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POWERBOX SYSTEMS

IGyro 3e

Turn off the wind!

A lot of background information can be found in a two part series on aircraft gyros in the May 2015 RC Jets column as well as the Jet Colum in this month's issue and if you're contemplating installing your first gyro I encourage you to read both columns.

Power Box Systems has a number of highly innovative products built specifically for the RC modeler. Known best for their power distribution systems, Power Box Systems has a lineup of gyros designed specifically for fixed wing model aircraft. The top of the food chain is the IGyro SRS which is a high tech unit that stabilizes three axes and has a GPS sensor to adjust the optimum gain on the gyro based on the current ground speed of the model and it fully integrates with their Power Distribution products. At the economy end of the spectrum is the soon to be released IGyro 1E that stabilizes a single flight axis. This is probably ideal for those looking to tame an unruly tail dragger model by using a small gyro on the yaw axis. In the middle is the IGyro 3E which is the subject of our review. The 3E is a triple axis gyro, without some of the fancy features of the SRS, but at a more attractive price point that is likely to appeal to a wider audience. Don't let the lower price fool you, the IGyro 3E is packed with a number of high end features such as selectable heading or rate mode, five servo outputs as well as delta and V-Tail mixing.

The IGyro 3E features a triple axis MEMS sensor gyro that is enclosed in a nicely machined two-piece aluminum case. There are five servo inputs and outputs (2 each aileron and elevator and one for rudder), a remote gain control lead and a MISC port that will be used for future expansion. A set of status are LED's provided on top of the gyro as well as a programming button. A diagram to show the signal, power and ground orientation of the connectors is printed on the bottom of the gyro. There is also a USB port for connecting your IGyro to a laptop or other device. A terminal program can be downloaded for free from the Power Box website that can be used for advanced configuration as well as updating the firmware on the gyro when new software is released. It's a cool feature and if you're a techno-geek like me, it will be hard to resist playing with it, but most folks will be able to configure the gyro without ever having to connect it to a computer.

Top of the IGyro showing the servo connections, LED's, and programming button.

Shot of the bottom of the IGyro 3E, the wire pin-out is unfortunately covered by the double side mounting tape.

NEED TO KNOW

MANUFACTURER: Power Box Systems

DISTRIBUTOR: Chief Aircraft

TYPE: 3 Axis Flight Stabilization System

FOR: Any skill level

PRICE: $239.00

MINIMUM FLYING AREA: N/A

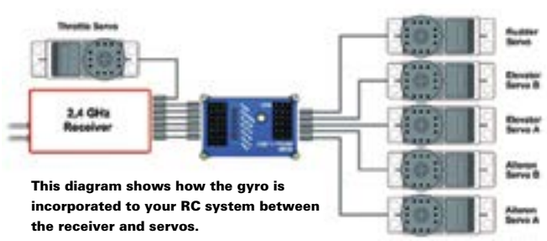
NEEDED TO COMPLETE: Suitable aircraft and 1 spare switched aux channel

Author's Opinion

The IGyro 3E is small, light, reasonably priced and supports two modes and 5 servos with remote gain input to allow gain and mode adjustment via the transmitter in flight. Basic configuration is easy and the device is pretty much plug and play. Advanced configuration can be done with an optional USB cable and a downloadable terminal program. Gyro operation is all but invisible to the pilot, but I tested the IGyro 3E on my Habu and it barely gave any indication that the wind was blowing.

The IGyro 3E is designed and included it specifically for fixed wing aircraft. In hold mode with the sticks at neutral, hold mode is engaged on the aileron and elevator axis, but when the sticks are moved, hold mode disengages and the gyro reverts to rate mode with progressively less gain as the stick is moved further from center. Flying a fixed wing plane in hold mode takes a little getting used to, but the way the IGyro implements it works very well.

Also included with the gyro are six patch cables to go from your receiver to the gyro for the channels you're stabilizing and two double side adhesive mounting pads. One of those male to male servo cables serves as your remote gain control which plugs into an open aux channel on your receiver.



This diagram shows how the gyro is incorporated to your RC system between the receiver and servos.

INSTALLATION

The IGyro only includes a two page quick start guide and for most users, that is all that will be required to get the IGyro flying successfully. Without restating much of what I already wrote in the May issue, select a location that is convenient to your receiver, perfectly flat and as free of vibration as possible. Mounting at or near the CG isn't important, making sure the gyro is perfectly parallel to all three axes is. The direction of flight is indicated in the guide and must be adhered to unless you access the gyro via the terminal program. If you botch a mounting pad or change your mind, 1" wide 3M VHB mounting tape works perfectly.

Once the gyro is mounted you connect the gain cable to an open channel on your transmitter. Initial flight testing should be done with the gain assigned to a dial or slider. Once you have the settings nailed down this can go on a three position switch. The elevator servo or servos are connected, the aileron servo or servos connected and finally the rudder servo is connected. The IGyro receives power through the receiver bus and only draws about 40 mA and is rated for up to 20 amps. I've included some screen shots, but unless your plane can't physically accommodate the default mounting you're not going to have to play with the terminal software.

I installed the IGyro on my Habu 32X, not because it needs a gyro, but because I put close to 50 flights on it in course of a month so I was very familiar with its flying characteristics. I located the gyro on the floor of the jet next to the receiver and under the battery tray. I took care when building the Habu to balance the motor/fan combo so vibration won't be an issue. I sanded any imperfections on the bottom of the plane and cleaned the dust away. I cleaned the bottom of the gyro with alcohol and used the double sided pad to mount the gyro to the bottom of the plane. I tested it for security and neatened up the wiring.

RADIO AND GYRO CONFIGURATION

There's really not that much to do here. As I said above, pick a channel and assign a knob. My DX-18 beeps as you're passing center which is extremely helpful during the flight test phase because it tells you when the gyro is off.

The gain channel will be at 0 gain when the knob is centered and as you move the knob or slider off center it enters either normal or hold mode depending on which direction you move, while increasing the gain the further you get from center.

Once you have the gain squared away, you are supposed to turn the gain all the way up in normal mode to set the gyro direction. **BE SURE BEFORE YOU START THAT THE RADIO IS PROPERLY CONFIGURED AND EVERYTHING IS GOING THE RIGHT DIRECTION! THEN CHECK AGAIN.** I actually prefer to use hold mode for the direction test because the surface will stay put.

Tilt the nose up and make sure the gyro

USB programming cable is available to access the advanced configuration functions and can be used to update the firmware as new features become available.

The terminal program accesses several advanced configuration options to optimize your IGyro including individual channel gains and Delta Wing mixing.

SPECS

OPERATING VOLTAGE: 4.0V – 9.0V
CURRENT DRAIN: 40 mA
MAXIMUM CURRENT LOAD: 20 A
SERVO OUTPUTS: 5
SERVO SIGNAL RESOLUTION: 0.5 us
GYRO MODES: Heading Mode and Normal (rate) mode
SENSOR TYPE: MEMS
SENSOR AXES: 3 (Roll/Pitch/Yaw)
DIMENSIONS: 43mm x 30mm x 15 mm
TEMPERATURE RANGE: -30C to 75C

KEY FEATURES

- Extremely accurate triple-axis MEMS sensor.
- Control algorithm designed specifically for fixed wing model aircraft.
- Input for in-flight gain adjustment.
- 16-bit processor for fast, high-resolution signal processing.
- Includes six patch cables and two double sided mounting pads.

PROS

- Easy to install and configure even without a laptop connection
- Inexpensive compared when compared to the cost of a large model or jet
- Nice anodized aluminum finish
- In flight adjustable gain

CONS

- A wire diagram is printed on the bottom of the gyro that will be covered with mounting tape rendering it not visible after installation.
- Stabilizing two servos on the rudder axis for nose wheel steering takes some tinkering

gives down elevator. Roll right and make sure the gyro inputs left aileron, nose left and you should see right rudder. The rudder will return to center because it doesn't use hold mode. If anything is backwards simply press the setup button until all the lights go out. At that point Aileron A will be lit, if that servo is correcting backwards tap the button otherwise hold it and it will move to the next servo. Any servos that need reversed should be and that setting is saved immediately.

Perform a full control and gyro direction test again. Then do it with a friend watching to double check. I may sound redundant, but if the gyro is correcting backwards for aileron, for example, and the plane starts rolling right, the gyro will make it roll harder; not correct it. The result will either be having the presence of mind to zero the gain, landing and changing your pants or retrieving the model with a Dust Buster. I've seen backwards tail rotor gyros a lot and have done it myself during late night building sessions so I speak from learning the hard way here.

Popup hints explain the various settings and functions.

FLIGHT TESTING

I couldn't have asked for a better day to test the IGyro. The wind was blowing at 8 to 10mph right down our primary runway, but it was also a 90 degree cross wind to our second runway that is generally used by the helicopter and foamie crowd. With the gain set at 0, I advanced the throttle and took off and nothing happened. So far so good! With a few mistakes between my Habu and the ground and about 60-percent power I advanced the gain until I could see some oscillations which occurred first on the aileron axis. I brought the jet down low at full throttle now that I had my confidence up and tweaked the gain as high as I could get in normal mode at full speed without getting any shimmy. A few laps at both high and low speed gave me the impression that the Habu was flying exactly as before, the difference being that it seemed utterly unperturbed by the wind gusts. I set up for landing and the approach was rock solid right to the ground.


The Habu 32X made a great test bed and flew extremely well when the wind kicked up. On a calm day it wasn't even noticiable.

I brought the end point down on the normal side so that I could move the lever all the way to the end and swapped a fresh pack in to play with hold mode. I took off again with the gyro in normal mode and the slider all the way forward. Since it doesn't control the nose wheel I didn't notice any effect on the ground, but it climbed smoothly away. I performed the same procedure as above, slowly raising the gain until it oscillated, flying low and fast. Hold mode is really something. Roll inverted in normal and it will slowly arch toward the ground, but if you roll inverted in Hold and establish your line, the plane remains level and rock solid. Point rolls stop when you let go and only minor rudder correction is needed for knife edge where the pitch and roll stay put. Flying in Hold mode takes a little getting used to, but before my timer was telling me to land I was in a groove.

This time I setup my approach on the helicopter runway with a stiff crosswind. Leaving the gyro in Hold mode, the Habu landed just like I was landing into the wind, albeit with a slightly higher ground speed. I flew in Hold mode almost exclusively after that flight though I did spend a little time decreasing the end point and getting the most gain I could without oscillation. At the end of the day I setup the gain on a switch and added a mix to my gear switch that kicked up the gain by 5 percent when the wheels are down.


IGyro 3E mounted next to the receiver in my Habu 32x. Before I cleaned up the wiring!

CONCLUSION

In calm winds on a good flying plane you might think that you wasted your money on a gyro. If the plane is a handful though, you might think you are flying a completely different and well behaved plane.When the wind picks up, however, the plane keeps right on flying the same way … like it's on rails. Cross wind landing? No problem. A gyro won't add power when you're going to stall and it won't overcome something the airplane isn't aerodynamically capable of doing. What it will do is make minor corrections at a rate that no human pilot is capable of.

How many times do you go to an event and weather is less than ideal? Depending on the distance and the event, that might be a significant investment in time and money. You'll still be flying with your IGyro at a much higher comfort and enjoyment level. Flying a twin and an engine goes out and you need enough time to get your wits about you? The IGyro will be correcting the rudder before you know you have a problem.

Note that I used the IGyro in a ducted fan jet because it tied in nicely with my Jets column, but the IGyro is appropriate in any fixed wing aircraft and I plan on flying it on a few different airframes. To the naysayers that talk about cheating or about the gyro flying the plane, enjoy listening to your 8 track on the way to the field. Flying an IGyro will increase your enjoyment, making you fly more, which in the end will make you a better pilot. ✪

CONTACTS

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For more information, please see our source guide on page 97.