

Thoughts about the Turnigy TGY-i6 (or the equivalent FlySky) radio system for use in Radio Yachts with particular reference to the action of the trim tabs for adjusting the sheet winch and suggested solutions.



Pros:

1. Light weight so easily held for a long time and fits well in hand.
2. Buttons and knobs readily to hand and feel well engineered.
3. Trims seem positive in action with sound to hear central position.
4. Radio has clear menu displayed on good sized screen with good contrast.
5. Aerials (2) are secure in the small vertical protrusion and in the handle so making the two aerials at right angles to each other and allowing maximum spread of signal
6. System comes with a system to measure the transmitter battery voltage **and the receiver voltage**. Both are displayed as numbers and graphically. This is an excellent feature in this low priced model.
7. Excellent price ~ \$100 Australian (at least it was before the pandemic??).
8. Set up as mode 2 when ordered allows the most common arrangement for the sail winch on left stick (channel 3 or throttle) and steering on right (channel 1 or aileron).
9. Many other features including mixes etc too numerous to mention here

Cons:

1. The action of the knob for moving the sails can be adjusted for tension as my radio had very low friction which does not give good feedback about movement. This does require taking the body apart. I prefer to have the sail winch knob move on small serrations so you can get a feel of how far you move the knob.

2. Like many current radios, the battery required for the transmitter is limited to 4X NimH or alkaline AA cells which need to be removed for charging or replacing. This is maybe good and bad. Good because replacing the cells regularly wipes clean any corrosion around the contacts but can cause mechanical damage over time. At least the springs holding the cells in seem robust. May need stretching out in time to maintain adequate pressure on thee contacts
3. Moving through the menu on the screen takes getting used to as buttons seem to swap tasks depending on the process. The left buttons Up and Down will move the main menu selections up and down while once a section is selected they become a means of changing the values while the OK button now is used to move through the options to change??
4. It took me much detailed reading of the manual to find how to actually save a change entered in the menu. Press **and hold** the Cancel key to exit the current menu area and the changes are then saved. The manual does not say to hold this key as a quick click of the Cancel button simply cancels without saving. Still you get used to this – eventually.
5. The action of the trim tabs particularly on the sail winch knob caused me the most angst. I will now discus this in detail. Notice this discussion specifically relates to the way this radio is used for controlling radio yachts and may not be an issue if it's used for flying model planes etc.

The Sail Trim Problem:

I noticed this issue when I tried setting up a yacht recently using the Turnigy radio. By default all trims are centred when first used and I left them there. I connected a sail winch and drum system to the receiver and used the 'End Point' adjustment to set the general throw needed to move the sails from full in (for beating to windward) to full out (for running square). This proceeded smoothly after getting familiar with the saving setting feature (remember hold Cancel button until menu changes back to previous screen) and moving about the menu.

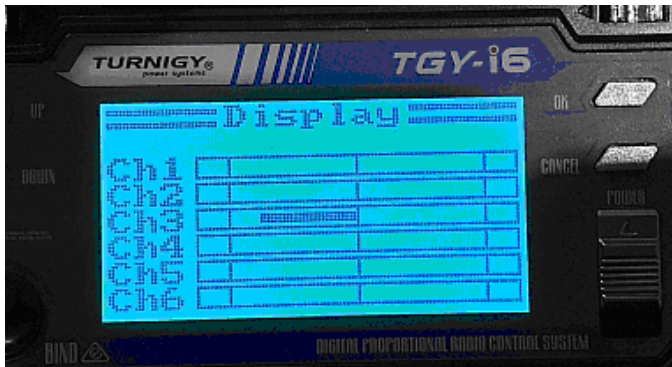
The issue began when I decided to check the fine adjustments using the trim action with the winch in the close hauled position (stick full down). From the centre position of the trim, moving the trim button up worked as expected and let a small amount of sail out. Returning to the centre position pulled the sail back in again. ***When I used the trim to pull the sail in a little further from the centre position such as when you want to squeeze a little higher into the wind by pulling the boom in a little further this HAD NO EFFECT!*** Listening carefully, I could hear the trim action operating but it caused no action on the sail winch.

At first I thought it must be the sail winch but soon realised after trying a few other winches in place of the one I was using that the response or lack of was universal so MUST be the radio. This also occurred after I had reduced the throws on the winch using the end points settings on the radio. The winch had definitely travelled much further back than it now was.

To check this I used the 'Display' function which shows graphically the signal sent to the receiver and the potential position of any servo. Sure enough if the winch stick on the radio is set to its minimum position (sail in) then the lower half of the trim action has no effect i.e. it will not produce a signal less than the 'End Point' already set. The upper half of the trim action still works as it will drive the signal above the 'End Point' value.



Stick fully down – trim centre note display already at max throw



Stick fully down - trim full up – value above 'End Point' so display moves and so does the winch



Stick fully down – trim full down - value should be below 'End Point' but it stays at end point so no movement of display and no movement of the servo!

So any action of the trim to attempt to move the signal below the lower End Point (or in fact above the upper End Point) will not result in any motion of the sail winch.

As the main reason for a model yacht to use a trim on a sail winch is for the close hauled position then the lower half of the trim does not operate. Can you just use the upper half? Yes but this only allows half the movement you may wish.

It would seem no mechanism in the radio allows for signals to be sent which would produce a value below the lower End Point or above the upper End Point. I even tried using another channel mixed with the sail channel to force it outside the End Point range with no success.

No other equivalent radio I have used has this restriction as they all allow the trim to extend outside of the End Point range.

Solution: Thanks to replies from GRYG and Joe R from Austin Texas for having an interest in this topic

I have only one solution (other than requesting an upgrade of the software good luck with that!) and that is to use a hardware solution.

I noticed that if I moved the sail control stick slightly up then the lower half of the trim action now works. So I have introduced a simple stop to prevent the sail control stick from moving all the way to the bottom and reset the End Points to allow the correct range of movement of the winch drum.



What about the fail safe function built in to prevent the radio operating unless the stick is all the way down? It turns out it doesn't have to be all the way down. By moving the stick in small increments up and attempting a restart of the radio the maximum position up of the stick can be found. I set the stop a little lower than this to ensure the radio starts reliably every time.

Now the sail trim works fine both up and down from it's slightly elevated zero position.

The mechanical stop I found most convenient was a piece of plastic to fit inside the depressed region around the stick matching the bottom curve. I bevelled the top edge to match the angle of the stick as it reached the plastic. I held this in place with thick double sided tape to prevent any damage to the radio

Bonus - To allow a simple means of letting the sails out a little in a gust or pulling them in for squeezing up to a mark.

If the top edge of the mechanical stop is angled then moving the sail stick sideways when fully down and maintaining contact with the stop causes the stick to move slightly up or down. This can be used as a quick mechanical trim while close hauled. Moving the stick one way will lift the stick slightly and allow the sheets to be eased during a gust while moving it the other way would pull the sheets in closer to squeeze up to a mark. The amount of mechanical trim here would be determined by how steeply the top surface is sloped. This method is applicable to any radio!



One can do the same thing as this using a simple mix instead as outlined in the screen shot below. In this case the mechanical stop is left horizontal.



In this example, the sail control (Chanel 3 – normally called throttle) is made the slave channel i.e. controlled by another channel. Channel 4 (sideways movement of the throttle knob usually called the rudder in airplanes) is made the master channel. Moving the master channel (i.e. moving the throttle stick sideways) will adjust the slave channel (sail control – throttle) a small amount. In this case the amount I selected was 15% of a full effect. These two values can be adjusted to suit. The Offset defines where in the movement of the throttle the effect takes place. Hope this all makes sense and is useful.

It is possible to use a switch (or two) to do the same thing as the mix above but why would you. It's bad enough having just two hands, watching your yacht and others without having to take your fingers away from the sticks then find the correct switch then remember which way to move it. Then you find a minute down the track its still on and you want it off. The sideways movement of the throttle or sail control stick is spring loaded and re-centres. As soon as the gust is gone or as soon as you've screwed up on the yacht trying to overtake to windward you just let the lever go and all back to normal.

Ben Morris

Ps if you've got this far then we have both found maybe something useful to fill in time during the pandemic lock down.