Do you like to receive JETPower regularly, on time and convenient directly home? You don’t like to miss any issue again? Order JET-Power as subscription.

Expect great prices as added benefit!

Have a look at our online shop and discover DVDs, informative books, airplane documentations and more.
Do you still have the jitters, or has a gyro calmed you down?

**From: PowerBox Systems in Model Jets**

Jitter? My model doesn’t jitter! Okay then, it’s not the model - but maybe the pilot is a little shaky. Anyway, our models are kicked around terribly by gusts of wind and turbulence over the site and at the landing strip. And that’s exactly where fixed-wing gyros come into their own. In our cars such automatic aids have long since been standard equipment - think of ABS and ESP - but many jet pilots still shy away from them. Which of us wants it said of him that he can’t manage his model without the support of electronic gizmos? For normal flying in optimum wind and weather conditions there is absolutely no need for a gyro. But if the wind is gusty, or changeable in direction, jets can easily develop a mind of their own - especially when the landing is imminent - and this does absolutely nothing for the pilot’s nerves. Our flying site is often badly affected by gusts, cross-winds and lee rotors, and those nasty moments on the landing approach have already cost me many Euros and probably a few years off my life. However, since I installed an iGyro, my model is distinctly smoother in the air, and all aspects of flight and landing have become substantially more relaxed. The jitter that would have to be expected with the various configurations, has been eliminated. A gyro may seem expensive - just on 400 Euro for the Gyro complete with GPS and USB - but the outlay is very quickly returned with interest.

I first installed the PowerBox Systems iGyro in my small Sebart Katana, and was instantly hooked. In fact, it was hard to believe that it was the same model. The tendency to wobble a wing in the barrier, or tuck under at full-throttle, were completely eliminated, and the effect of the wind almost completely disappeared! I subsequently fitted the iGyro to my CARF Eurosport via the CARF Yak, and it has also shown its worth in my Hobby Top Gun L39 and CARF Ultralash - the latter a jet, please note, which actually does not need a gyro. More recently the unit has flown in a Eurosport Evolution with thrust vector control. I intend to report back on this later, together with my experience with the Ultralash.

In my opinion the iGyro is the most interesting gyro system currently available: it is light and compact, and I was able to integrate it into my Futaba radio control system without a major investment in extra wiring and setup time. The system is very understandable in respect of installation space and position, and features speed-depen- dent gain control when used in conjunction with a separate GPS sensor, which plugs in to the unit. It also has one feature which is to the best of my knowledge unique: the iGyro works in two modes without manual switching. The first is Normal or Damping mode - the familiar mode present in every other gyro - and the other is Heading mode. Heading mode is active as long as the sticks are at their centre position; when the pilot makes a deliberate control command, the gyro switches to Damping model, and acts as a perfectly "normal" damping gyro, compensating for all movements not commanded by the pilot. As soon as the pilot centres the sticks again, the iGyro automatically reverts to Heading mode, i.e. without the pilot having to operate a switch.

**iGyro in the Eurosport**

Now let’s see the iGyro in practice: I installed the unit in my elderly Eurosport (second generation, detachable fin, large fuselage hatch, JetCat P180 RX), in the hope of alleviating a couple of its bad habits: the well known tendency to rock around the roll axis to a greater or less extent in windy conditions, and the tendency to dip its nose in a turn.

**Preparation**

Before the gyro is installed in the model it is as well to read through the clearly written and well illustrated manual, and the Setup Assistant instructions. The former is incomprehensible, and covers all the unit’s features and functions in detail, while the folded sheet covering the Setup Assistant is all you need to set up the gyro in double-quick time. Before starting on the procedure, it is essential to prepare two spare channels at the transmitter: one three-position switch for the flight modes, and one slider or rotary adjuster for gain control - for safety’s sake please check what you have assigned immediately using the transmitter’s servo monitor! When the setup procedure is complete, the gain channel can be disabled again, and used for any other function.

For the initial “dry run” I simply unscrewed the appropriate components from the Eurosport and mounted them on a test board. This enabled me to play around with the various configurations, and also gain a “live” idea of the servos’ movements when the activated iGyro is moved. Even so, I would recommend re-setting everything to zero before installing the unit in a model, so that you really are starting from “square one”; this is accom- plished by selecting Factory Reset in the iGyro’s menu.

**Installing the iGyro in the Eurosport**

The installation procedure was uneventful, as there were several possible locations in the Eurosport which called for no major structural changes. The only requirements regarding the gyro’s position are that it should be perpendicular to the jet’s vertical (yaw) and longitudinal (roll) axes, and ideally with a clear view of its integral screen; the position you select is entered in the menu at a later stage. The orientation of the gyro is defined by the position of the screen and the Setup switch socket. In my case the screen is on top, and can be read out conveniently, while the socket for the Setup switch faces left, towards the centre, where it is easily accessi- ble. The switch is used to carry out the entire set-up procedure of the iGyro.

The iGyro is supplied with self-adhesive mounting pads, which would be destroyed every time I removed the unit, so to avoid this I mounted the device on a slightly oversized plate made of a CFRP sandwich, and fixed this in the jet using two screws. If there is no suitable structure for it, all you need to do is glue two hardwood rails in the fuselage to accept the gyro plate retaining screws. This arrangement makes it very straightforward to shift the unit from one model to another.

Once you have determined the gyro’s location in the model, it takes about half an hour to complete the basic setup procedure. At the flying site I would suggest that you spend a few minutes activating the Test Fly Assistant.

**Set-up**

The switch mentioned above is only needed for the initial set-up procedure, and later for any changes or fine-tuning re- quired. Alternatively you can leave it in the model if you prefer. For maximum flexibility mine has a permanent place in the pitbox, so I can make adjustments at any time.

The switch housing is identical to that of the Servo Switch and the switches supplied with PowerBox battery backers. A short press on the Set button calls up the menu, and activating each menu option is as required, while buttons I and II are used to change the values.

**Set-up procedure**

Of course, the fundamental requirement is that the setup menu is easy to follow and accurately, with slop- free linkages installed at right-angles at the control horns, and that the control surface movement is as demanded. The setup procedure for the iGyro uses the Setup switch, and is very swift to complete: the Setup and Test Fly Assist-
Once the basic settings have been entered in the “Basic Setup Assistant”, the next step is to activate the Test Fly Assistant in the iGyro’s menu, and move all the sticks briefly to their end-points. The gyro now “knows” the travels, and you’re ready to fly the model!

GPS speed sensor
So what has airspeed to do with the gyro? Plenty! If test-floated at moderate speed, the iGyro carries out its corrective actions and reduces the gyro’s gain accordingly. The gyro stores the recorded Vmax, and adjusts the gain appropriately. Increasing the speed factor by one increment causes a more rapid reduction in gyro gain as airspeed rises; this ensures that the jet remains sensitive at landing time, but eliminates the tendency to oscillate at high speeds, without reducing the gain value. As an example, flying my Eurofighter I selected these values during the set-up flight: aileron 28 / 14%, elevator 50 / 25% and rudder 90 / 75% (in each case for Normal / Heading mode). During the fine-tuning procedure I then increased the speed factor to 4 on ailerons only, i.e. at low speeds I can set higher gain, and the gain declines more rapidly with increasing airspeed - result: 30 / 19%.

The canards are assigned to the second elevator channel, and for this function I set up the values manually. This is accomplished simply by assigning a slider or rotary knob channel to gain control for that specific gyro output, and increasing gyro gain during a test-flight. For the canards the values I obtained were 95 / 80% for Normal / Heading mode. At present I only have iGyro support on the canards in Flight Mode (FM); some model helicopters also use for low-speed aerobatic manoeuvres. Heading Mode in the iGyro
As already mentioned at the start, the iGyro operates in Normal (damping) mode unless the sticks are at the centre position, when it switches to Heading mode (model helicopters this mode used to be known as Heading Lock). Flying in Heading mode is different from Normal mode; the jet appears to fly on invisible rails, and this does require a certain amount of familiarisation. But it does not mean that the model is completely different to fly; it just has to be flown more actively. Any tendency the model had to correct itself are no longer present. For example, if the jet used to pull out of a loop or a reversal by itself, then it will no longer do that in Heading mode! However, once you have become used to this behaviour, you will soon learn to love it!

If you do not immediately feel at home with Heading mode, you can disable it in Setup. An alternative ploy is to define one flight mode with Flight mode, and one without (see Flight Modes). With the Heading function active, the iGyro attempts to maintain the jet’s current flight attitude. As the mode’s speed declines, this has different effects depending on the specific aircraft; for example, the Eurofighter loses height safety and controllability, i.e. the iGyro retains and amplifies the typical delta low-speed characteristics. Non- deltas have a reduced tendency to tip-stall, so this can be flown much more slowly and then simply lose height straight ahead. However, the iGyro’s Heading mode does not take things so far that it allows the model to slow down to a point of stalling; this means that the gyro can be left active on landing and take-off without any danger.

If the pilot has a sensitive “throttle foot” and a turbine which responds quickly, it is possible to control the landing and the model’s speed by rectifying its angle of attack. In broad terms, with the iGyro I find that I only have to align the jet with the runway, set-up the correct approach angle and leave the sticks alone … this initially calls for a mixture of courage and faith in the experienced pilot. Of course, if you are already reasonably familiar with your machine, it is better to make the correct response before things become risky — especially if the turbine’s throttle response is relatively slow!

Trim function and Heading Mode
The moment you adjust the trim as associ - ated with one of the axes to which the gyro is assigned, the Heading function is dis- abled until the gyro is reset switched on; the gyro perceives the deviation from the zero position as a control command, and therefore continues to operate as a standard gyro in Normal mode. Every time the iGyro is switched off and on again, the unit adopts the new servo positions as its refer- ence neutral settings.

The flight modes in the Eurosport
FM 1: gyro completely off, signals are looped through 1-3; in my case FM 1 is the up / out position, but this is just a matter of personal preference.

FM 2: Normal mode for all three axes, Heading mode for aileron and elevator; Heading mode on rudder makes no sense here, otherwise the gyro compensates for turns with the rudder, causing the jet to “hang in the turn” (see above for values). FM 3: Normal mode for all three axes including canards. Heading mode for aileron, elevator, rudder and canards (for aerobatic manoeuvres and low-speed 3D manoeuvres). The gain values are quite high in FM 3; values: aileron 60 / 30%, elevator 60 / 30%, rudder 100 / 80%, canards 95 / 95%, in each case for Normal / Heading. With...
For my purposes the iGyro has become an important part of the safety equipment of my jets, and it has already saved me from landing damage several times.

For FM 3 you should activate the previously defined Heading values, but without Heading on rudder. This arrangement temporarily eliminates aerobatic mode, but allows you to feel your way towards Heading mode slowly, and make direct comparisons.

Note 3: in the latest version of the iGyro’s software all three flight modes can be assigned setup-values, for example: FM 1 - low gain in Normal mode without Heading. FM 2 - previously defined settings with Normal and Heading, and FM 3 - 3D or aerobatics, with rolling manoeuvres as straight as a die.

Summary: the Eurosport

The Eurosport now appears to be an entirely different jet to fly. The aeroplane is less twitchy, and flies more smoothly; in simple terms it is just more “jet-like”. Landings, especially in windy conditions, are just as straightforward as without wind. My experiences are more than positive, and for this reason the iGyro is permanently installed in the Eurosport, which now features “scale-like” gyro effects (as we all know, the full-size Eurofighter flies with total gyro support).

iGyro in the L-39

Anyone who is familiar with the Hobby Top Gun L-39 will immediately start thinking about a gyro. Not that this aeroplane actually needs such a thing; the foamie jet flies straight and precisely, and lands as soft as butter in calm conditions.

The iGyro ended up in this machine because I lacked a suitable receiver, but has stayed there ever since, as the combination has proved outstandingly effective! The only receiver I had spare was a Futaba R7008, and its eight channels were too few. However, in combination with the iGyro it is possible to exploit eighteen channels: both ailerons, the elevators and the rudder are connected directly to the iGyro, which in turns receives its signals in serial form via the S-Bus from the receiver, to which throttle, retracts, turbine, turbine aux, nose-wheel steering and lighting are directly connected - and it works! Wiring arrangements for this type of application are included in schematic form in the iGyro instructions.

Fully fuelled, the foam jet weighs just on 3.5 kg, which means that it is naturally susceptible to wind: in straight flight in windy conditions it manifests a slight tendency to rock around all axes, and on the landing approach the little model is terribly buffeted by gusts and cross-winds.

I carried out the set-up flight, and the result was fantastic, as were subsequent flights: a smoothflying model even in quite strong winds, accurate rolls without any need for mixers, and inverted flight without the need for ‘down’. On the landing approach the foamie carves through the lee rotors without any problem. Finally the L-39 no longer drops a wing if I have to rip it off the ground after a fairly long take-off run on long grass. The most impressive aspect is this: in gusty conditions even quite large nongyro aircraft have to stay on the ground. With the iGyro, I can relax and carry on flying.

One final tip

A large number of jet pilots set up their models with very high Expo settings on aileron, elevator and rudder. However, since the gyro does its most pronounced corrective work when the sticks are at the neutral position, and its effects are only suppressed substantially as the sticks are deflected, many pilots find their aircraft respond in a spongy way, i.e. less directly, after the set-up procedure. I counter this by setting up a second flight mode with about 15 to 20% less Expo, and use the iGyro’s flight mode switch to select it - it works!

Summary

For the purposes of the iGyro has become an important part of the safety equipment of my jets, and it has already saved me from landing damage several times. Since my first experiments I have installed iGyros in my three active jets and even my 3D propeller machine, and I am not inclined to remove them again! The models fly and land much more smoothly, and I as pilot also benefit from this - everything has become smoother, and the jitter has disappeared. A successful experiment, to my mind!