

Weatronic internal gyro programming 2

This article describes how to program a Weatronic receiver internal gyro for multiple gains with fade-out. You may want different gains for different phases of the flight, for example a lower gain for normal flight and a higher gain for landing. I finish by showing how you can even have different rates of fade out for each gain, should you feel the need for that.

It is assumed that you have already read article 1 which deals with single gain and fade-out so you are familiar with some concepts which will not be explained in any depth in this article. Both these articles are available at <http://modelpilot.weebly.com/>

If you have other ways of programming these features, or suggestions to improve these programs, please do post them to the thread at http://www.rcuniverse.com/forum/m_9129187/mpage_1/key_/tm.htm which is popular in the English speaking community especially amongst jet fliers who use Weatronic, or to the Weatronic support area at http://www.rcuniverse.com/forum/forumid_482/tt.htm

The example set out below deals with 2 different gains, switched by the retracts. However it can cope with many different gains (7 in the way I have programmed the Multiplex 4000) and you can set it to whatever switches you wish.

An aside for Multiplex Profi users – my retract switch is double pole with two separate wiring harnesses, one plugged into a secondary switch socket and one plugged into a control socket, so that the one switch is both S09 and control H at the same time, which greatly simplifies the programming of things like this where controls and secondaries are needed.

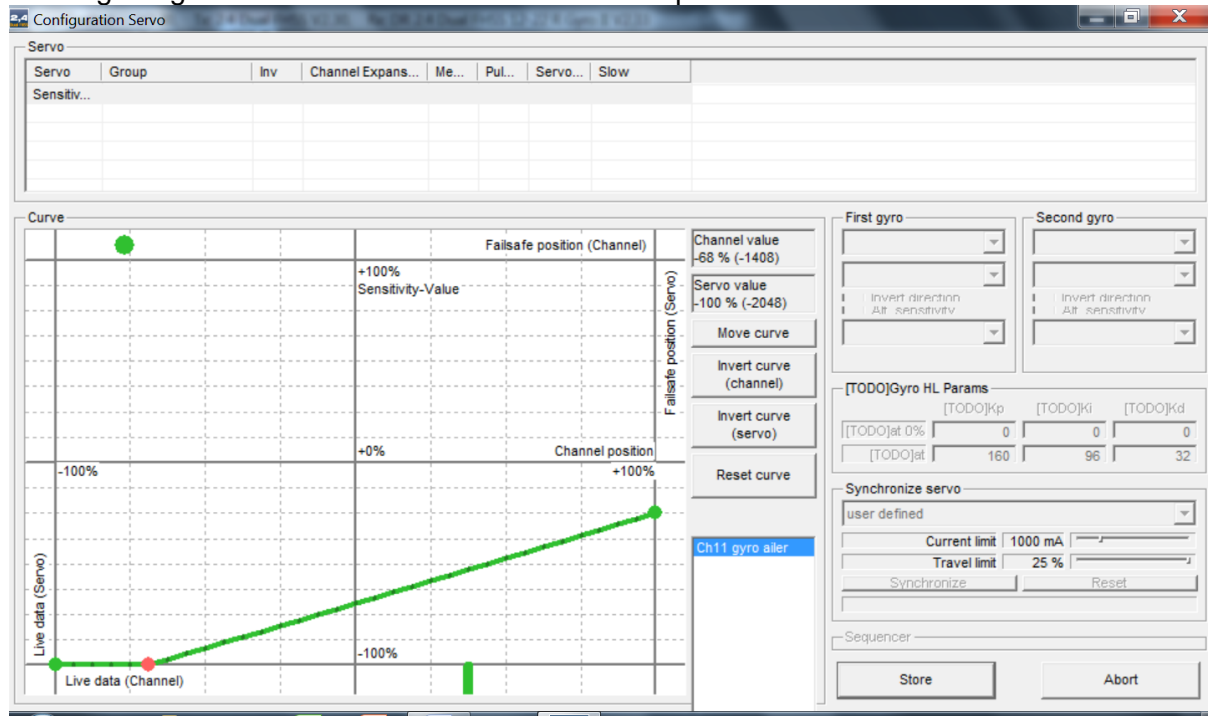
With single gain and fade-out, most of the programming is done to the Weatronic Rx via GigaControl. To have multiple gains, most of the programming is at the Tx so the possibilities will depend upon the capabilities of your Tx and your knowledge of its programming procedures. I am using a Multiplex Profi 4000 Tx which is very simple to program and produces clean programs without unintended consequences. The latest Japanese Tx have improved a lot but less recent versions have muddled concepts in their software and altering one value can often have unexpected consequences to other values, so whatever you do please test and test that your Tx does indeed produce the results that you think it will.

Please refer to article 1 and follow the instructions about how to set up the gyro and do the test flight to establish the level of gain that you want. This article picks up from the point where the test flight is concluded and you have established the required gain using a slider/knob.

With a single gain we altered the curve in GigaControl to an upside down V shape, for multiple gains we leave it as it was for the test flight, a straight diagonal line. It is worth explaining now the concept of what we are about to do. With single gain, looking at the GigaControl graph, the green control bar along the bottom axis moves left and right following your aileron stick, and sits in the centre when the stick is at neutral. The inverted V shape curve caused the fade-out of the gain as the stick moved to the edge. For multiple gains the green control bar has to move to the left only, regardless of which way you move the stick. That way, either left or right stick makes the green control bar reach the zero gain band at the left end of the graph. The gain when the stick is at centre is then controlled by how far to the right the green bar moves when the stick is at centre, and it is that value that we can control from the Tx travel values. So when the stick is at centre, the green control bar could be anywhere along the horizontal axis, it is not fixed at the centre of the graph. This point at

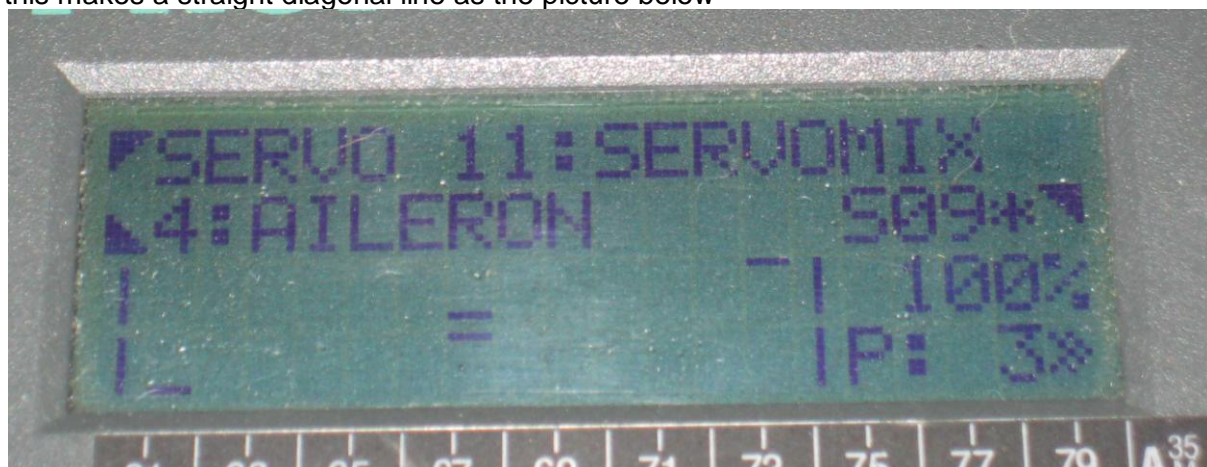
which the green control bar sits when the stick is at centre is what we can change for each different flight mode/condition/phase in the Tx.

Got the hang of the concept yet? It will become clear as we look at the screens. Here is the GigaControl for the gyro at the end of the test flight using the slider/knob to control the gain, showing the gain established as safe at maximum speed.



That establishes the value for normal flight and for the purpose of this illustration we will assume that the landing gain is some arbitrary higher value. This time we do not need to bother too much about the gain value on the vertical axis, because we need to program the Tx aileron stick to replicate the position of the green control bar on the horizontal axis. Make a careful note of its position as that is what we need to replicate a little later.

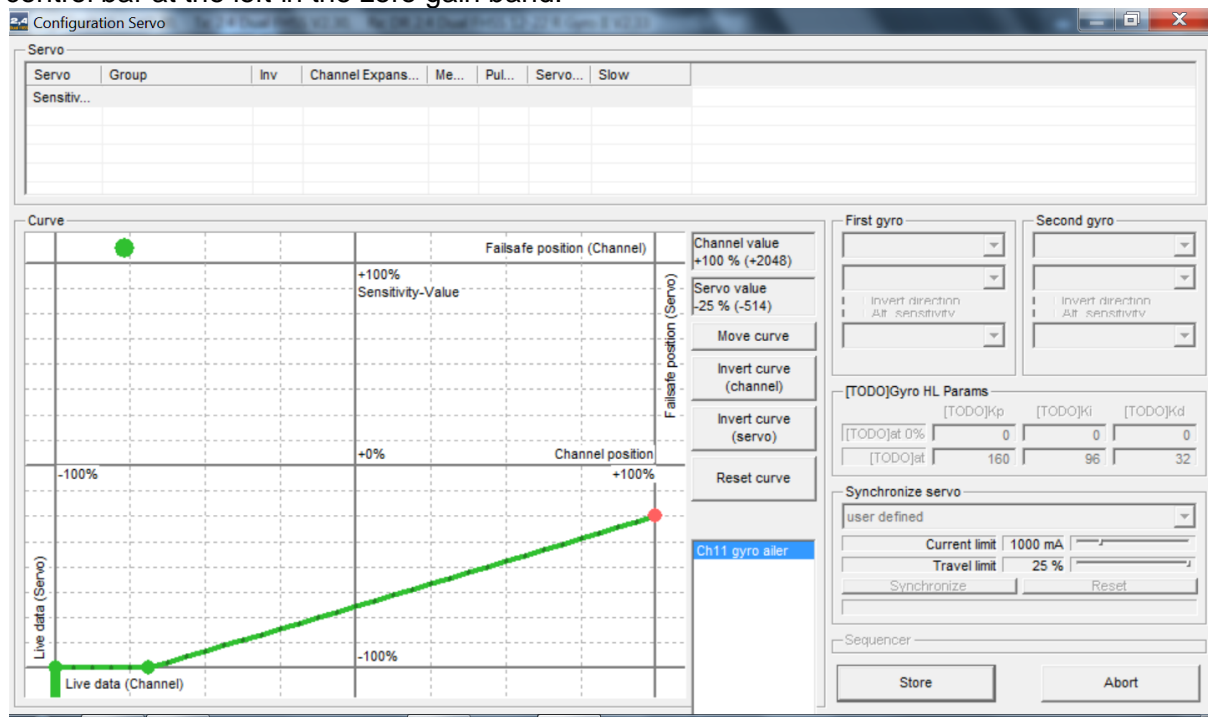
We turn now to the Tx programming. Change the gyro gain channel from slider/knob and master switch, to aileron stick without trim, and master switch. We need the Tx gyro channel to send a travel value in the one direction regardless of which way we move the stick. How? In a Multiplex 4000 the channel curve defaults to this, -100%, 0%, +100%. We can see that this makes a straight diagonal line as the picture below



Change the travel values to -100%, 0%, -100% so that the Tx curve becomes the inverted V shape. Thus the Tx always sends a “left” direction of travel along that channel, whether you move the stick left or right. (Your brand of Tx may need +100% rather than -100%)



That takes care of the required movement in GigaControl, if you now look in there you will see that whichever way you move the aileron stick the green control bar on the horizontal axis always moves to the left into the zero gain band. Picture below shows what the graph looks like for both full left and full right aileron stick - both produce the same view with the control bar at the left in the zero gain band.



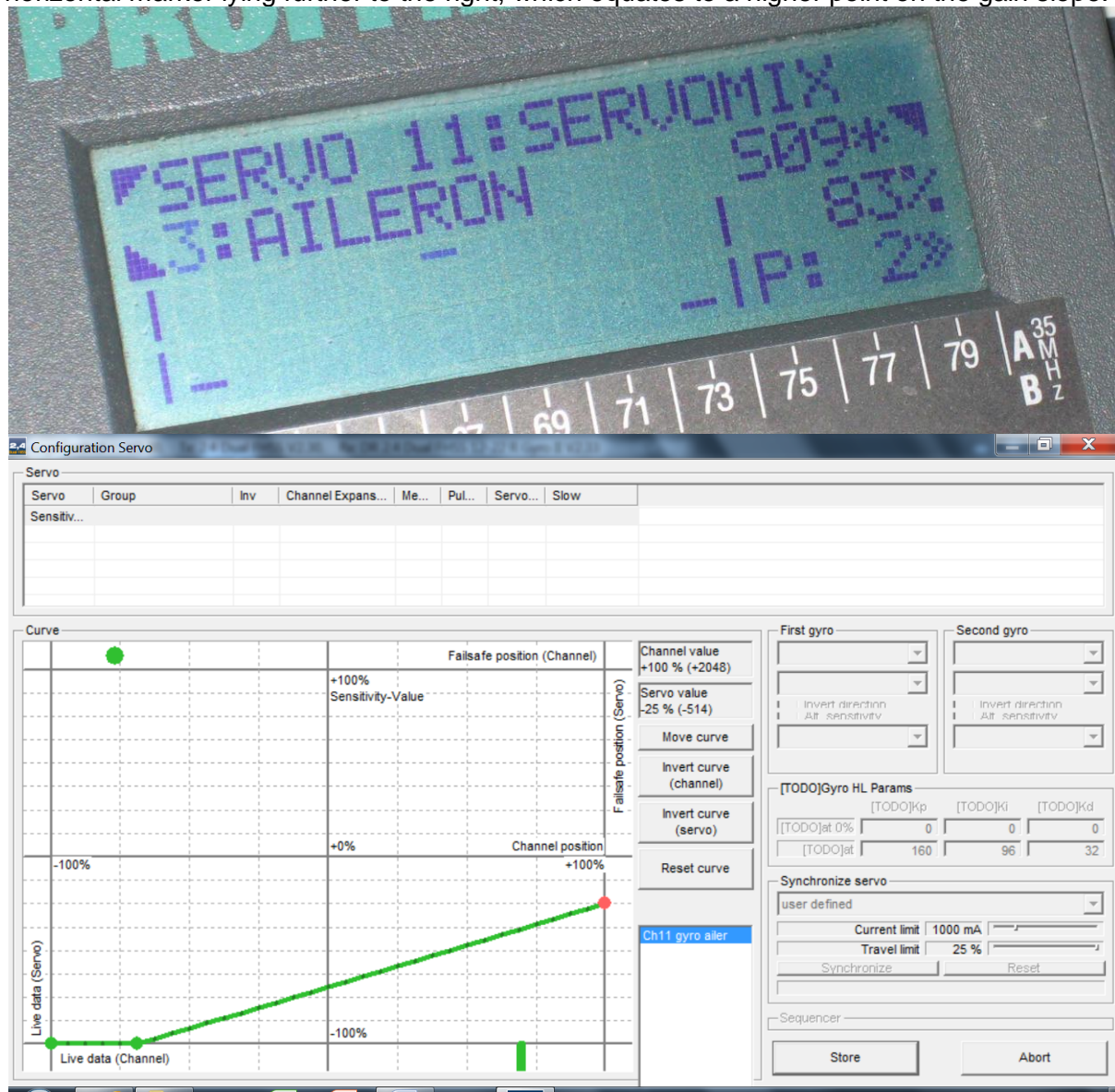
What we need to do now is control the centre point that is sent from the Tx. By varying that we can move the control bar in GigaControl to the left or right, which gives us different gains. An easy way to do this on the Mpx 4000 is to assign the gyro control channel to servomix, inputs 2 and 3 are aileron without trim and their switch is toggled by the retract switch, input 1 is fixed value switched on by the gyro master switch and priority is switched on so that the gyro master switch as the number 1 input overrides either of the other 2 inputs.

Each of inputs 2 and 3 get their own curve and the value of the centre point can be adjusted per input, thus altering the position of the control bar in GigaControl when the aileron stick is at centre.

With the retract switch in the up position, adjust the centre point travel value of the gyro channel in the Tx to make the green control bar in GigaControl match the point where it was at the end of test flying. This is one of the points to be wary of when using a Japanese Tx, as I have often seen them move the end points as well as the centre point, which is not what you want. The result is that my Tx shows a centre point value of +53% instead of the normal centre value of 0%, see picture below, and GigaControl shows that green horizontal marker sitting at the position that we determined in flight testing, shown in the first picture in this article.



With the retract switch in the down position, the Mpx 4000 offers me the screen for input 3, so I can adjust the travel value of the centre point so that in GigaControl the green marker on the horizontal axis lies further to the right, which gives a higher gain. In this case the Tx travel shows the centre point now has a value of +83% and GigaControl shows the horizontal marker lying further to the right, which equates to a higher point on the gain slope.



Now if you watch GigaControl while switching the retracts up and down with the aileron stick at centre you will see that the horizontal control marker jumps left and right, thus altering the gain for the different flight conditions.

In both states of the retract switch, move the aileron stick fully left and fully right and confirm that the green horizontal marker does reach the zero gain band. Move the Tx gyro master switch to OFF and confirm the green horizontal marker goes far left into the zero gain band and that it stays there for wheels up and wheels down and all movements of the aileron stick.

Now we move on to having different rates of fade-out. The instructions above will produce a fade-out that reaches zero gain just before full stick movement. You may prefer a more rapid reduction in gain to reach zero at partial movement of the stick, and may want different rate of fade-out for the landing gain compared to the normal flight gain and fade-out. This is

programmed from the Tx, as it is the Tx travel that determines the position of the horizontal axis control bar in GigaControl and thus determines the gain. In the Mpx 4000 I change the servo curve from the default 3 point, to many more points, in this example to 7 points. I then adjust those points to give the servo (i.e. the gyro gain) a rapid travel to full travel, which is zero gain in the GigaControl graph. Since each gain has its own curve, the fade-out can be set independently for each gain. Should it be needed, all sorts of fade-out curves can be programmed in this way, such as flat top, reverse exponential fade-out etc.

This picture shows the altered servo travel curve on the Mpx 4000, to give a rapid fade-out.

