Rotary Air Force Marketing, Inc. Presents:

THE RAF 2000 ROTOR STABILATOR

PATENT PENDING

Rotary Air Force Marketing, Inc.
Box 1236,1107-9th St W
Kindersley, Saskatchewan S0L 1S0 Canada
Tel: 306-463-6030, Fax: 306-463-6032
Email: info@raf2000.com
Web: http://www.raf2000.com

Rotary Air Force Marketing Inc. presents…

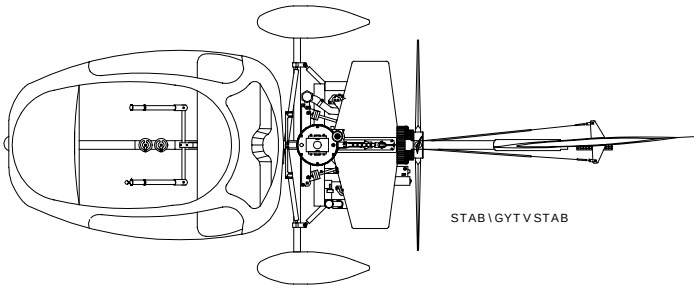
The RAF 2000 Rotor Stabilator (Patent Pending)

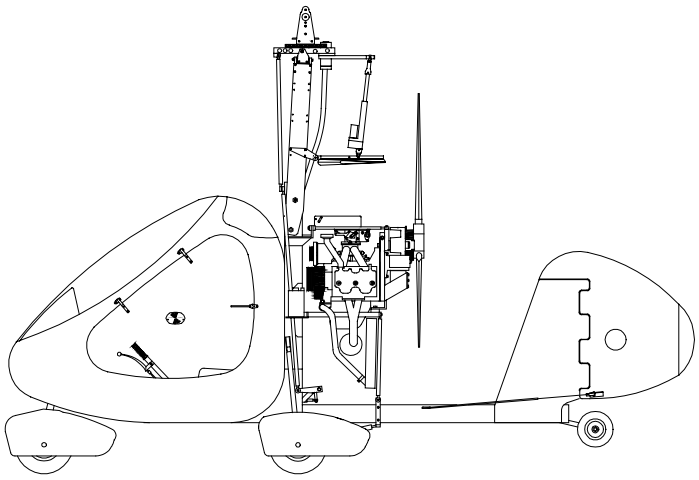
Gyroplanes are a unique aircraft clearly distinguishable from airplanes. The most obvious contrast is the rotating primary lift surface of the gyroplane compared to the fixed wing of the airplane. The primary lifting surface of the gyroplane also acts as a control surface for pitch and roll movements whereas a fixed-wing uses much smaller ailerons and elevators. Furthermore, this lifting surface suspends the fuselage against gravity during flight. Rotational freedom about two axes exists at the joint between lifting surface and fuselage. The pilot manipulates these two free rotational axes for rotor control from the fuselage.

These design differences translate to controllability differences. In comparison to fixed-winged aircraft, rotor rotation and size provides improved controllability at low airspeeds. In fact current gyroplanes display greater agility than airplanes throughout the airspeed range. Advantaged by the rotary-wing, gyroplane control responsiveness variates less versus airspeed than with fixed-wing airplanes. However, control inputs still gain sensitivity as forward airspeed increases. Some pilots find piloting tiresome if turbulent air jostles the rotor disc at higher flight speeds. Novice and non-proficient pilots may be prone to over-control in these same conditions. The two free rotational axes between fuselage and rotor disc removes the ingrained visual reference between wing and horizon for fixed-wing conversion pilots. Rotor motion independent from fuselage motion creates control system movements that further complicate conversion from the fixed-stick fixed-wing practice.

Rotary Air Force Marketing, Inc. (RAF) explored ways to enhance high-speed controllability for novice pilots and cross-country flights over the previous eight years. Early in the project RAF sought criteria from pilots and Certified Flight Instructors (CFI's) on pilot workload and over-control human factors. RAF concluded an ideal device would:

- Maintain the unique maneuvering characteristics of the gyroplane
- Increase pilot feedback from control movements
- Provide direct assistance in the control of the rotor disc





RAF then focused on concepts that met these three design goals. Direct rotor control requires an interface with control rods or torque tube. Dynamic trim from a pilot controlled airfoil provided a simplistic alternative to a computer and sensors. Duane Hunn, Sr., a CFI with 8500 gyroplane hours including 4500 on the RAF 2000, became interested in the project. He built and flew the first rotor stabilator in spring 2002. Further collaboration with RAF led to a groundbreaking improvement after an exhaustive design and flight test program.

Professionally delivered ground and flight training instruction is of paramount importance. No aircraft or aircraft feature substitutes for basic pilot knowledge. A gyroplane equipped with the RAF 2000 Rotor Stabilator still requires complete and current pilot training. Likewise, the RAF 2000 Rotor Stabilator does not prevent risks related to poor pilot decision-making or dangerous attitudes.

The gyroplane industry has traditionally suffered from misinformation and poor attitudes. Many falsely believe a person can learn to fly a gyroplane with only a few hours of instruction. In reality, the gyroplane as with airplanes and helicopters requires a proficient and knowledgeable pilot trained on type class for safe operation. Most gyroplane incidents involve unauthorized individuals or fixed-wing pilots with insufficient conversion training. Other incidents commonly involve pilots whose attitude takes them beyond the aircraft limits. Think about flying at 60 mph (88 ft/sec). Now think about flying 50 feet above ground as many gyroplane pilots do. At this speed and height, you are less than 1 second from solid earth. A normal human response time falls between 1-3 seconds. Considering the delay in control inputs to aircraft motion, your chances of passing unscathed from any unseen obstacle or disturbance are marginal.

The RAF 2000 Rotor Stabilator reduces the piloting workload thus enhancing the flying experience. An RAF 2000 Gyroplane equipped with the RAF 2000 Rotor Stabilator exhibits trim control previously limited to fixed-wing aircraft. On calm, stable days the trim control alone holds the aircraft in fixed attitudes. On gusty, turbulent days the dynamic trim far outperforms static spring or bungee trims.

The RAF 2000 Rotor Stabilator trims rotor motion in steady level, climb, and descent flight. Air passing over the stabilator counteracts minor rotor pitch movements and keeps the aircraft flying straight and smooth. Maintaining a fixed flight attitude by applied airflow against a control surface is called dynamic trim. The dynamic trim provided by the RAF 2000 Rotor Stabilator adjusts through all flight speeds and increases in effectiveness as the airspeed increases.

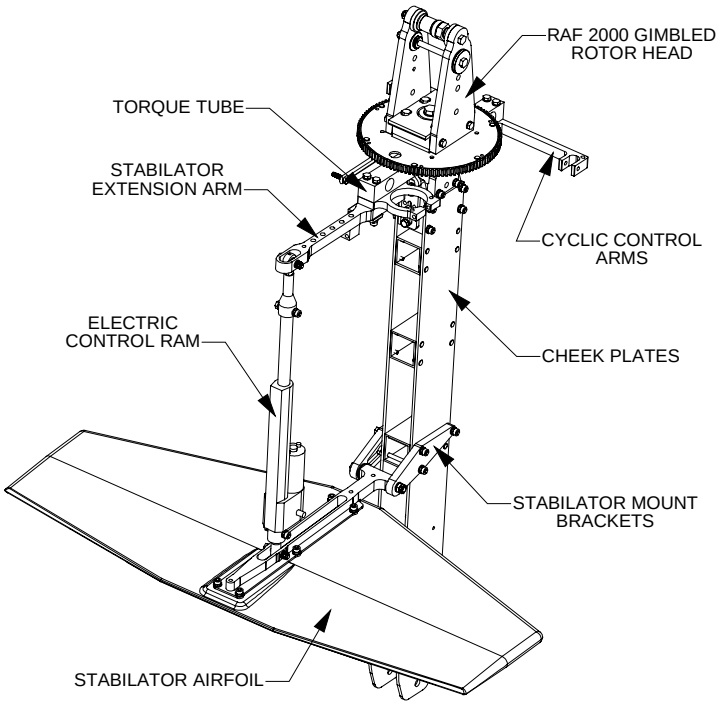
The RAF 2000 Rotor Stabilator is the only dynamic trim device available for gyroplanes that dampens rotor motion. Rotor orientation primarily determines gyroplane motion. Common sense dictates that dampening rotor motion will most effectively dampen gyroplane motion. Further advantages include improved trim performance at high airspeeds, increased feedback to the pilot in the control stick, and easier co-ordination during turns as compared to all other available trim devices.

The RAF 2000 Rotor Stabilator operates with a double throw switch or with the optional four directional switches mounted on the control stick. These switches increase or decrease the electrically driven ram length. As the ram changes in length, the Rotor Stabilator angle changes with respect to the relative airflow.

The optional programmable pitch trim includes a column of LED lights on the instrument panel. The LED lights reference the stabilator airfoil position. A memory switch next to these lights allows the pilot to preset one stabilator airfoil position that can be recalled from memory. The pilot can set this personal favorite for take-off, cruise, landing, or any other flight mode. Movement cancels with a single touch on the trim switch should the pilot accidentally select the personal favorite or need to make an unexpected maneuver.

The backward compatibility of the RAF 2000 Rotor Stabilator design means installation with ease to all pre-existing RAF 2000 Gyroplanes. The mechanical portion attaches to the airframe with the pre-existing fastener removal and replacement. Routing and attaching the wire harness requires seat tank removal. The optional position light display attaches to the bottom of the instrument panel (or other convenient location). The optional push-to-talk switch and trim control switches install into all previous RAF 2000 Gyroplane stick control configurations.

RAF 2000 Rotor Stabilator
Benefits
- Reduces pilot workload
- Increases control stick feedback
- Improves trim as airspeed increases
- Dampens rotor motion
- Enhances the flying experience



RAF 2000 Rotor Stabilator
Standard Components
- Composite stabilator airfoil
- Electric control ram
- Standard manual roll trim
- 2-position control switch
- All mounting brackets
- All hardware
- All wiring

RAF 2000 Rotor Stabilator
Optional Extras
- Programmable pitch trim with LED display
- Electric roll trim
- Stick-mount 4 control switches
- Stick-mount push-to-talk switch

Photos shot at EAA AirVenture 2003, Oshkosh, Wisconsin

Acknowledgements:

Dave Armstrong, RAF Representative, Botswana
Garth Armstrong, RAF Representative, Botswana
Duane Hunn Sr. CFI, Pilot, Subject Ship
Jim Logan, CFI, Pilot, Chase Ship
John Miller, Editor, SA Flyer, Photographer

For More Information Contact:

Rotary Air Force Marketing, Inc.
Box 1236,1107-9th St W
Kindersley, SK S0L 1S0 Canada
Tel: 306-463-6030, Fax: 306-463-6032
Email: info@raf2000.com
Web: http://www.raf2000.com