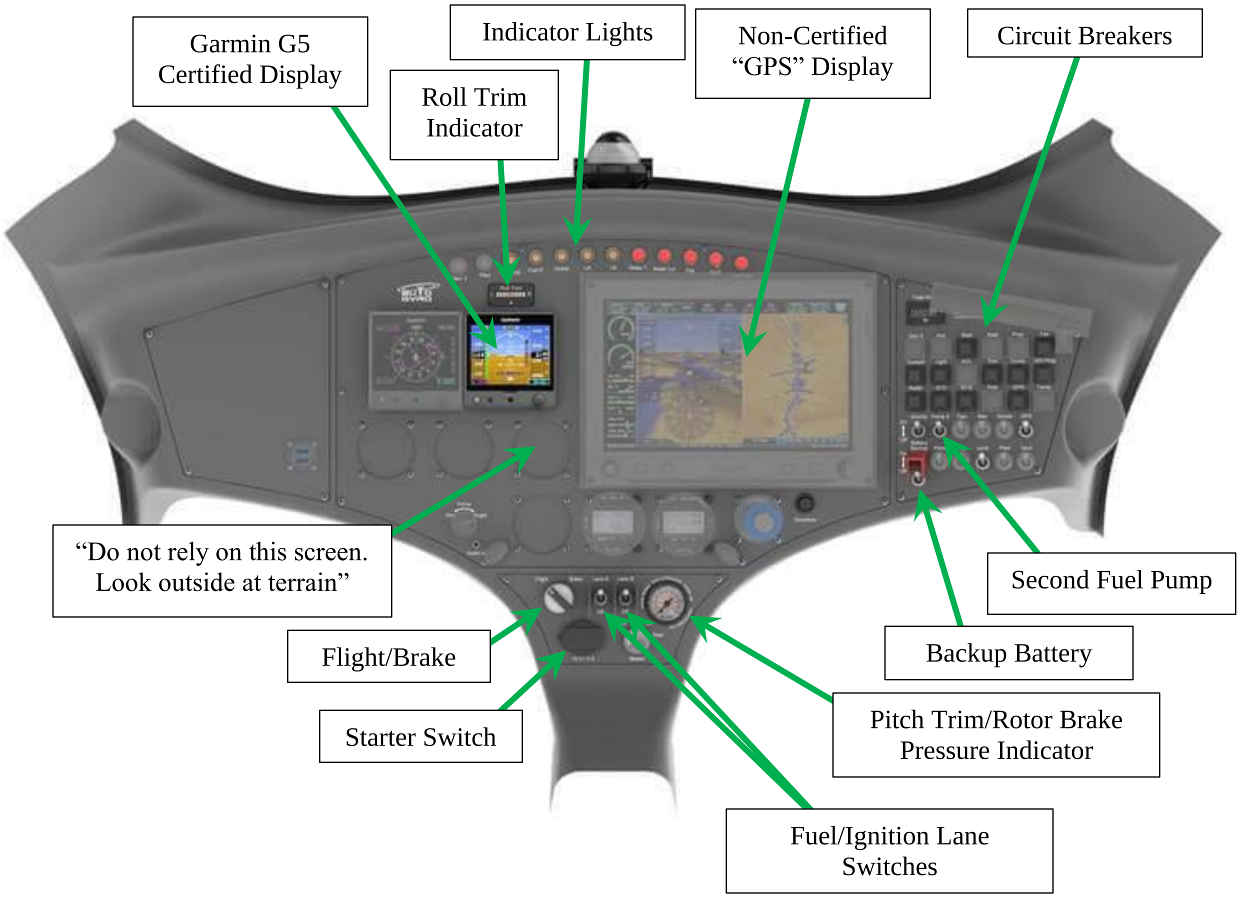
A pre-rotator shaft from the engine to the rotor was provided to spin up the rotor just before takeoff. The shaft used a Bendix gear, much like a starter motor, to engage a ring gear on the rotor shaft.

The engine drove a four bladed, fixed pitch propeller of fairly small diameter (for clearance with the rotor and tail boom).

A tail boom under the propeller mounted a horizontal stabilizer with three vertical stabilizers. The center vertical stabilizer was fitted with a rudder. The horizontal stabilizer and vertical stabilizer/rudder were positioned in the propeller slipstream for increased effectiveness.

Cavalon Tail

The Pitot tube was a short tube that protruded one to two centimeters (it is German, after all) from the nose of the fuselage. The static ports were located behind the seats on the underside of the fuselage pod.



Cavalon Instrument Panel

The instrument panel in the Cavalon was similar to the one shown above. There were two major screens, a small Garmin G5 display and a larger Garmin display. Next to the larger display was an unusual placard, reading something like "Do not rely on this screen. Look outside at terrain". If I'm not supposed to rely on this screen, then why is it there? Apparently the small G5 is the certificated Primary Flight Display (PFD), and the presentations on the larger screen, including synthetic vision, are not certificated. However, the screen that I'm not supposed to rely on has the only presentation of critical things, like rotor and engine RPM, as well as engine temperatures and other important engine data.

In this particular Cavalon, the screens were set up in an unusual fashion. Airspeed on the G5 display was shown in miles per hour, while the airspeed on the larger display was shown in knots. Personally, I was much happier with the knots display. (I would later find out that these displays were set up this way because the owner was trying to decide which units he preferred.)

AutoGyro MTOsport 2017

Karl chose to fly in the AutoGyro MTOsport 2017, which was a two-seat tandem open cockpit gyroplane. The front seat was considered the primary seat. Flight controls and throttle were provided in the rear seat with minimal instrumentation. Radio controls, such as for changing frequencies, were only available in the front seat. Because Chino Airport is a very busy towered field, Karl chose to fly in the rear seat and leave the radio manipulation to instructor Pete.

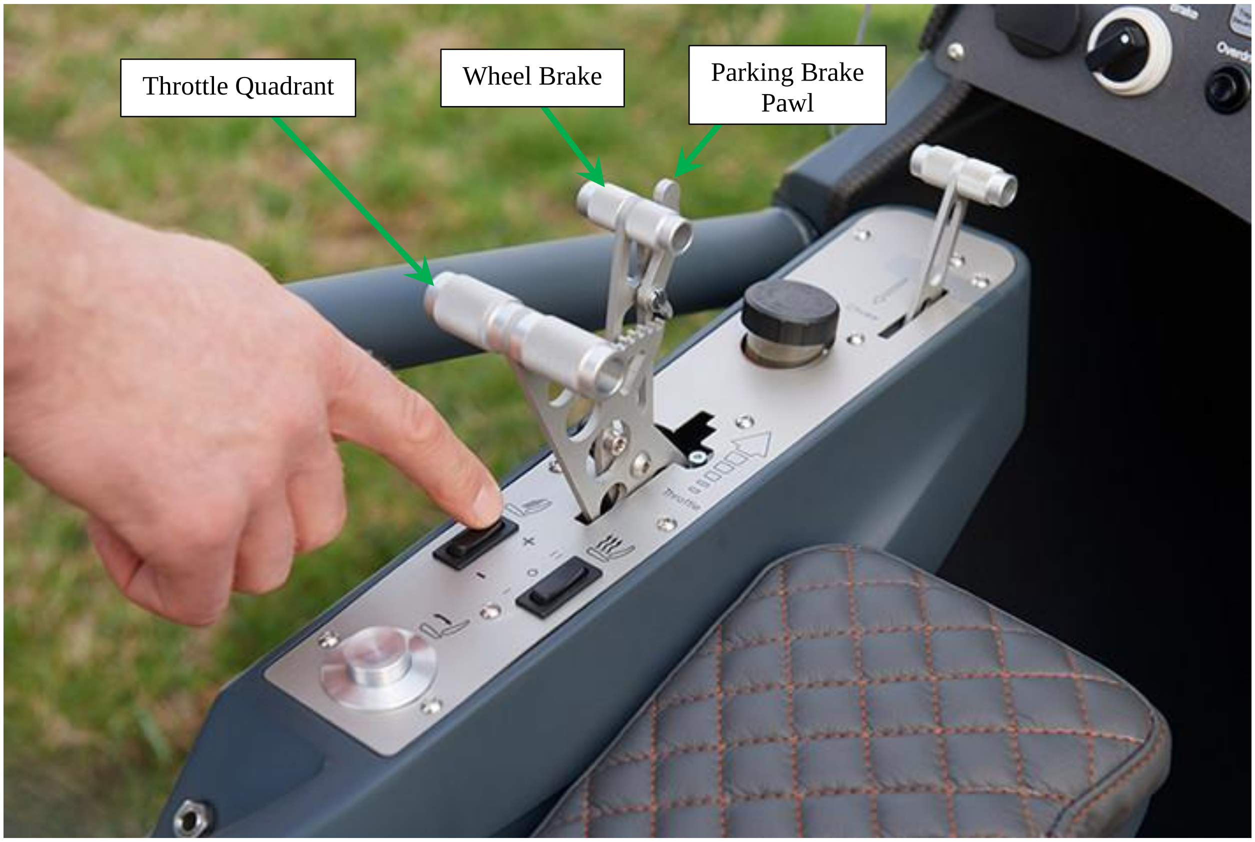
This example of the MTOsport 2017 was powered by a Rotax 9-series engine of lesser horsepower than the 915is, but I don't remember exactly which one.

AutoGyro MTOsport 2017

Karl with Red MTOsport 2017

The rotor system, landing gear, and tail assembly were very similar to the Cavalon.

The throttle was located on the left sidewall of each cockpit. Mounted on the throttle lever was the Wheel Brake lever, which was actuated by pulling the wheel brake lever toward the throttle lever. A pawl was provided that could be placed in any of several notches to hold the wheel brake lever in place, providing parking brake functionality.



Throttle Quadrant and Wheel Brake

Startup and Taxi

A checklist was provided for startup, and was similar to most aircraft, especially those aircraft with a Rotax 9-series engine. One difference was confirming that the rotor control was in “Brake” and that the brake pneumatic pressure was at a minimum of 6 bars. With the rotor brake engaged, the stick must be full forward, and the rotor brake will not let you move the stick aft. The wheel parking brake was engaged before starting.

Rotax refers to each fuel injection/ignition system as a “lane”. Lane 1 was turned on, the ECU computer ran a self-test on the system, and if everything was okay, turned on a white indicator light. This process was repeated for Lane 2. The electrically driven second fuel pump was turned on to ensure sufficient fuel flow for high power running, and then the starter was cranked. With electronic ignition and fuel injection, startup sounded much more like starting a car than starting an airplane. Because of the pusher prop, the actual start was monitored by listening rather than visually.

Taxiing began by releasing the parking brake. Idle thrust was sufficient for a reasonable taxi speed. Steering was by direct connection from the rudder pedals to the steerable nosewheel. The rudder pedals were pivoted at the bottom, much like gliders and the Bearhawk.

On my first opportunity to taxi, when I felt the need to slow down before a turn, my first response was to try the non-existent toe brakes. When that didn’t work, I tried to reduce the throttle, which was already at the idle stop. Finally, I remembered to squeeze the brake lever into the throttle lever. Sufficient braking was possible with just finger pressure.

In the run-up area, there was no need to do a “mag check” as the Rotax 9-series engines don’t have magnetos. Rotax states that if the white indicator light is illuminated, then that lane is functioning properly. If you really must turn one off and then the other, you can, but all you are really doing is turning the lane off and back on again, which requires waiting for another self-check.

Takeoff

Takeoff was nothing like a tricycle geared airplane, where you push the throttle to full power, steer, and wait to get to rotate speed. There were other things to do, similar to a taildragger takeoff where the tail is raised during the ground run. At a towered field, it may be good to alert the tower that you will need an additional 20 seconds or so on the runway to do the pre-rotation. While the pre-rotation can be done prior to taking the runway, there are issues with making turns on the ground with the rotor spinning (as in tipping over) that are best avoided for low-time pilots.

The pre-rotator was engaged by pressing a button on the stick under the thumb. The stick must be held full forward while pre-rotating whenever the rotor RPM is less than 200 RPM. Below 200 RPM the rotor does not have enough centrifugal force to stabilize it, and moving the stick can lead to excessive flapping, which will likely result in very expensive noises caused by mast bumping and the rotor striking the propeller, vertical tails, and possibly the ground.

For the takeoff (on the runway lined up for takeoff):

1. Move the rotor brake switch to "Flight" and confirm the brake pressure releases.
2. Engage the wheel Parking Brake or hold the brake lever.
3. Advance the throttle to 2000 RPM. Hold stick full forward and press the pre-rotator button. Hold this position until the rotor RPM exceeds 200 RPM. Add power if required to keep engine from bogging down.
4. In a smooth motion, release the pre-rotator button, pull the stick to the full aft stop, release the wheel brakes and advance the throttle to 3000 RPM. Steer with your feet.
5. As the rotor exceeds about 300 RPM, the nose wheel will rise off the runway. At this point, apply full throttle and lift off. Right rudder pedal will be required because of increased P-factor at high power and increased propeller angle of attack. Left stick will also be required.
6. Using the pitch stick, climb out around 60-65 KIAS. Trim as required using the coolie hat.

For shorter takeoffs, the pre-rotator is capable of spinning the rotor up to about 325 RPM, which can then be used for an almost immediate takeoff.

Cruise

In an airplane in cruise, we are used to flying what flight testers call a "front side" technique, where the pitch stick controls altitude and the throttle controls airspeed. If you try to fly a gyroplane this way, your brain will rapidly become confused, because nothing will seem to work right. Gyroplanes fly very naturally according to a "back side" technique, where the pitch stick primarily controls airspeed and the throttle controls altitude. This is the same way we teach flying the glider. Pitch controls airspeed. In the pattern, the spoilers (acting in the same way as a throttle) control descent rate.

To demonstrate this, we did a level deceleration by just slowly pulling back on the stick without touching the power. In an airplane this would cause a gain in altitude. The airspeed decreased, and the altitude remained unchanged.

As a glider pilot, I also felt right at home with the yaw string taped to the canopy. Worked just like in a glider.

In cruise flight, there was some shaking in the stick, but it was not objectionable. Because the stick is directly connected to the rotor, this could be caused by a large number of things. Clearly, if the rotor is unbalanced, its vibration relative to the fuselage could result in shaking in the stick. However, an unbalanced propeller could vibrate the fuselage relative to the rotor, which could also result in shaking in the stick. Even slop in the control system, such as worn bearings, could result in shaking in the stick. It can be a maintenance challenge to keep the shaking down to an acceptable level.

The rotor RPM may get as high as 450 RPM in cruise flight, and possibly more. A bit of recreational maths can tell us the tip speed. A rotor diameter of 28.6 feet gives a radius of 14.3 feet. 450 RPM multiplied by 2π/revolution and divided by 60 seconds per minute gives an angular velocity of 47.12 radians/second. Multiplying this by the rotor radius gives a tip speed of 674 feet/second, or 399 knots. At sea level, standard day, that gives a tip Mach number of 0.60, still well below transonic. With a maximum airspeed of 104 knots, the rotor appears to still be far away from retreating blade stall.

Because of the flexibility of the rotor, the effect of turbulence on the occupants is greatly reduced. Turbulence mostly flexes the rotor blades, and little of that acceleration is passed on to the fuselage.

Maneuvers

For maneuver practice, we proceeded west about 7.5 nautical miles to a location that Adventure Air refers to as "Happy Valley". I was told that this was a large area of privately held land with an owner that has turned down all offers to buy up his land and "develop" it. This is very convenient for Adventure Air, as it provides a location for practicing maneuvers and low level flight without annoying homeowners who are less than impressed with gyroplanes.

Gyroplanes cannot stall like an airplane, which was exactly what Cierva was going for when he invented the Autogiro. This leads to some interesting capabilities. For instance, you can pull the throttle to idle and bring the stick back until reaching zero indicated airspeed. Of course, at this point the gyroplane is descending at about 1500 feet per minute. To recover, the nose is lowered by pushing the stick forward to gain airspeed (using gravity as thrust) and the throttle is advanced to regain altitude.

Pivot turns could also be accomplished by reducing the throttle and bringing the stick back to slow down. At about 30 knots indicated, left stick was used to bank 5 to 10 degrees left, then a large boot of left rudder spun the nose to the left. Stopping the pivot after 180 degrees of turn was easily managed by centering the rudder. Recovery was by lowering the nose and applying power. This impressive maneuver could be used to turn around in a box canyon, or after losing power on initial climbout, thus making the "impossible turn" possible. Left rudder was used to take advantage of the left turning tendency from P-factor. Continued application of full left rudder simply made the gyroplane fuselage spin around within its own footprint, presumably losing altitude at the same time.

Traditional steep turns by banking and pulling yielded a very small turn radius because of the low true airspeed. We exploited the inability to stall, the tight turn radius, and the large power available to fly about 100 feet above and around some small ridges. It felt like we were flying through the Fulda Gap on our way to stop the godless Commies!

Pattern and Landing

At Chino, gyroplanes essentially follow the fixed wing pattern. With a pattern airspeed around 60-65 knots, it is easy to mix with the airplanes.

I found downwind, base, and final to be very much like a glider pattern. At the perch (abeam the numbers), I maintained my airspeed using the pitch stick. I retarded the throttle (much like deploying spoilers) until I saw the descent angle I wanted. Turns from downwind to base and from base to final felt very natural and similar to glider turns.

The flare was at a similar sight picture to a glider flare, around 2 to 5 feet above the runway. Power was pulled to idle to allow the gyro to lose altitude. Because the power was reduced, the P-factor decreased, which required less right rudder pedal or possibly even some left rudder pedal to keep the nose straight. The pitch stick was slowly pulled back to maintain altitude. Once the pitch angle was slightly above the horizon, the main wheels were allowed to sink to the runway. The pitch stick continued to come back until reaching full aft, holding the nosewheel off the runway as long as possible. When the nosewheel finally came down, ground speed was about that of a walk. The phrase was to "hold the nosewheel off as long as possible". I don't think the issue was wearing out the nose wheel. It was merely a convenient indicator to keep the rotor back in an aerobraking position to slow the craft down.

To take off again, check that the rotor RPM is still above 200 RPM. At this point, it was usually still above 300 RPM. Hold the pitch stick full aft, advance the power and apply right rudder pedal. Takeoff as described before.

We asked about wind limits. We were told that the POH states 40 knots (!) of wind, but that wind wasn't as big of an issue for gyroplanes as with airplanes. As for headwind, more wind just slows down your ground speed at touchdown. As for crosswind, with such low landing speeds, a gyro can generally point into the wind and easily land across the runway. With no wing, there was little to no dihedral effect, so any issues with maintaining lateral control were greatly reduced.

Also demonstrated was a "vertical approach" where the gyroplane was slowed to almost zero airspeed just short of the numbers, descending vertically toward the runway. At an altitude of a few hundred feet, the nose was lowered to accelerate to about 60 knots and a normal landing was made.

After Landing

After a full stop landing, the pitch stick was moved full forward and the rotor brake switch was set to "Brake". Pneumatic pressure was applied by pulling down ("aft") on the coolie hat until indicating more than 6 bar of pressure. The rotor will brake to a stop in about 60 seconds.

Gentle taxi turns can be made to exit the runway. Aggressive turns with the rotor still spinning can cause the gyroplane to tip over or the rotor to hit things it shouldn't.

The preferred position for a stopped rotor was directly fore-aft. If the rotor stopped in some other position, a button marked "Overdrive" could be pressed until the rotor was in the proper position. This button engaged the pre-rotator to turn the rotor, even with the brake applied.

With the brake applied, the rotor could still be turned slowly by hand as needed for parking.

The Cost

Like any other type of aircraft, flying isn't cheap, especially when renting someone else's certificated aircraft. In this case, we flew for 1.0 hours at a rate of $269/hour, which included wet gyroplane rental with an instructor.

Upgrade Path

14 CFR Part 61 lays out the requirements for a gyroplane rating at the private and commercial pilot certificate level. Also available is a Sport Pilot rating for gyroplane, which will allow you to fly as Pilot In Command of a gyroplane with the least amount of required training, though there will be limitations on what you can do. For an initial Sport Pilot gyroplane rating, you will need 15 hours of instruction flight, 5 hours of solo flight, pass an FAA Knowledge Test, and pass a practical exam with a different flight instructor than gave you the training. Much of this time is intended to teach you basic airmanship skills that all pilots require.

However, adding on a Sport Pilot Gyroplane rating becomes very attractive if you already have some form of pilot certificate. By the Sport Pilot rule, all I have to do is to fly with an instructor just long enough to attain proficiency in flying a gyroplane. Then I fly with another instructor to demonstrate that proficiency. If the second instructor is satisfied, then he will make an endorsement that will grant me Sport Pilot Gyroplane privileges. And you thought the Sport Pilot rule would never be of any benefit to you.

Interestingly enough, the same procedure can be used to add a Sport Pilot Instructor Gyroplane on to my Instructor certificate.

YouTube Videos!

I encourage you to visit Adventure Air in Chino or some other gyroplane flight school near you and try it out yourself. In the meantime, Henry Boger has a YouTube channel called "Adventure Air" (clever, huh?) that you can check out to see what I have been talking about.

Some recommended videos:

Unbelievable! & Mind-Blowing Skills of a Gyroplane https://youtu.be/Fjb18_UidqY?si=A0IJyaKlWtKbHmRq
Safety First: Common Gyroplane Flight Errors https://youtu.be/qTQYwRE6Ph4?si=O6PEJF-jk6UABnfS
Gyroplane 101: Answering FAQs https://youtu.be/2w4EkAjVK-I?si=4qejUeeFjR4y3mTo

And if you want to see what is involved in trying to minimize stick shaking:

Eliminating Stick Shake: Balancing the Prop and Rotor Part 1
https://youtu.be/dqbeoNI7GMc?si=ggvoi92JWagJ2n-E

- **Russ Erb,** with help from **Karl Major**