

Advanced Radiomaster for Radio Sailors

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This is a pdf download of our online website material at 03/26. The website will always contain the latest thinking. You can access it via the main menu of our Datchet Radio Sailing website at

www.drssailing.org

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1.0 Why Radiomaster?

There has been a sudden surge of interest in Radiomaster at Datchet Radio Sailing. Radiomaster transmitters are a little more complex to program. Nearly a quarter of our members are now trialling them.

There are two main reasons why you might consider Radiomaster:-

- in the flying community, there is much talk about very long range transmissions achievable with ELRS receivers, as favoured by Radiomaster. Flyers lose contacts with planes, sailors lose contact with boats. Datchet opinion so far is "we haven't lost an ELRS boat yet".
- Radiomaster are widely felt to have competitive pricing for their radios relative to other brands.

Take a look at this page:-

<https://www.expresslrs.org/info/long-range/>

Reception Range

Flyers are writing that they stay in contact with ELRS planes for a surprising number of miles. A land based test by flyers in 2023 showed ELRS to be the best receiver technology by far when measured by distance over countryside.

<https://drsailing.org/2025/03/12/elrs-so-the-commodore-was-correct/>

In sailing, we have other challenges - waves, dampness, heeling and most famously - carbon fibre. Less of a worry in IOMs, DF95s who have no carbon in the hulls, but for Marbleheads and Ten Raters there's a lot of questions to answer. Google "carbon fibre impact radio signals" and see what you get. Carbon simply never enhances the signal.

There will be lots of other considerations - where are the antenna relative to the carbon in the hull is quite a good one. Not to mention the huge variety of receiver technologies around.

Product Choice

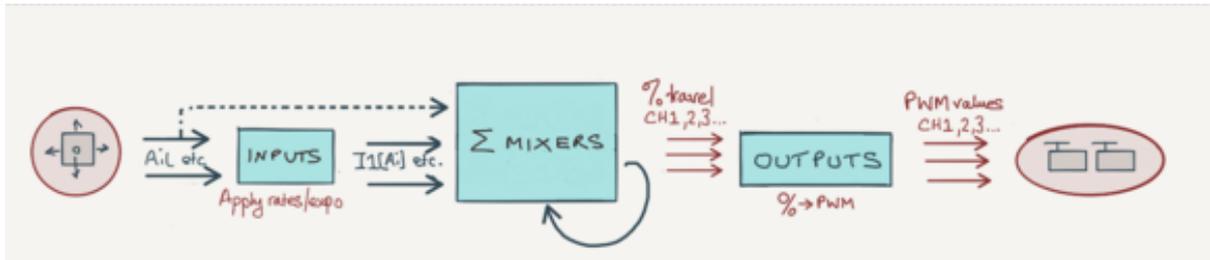
At Datchet Radio Sailing, we have experience of these four transmitters

- The Pocket
- The Boxer
- The TX15 max
- The TX16s max

The price range is from £70 to £250. Size/weight varies a lot over the product range. Really, you might just choose by how they feel in your hands, how they feel around your neck and

what the joystick gimbals feel like. We all have different preferences in that area. In radio sailing, we use such a small part of their overall capability. They can all do the job.

2.0 Basic Workings



(Diagram ©EdgeTX)

Before programming the transmitter, it's useful to have a little context as to how it all works.

You will see on some parts of the website that it is necessary to describe separate methods for programming the transmitter, depending on whether the transmitter you employ has a Touchscreen or not. Essentially the TX Transmitter models have touch screens (the way of the future!). The programming looks very different (but vaguely related!) depending which transmitter model you have.

Starting at the Receiver end, the boat receives "Packets" of data that contain instructions for Channel 1 (Rudder) and Channel 3 (Winch) that set your rudder and winch in the way you want. The packets are sent, and hopefully received, hundreds of times per second. For example, the TX15 transmitter targets 500 times per second. (We can check the percentage of packets that successfully get through (PSS) in our telemetry settings.)

The packets have serial numbers, so the receiver knows if any packets go missing. If a lot of packets go missing, and there is enough battery left, the receiver will go into failsafe mode.

How does all this get sent from the transmitter?

Radiomaster runs operating system software named EdgeTX. Like with most of the transmitters you can buy, EdgeTX is a "tables driven" operating system. "Tables" are where you set your personal preferences for how you want the boat to behave.

The transmitter simply executes a simple loop hundreds of times per second. (see diagram above). The "Loop" is as follows:-

- 1/ It reads the physical position of your joysticks, switches and dials at that moment.
- 2/ Then the software modifies those readings with any dual rate or expo settings that you have specified.

NOTE : In edgeTX, "Weight%" is what the rest of the world calls "Dual rate%". We associate Dual rate with being a rudder option, but with RadioMaster any input channel can have a dual rate weighting applied.

3/ EdgeTX then looks at what you have set in the mixers (curves, channel mixing etc) and in the output channels (end limits) and applies those modifications to your joystick and switch readings.

4/ It maps these readings on to our two channels - 1 for rudder and 3 for winch

5/ It sends these signals to the receiver in the boat, then simply goes and starts this "loop" again.

So mainly "programming the receiver" is about loading your preferred settings into the Transmitter Tables.

2.1 Preparation and How to Edit The Control Screens

Preparation

As discussed elsewhere on this website, before embarking on this it is helpful, but not essential, to make sure that your mainsheet and rudder centres are absolutely true when your joysticks are centred. Get it all "neat and tidy" before you begin. Do this by precisely centring your joysticks, then pop off the rudder servo arms and winch drum and get them rotated on their splines to 'dead centre' positions. On the mainsheet, look for dead centre of the full mainsheet travel for your swing rig (if you have one), which will be the longest.



I place a 50cm ruler along the deck under the mainsheet to do this and I leave it in place for the whole set of advanced processes that follow. You need to check that the mm shifts in the advanced features match your view of how to tune the boat.

As an example on my F6 Marblehead, from the mainsheet turning block on the transom (gizmo 'on' position) to the fully sheeted out position is about 410mm. I rotate my drum on the splines until the hook sits at about 205mm. It won't be precisely spot on. If you have a latest Stinger winch it has an onboard throttle curve – when you centre the joystick it will be closer to the transom than 205mm. Then you are looking to check that your end limits are roughly the same number at each end - on mine it is around -80 and +75 which is close enough. This is to help prevent you reaching the 100/150 maximum at either end of the mainsheet travel as you instal the advanced features.

How to Edit Control Screens

To get all these magic features working on your transmitter, you are going to be "editing" the Inputs and Mixers part of your transmitter. If you have not done this before, it's worth a quick practice before you start.



This is the Mixers menu before you start. The Inputs menu looks very similar. You can see the Flyers' naming of all the Channels (AETR : Ailerons, elevators, throttle, rudder) on Channels 1,2,3,4. We are going to tailor Channels 1 and 3 for 'Boat Rudder' and 'Mainsheet' respectively.

If you touch any one of those yellow lines with your finger, the command screen pops up.

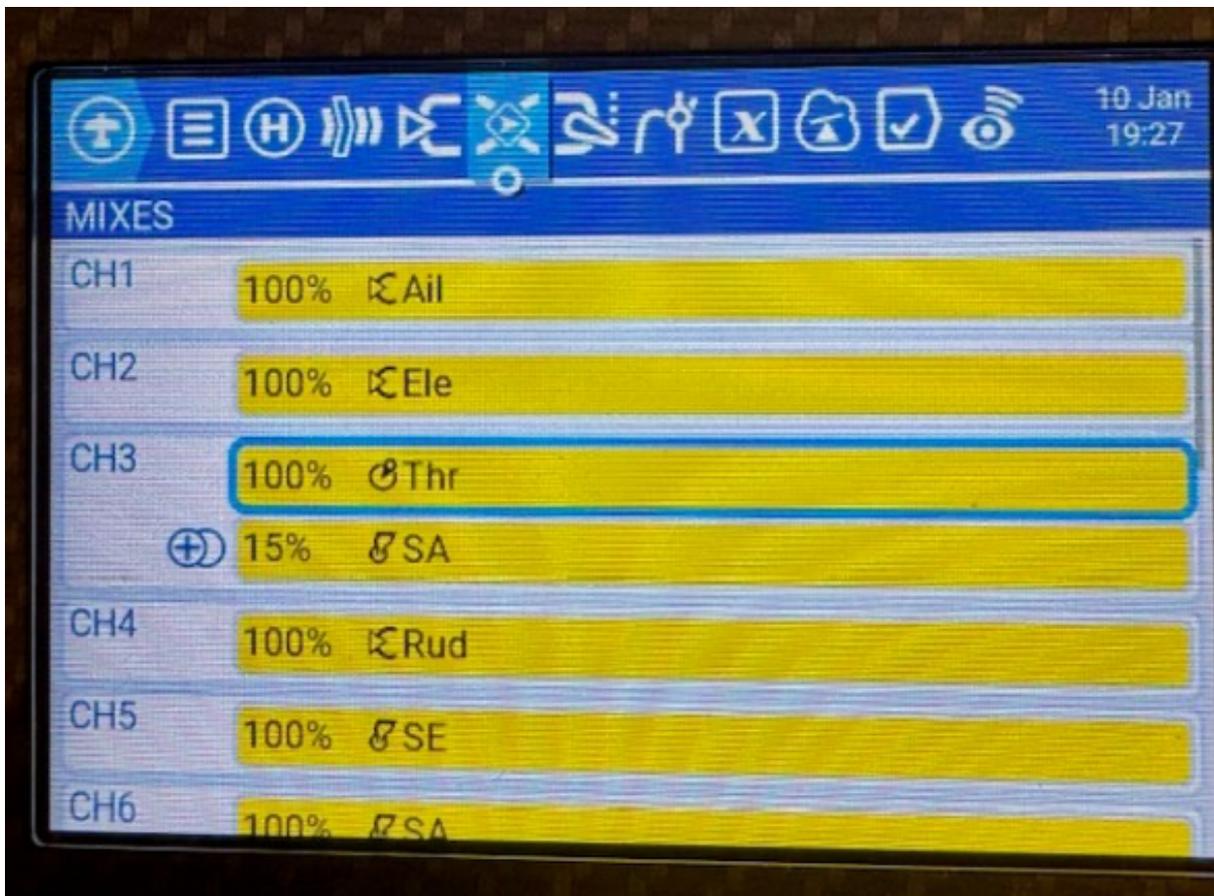


It looks like this you can select EDIT to change the line that is there. You will also use "Insert after" a LOT. The other command to get used to is DELETE for when you mess something up and need to start afresh.

We need to create 3 or 4 new mixers which we need to add to the mixers menu at channel 3 (mainsheet). So go to the Mixers menu and press the yellow line for CH3 and select "Insert after". You will see this:-



Now our basic process is to select the new mixer that we have added and EDIT it. Give it a try now....



Now use EDIT to just try and select SA as your switch, and set it's Weight at 15% and you should see the Mixers menu change as you can see above.

That's your basic editing process. Now choose DELETE on that new SA mixer that you've made a moment ago to revert to a fresh clean system before you start.

Now you have completed practice of the basic editing process for new mixers and EXPO/Dual Rates.

3.0 Mainsheet Ratchet

Ratchets "on or off" is a matter of personal preference. If you started sailing using a Futaba, then you'll miss your ratchet. On Spektrum you can switch it on and off. For Radiomaster, at least the Boxer, TX15 and TX16 models have a ratchet - unpublicised on their website (!?)!

We believe any Radio transmitter with AG01 or AG02 gimbals has the capability to switch (or adjust) the mainsheet ratchet on the joystick.

Before you consider this, watch this video:-

<https://youtu.be/K8aRgndgyp0>

Engaging the mainsheet ratchet can be a slightly nerve racking experience as it requires taking the back off the transmitter. However, the job turns out to be quite easy.

This is one of these jobs that has two pre-requisites:-

- 1/ Watch the "how-to" video (below)
- 2/ Definitely get the right tools available before you start - in this case two tiny hex keys

Here is the video for taking the back off a TX15

<https://youtu.be/jC3ac3KJof0>

Now for the simple tools you need. Outside the casing you'll need a 2mm hex key and inside a very small, probably 1mm hex key.



In the TX15 that arrived here today, thankfully one of the spare parts bags contained the tiny hex key - perfect!



Don't consider brute force or the wrong tool - get the correct hex key.

©Datchet Radio Sailing

You have seen in the video above how to get the back off.

- remove the battery and cover
- remove the central accessory panel
- remove the hand grips (there are useful access screws under here)



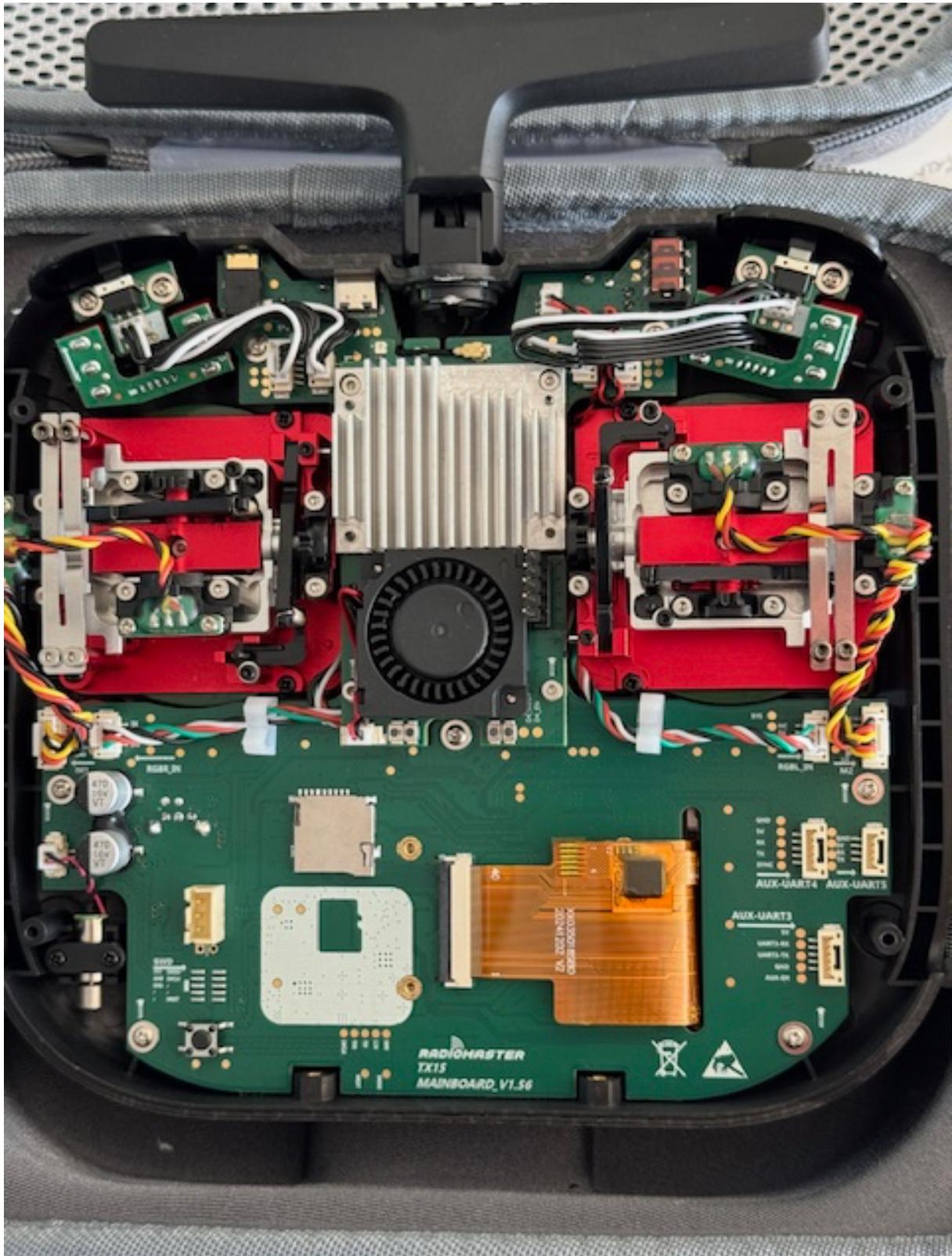
Under the hand grip you will see this (above). There are four screws (2mm) holding the four corners of the back panel down. You can see the top left screw down the circular hole here.

If you look carefully, you will see an oval hole with two screws at the bottom to adjust (in this picture) the right hand stick tension.

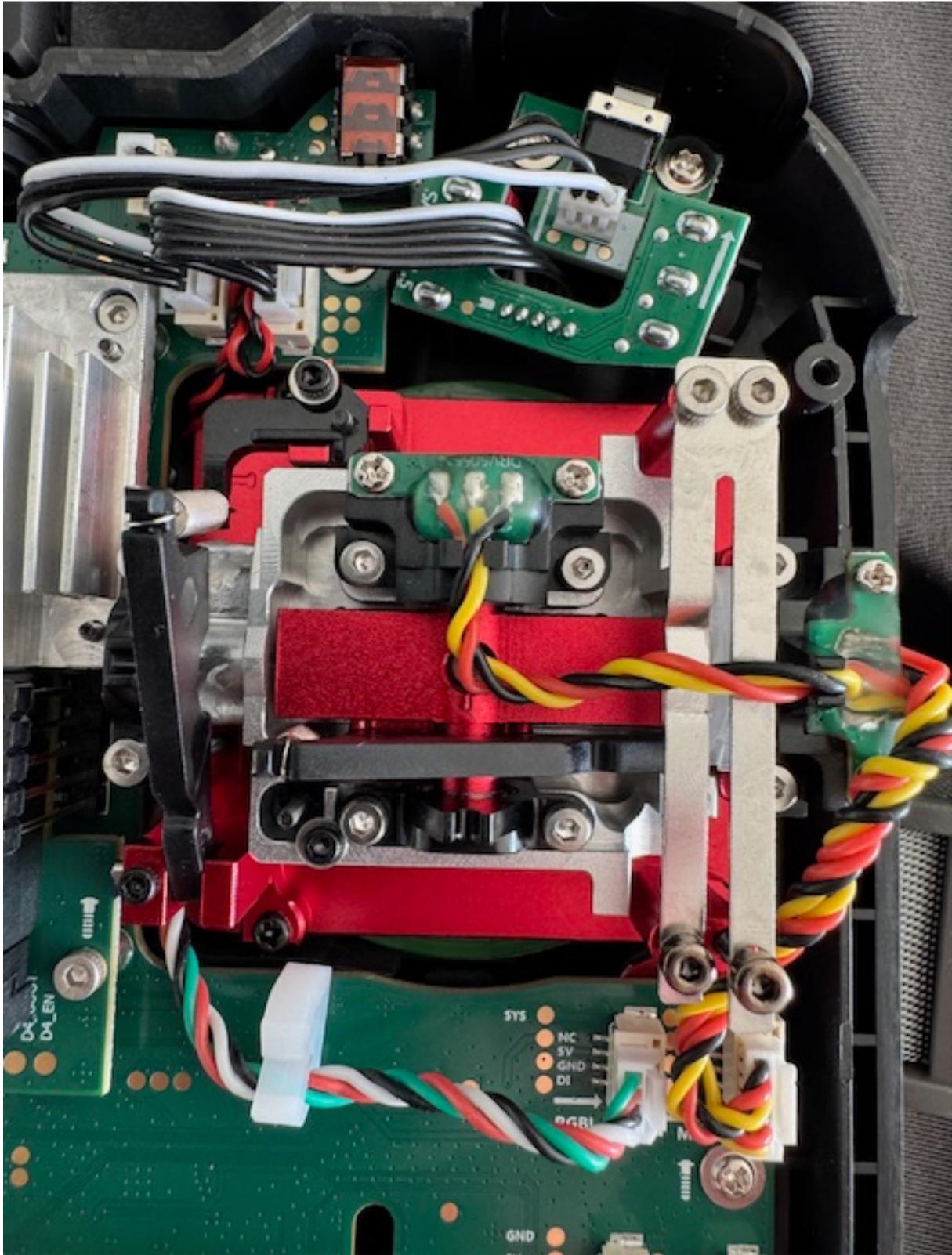


(See them better in the photo above, ©Datchet Radio Sailing - their role becomes crystal clear when you get inside.

There is a similar oval hole beneath the left joystick but in a different position. You'll swear that of the two screws there, one of them is probably the adjuster for the ratchet on/off from OUTSIDE the casing. No manual, so you don't know.... Get inside and all will become clear.

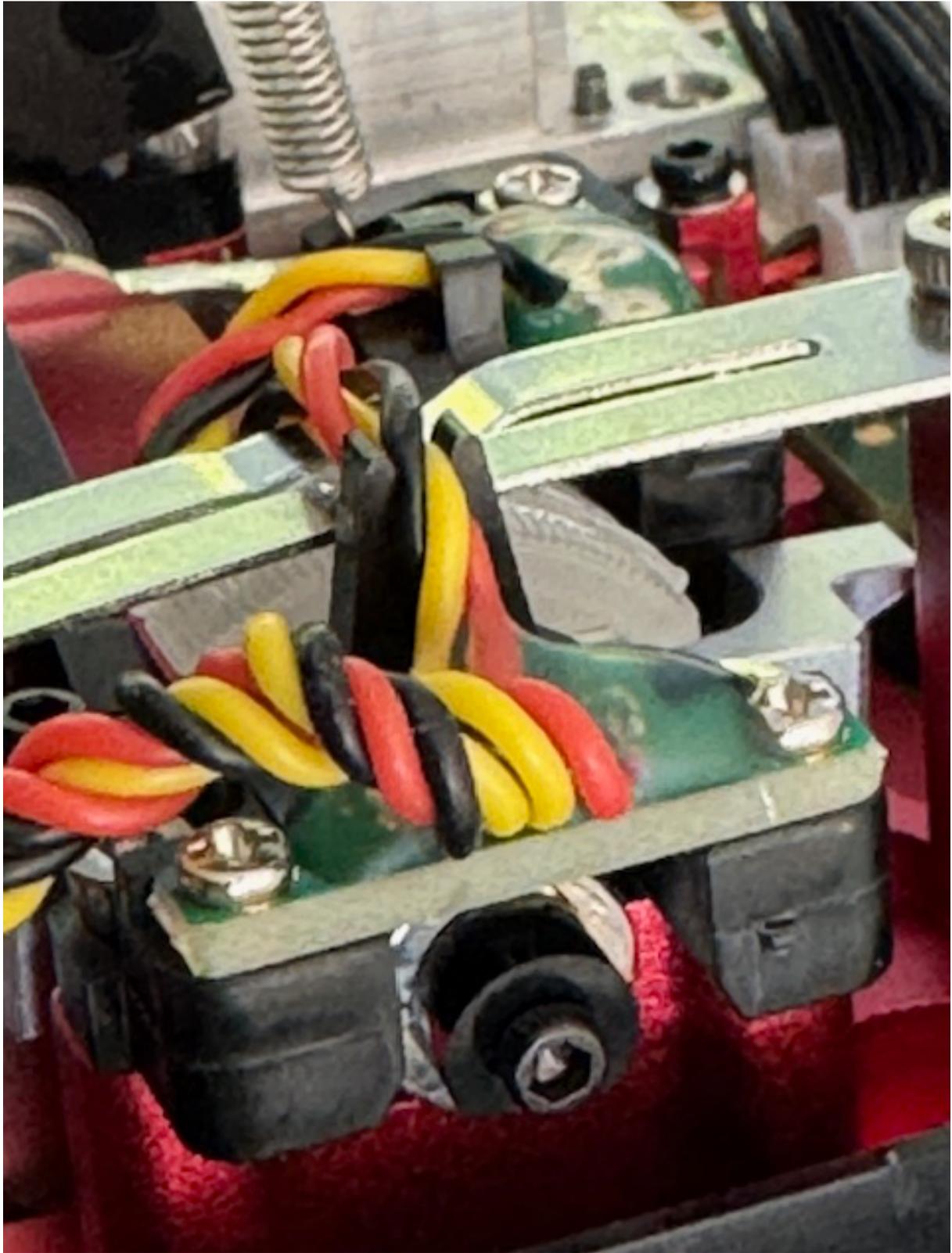


When you pop the back off, you will see this (above). It's upside down, so the winch joystick is the one on the right.

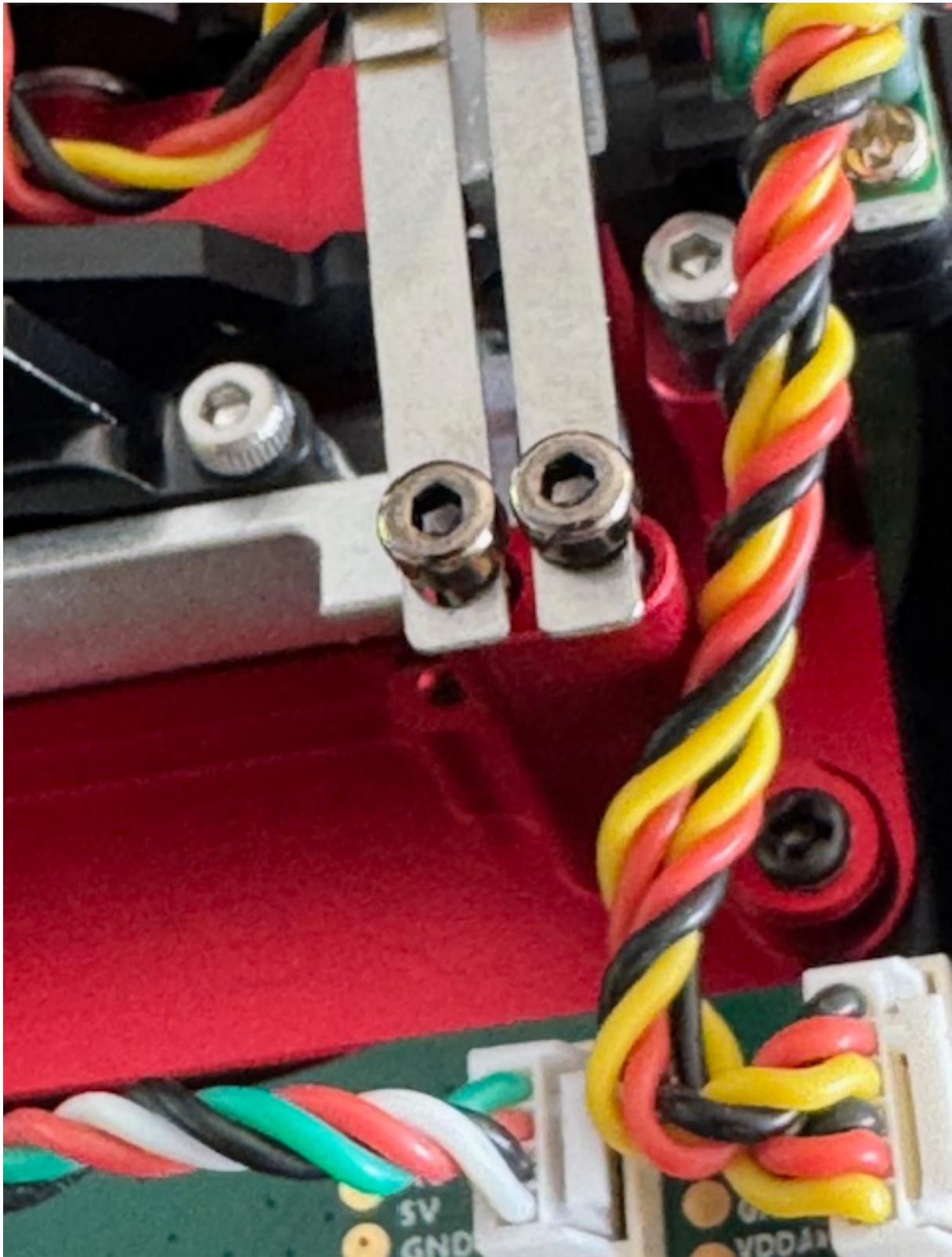


Look at this photo of the winch joystick. There are two leaf springs on the right hand side.

The right hand spring engages the ratchet. You can probably see that this spring is slacked off at the bottom screw and the spring end is maybe 3-4mm above the left one. (photo could have been better!)



This. (above) is a side photo of the joystick assembly. Can you see the ratchet teeth on the white curved plastic moulding nearest the camera? That is the ratchet.



To engage the ratchet (above) screw the right hand screw down until the spring aligns as per the photo. Have a fiddle with the joystick and adjust the screw until it feels "right" to you.

Now, gently reassemble the back cover and screws being very careful not to prang those central needle connectors sticking upwards at you. Do not over-tighten the 2mm screws.

Put the central accessory cover back on, wiggle the side grips on - there's a knack to this - see video above, last few sections.

Reinstall the battery, pop the battery cover on.

Power up and you're ready to go!

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All photos ©Datchet Radio Sailing

4.0 Receivers

Your "Radio" really consists of two parts - the Transmitter in your hands, and the Receiver in your boat.

Let's start at the Receiver...



(photo ©Radiomaster)

Perhaps this is what the fuss is about.

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Like all the manufacturers, there are a baffling array of receivers to choose for a whole range of applications - surface and air, indoor optimised and so on.

In sailing, we only use two channels. Not too much is needed. We are trialling two receivers from the ER Series. We are using the ER3C and ER5C. Click here:-

<https://radiomasterrc.com/collections/er-series-receivers>

When you hold one of these in your hands, two things strike you immediately.

1/ They are tiny. One weighs 4.0gms and the other is 4.8gms.

2/ No antenna wires.... they use ceramic antennae.

By the way, they cost about the same as four or five espressos.

Binding the ELRS Receiver

There is a very useful video below on binding an ELRS receiver using a the "three touch method".

The only tip from us is that an XT30 plug can be a little fiddly and stiff. Try putting the lightest smear of vaseline or similar on the surface causing friction before you begin.

You can bind with a new transmitter, in or out of the boat. Note that as is the case with many transmitter brands, once the transmitter is bound with a particular receiver, it cannot be unbound again. Think through any implications of that for you.

The video shows a Radiomaster transmitter without a touch screen, but if using a touch screen model the process is hardly any different - just look for the "ExpressLRS" screen button with uses some LUA code to very slightly simplify the process.

TIP : You will see in the video that preparing the receiver to enter the bind process, consists of plugging it in quickly three times in quick succession. A couple of us have experienced the receiver not being bound to the transmitter at the start of the day. I wonder if this is because with a stiff little XT30 plug we are naturally prone to not getting the plug in smoothly in one press.... so maybe the tip to get vaseline on the XT30 plug and socket is a good one.

<https://youtu.be/DbzECzpG0nw>

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5.0 Bind Receiver

TIP: On Radiomaster, quite a few of us at Datchet notice a little shimmering on the mainsheet winch... a little shiver or judder. You can feel it best with your fingertip on top of the winch

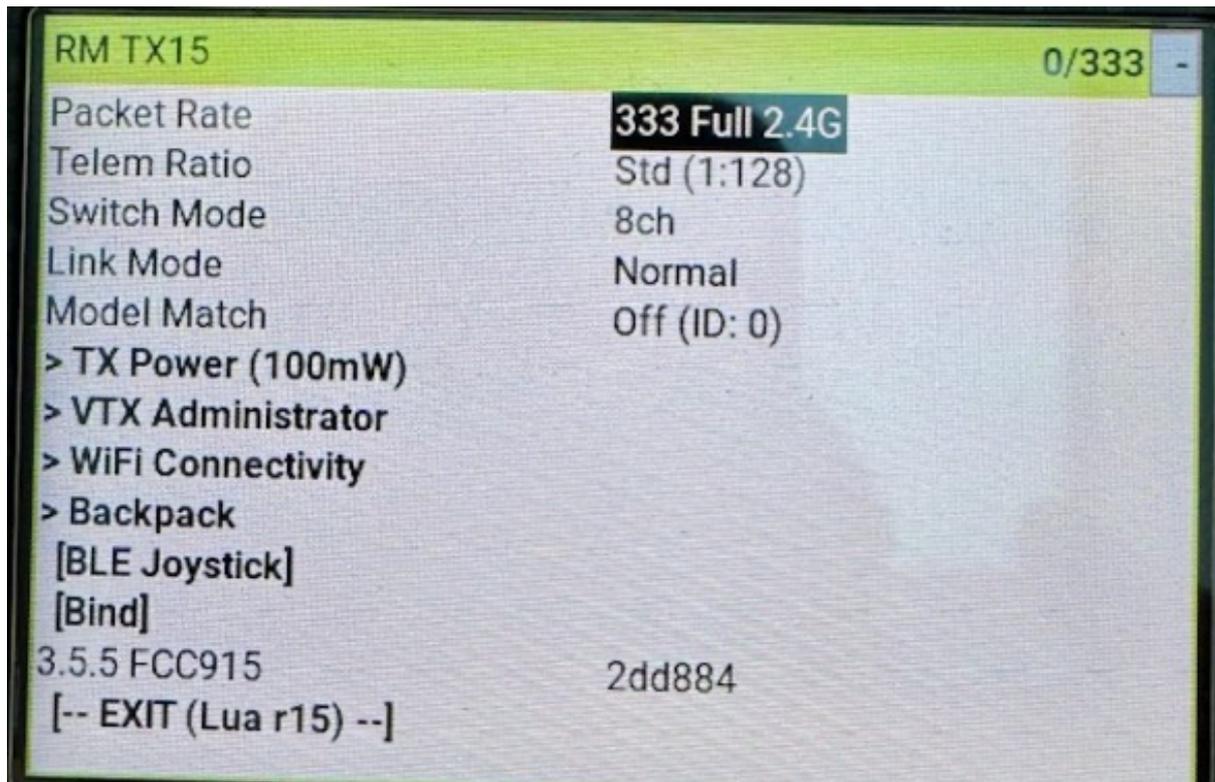
©Datchet Radio Sailing

drum screw. It doesn't seem to present any issues while sailing, but it would be nice to get rid of it.

Our man in Australia says to try replacing our ceramic antenna ERC receivers with an ER6. NB has done this on the VISS.

However, this weekend, PH suggested he has found the answer by setting the Transmitter packet rate from the original 500/sec to 330/sec.

Very easy to do. Go to the ExpressLRS button of your transmitter system page.



You can see the field you need to change in this blocked are of the photo. Try that on "333 Full" and see what you get.

I've tried this on an ER5Ci receiver with a TX15 this morning. I'd swear my shimmering winch is reduced, but sadly not completely eliminated.

Binding:-

There are two videos that you might find useful, and are attached below.

It turns out that on Radiomaster there are two methods of binding a receiver to a transmitter. There is the simple original way of cycling the power-on sequence three times to enter bind mode. As far as I know, this is the method we all use.

The second method, called "Automatic Binding", involves putting a "binding phrase" (like a password) on both your receiver and transmitter so that this particular transmitter will only bind with a receiver that is carrying the same password. This is the more modern method.

The "binding phrase" is like a password (minimum 8 characters, case sensitive etc) that gets translated to a long (10 character?) numeric code that must match at both the transmitter and receiver ends of the connection.

TIPS : You need a laptop/desktop to put a binding phrase on. The binding phrase is upper/lower case sensitive and the tool will automatically assume that you want the first letter to be uppercase... so be alert to that one!

I have two transmitters and... about five receivers. I had a long think about which binding phrase to put on what, but eventually determined to have the same phrase on everything. Obviously that's going to mean I cannot use both transmitters simultaneously. (eg a friend uses my standby transmitter) So if you have two transmitters, have your wits about you as you set this up. If you think you'll have to adjust binding phrases at the waters edge, you'll need your laptop there with you.

This is what AI says about it...

Unique Communication Link

A binding phrase creates a unique link between your RadioMaster transmitter and receiver. This ensures that they can communicate effectively without interference from other devices.

Automatic Binding

When you set a binding phrase, it allows for automatic binding during startup. This means that every time you power on your receiver, it will automatically connect to the correct transmitter, simplifying the process for users.

(end of AI generated text)

So the process to start off is set the binding phrase in the receiver first, then set the phrase in the transmitter - then power up normally and off you go.

Just very occasionally at the Club we have had a receiver appearing to drop its connection... and the solution is to quickly manually bind it again - as far as I know, we all use the "three connections " method (the old and original method) to enter binding mode. Re-doing the bind like this in the pressure of the moment seems the quick and easy solution.

There are a fair number of Youtube videos telling you how to set a binding phrase. It seems to me that the factory ships transmitters and receivers with a default binding phrase. Unless you set your own binding phrase there is a risk when you enter binding mode in a large radiosailing group, conceivably if two receivers are in bind mode at the same time, your transmitter may connect with two boats (or worse, simply connect to someone else's boat) - and another skipper could connect with yours. I know we all waggle the rudder as a safety check before launching.... to check everything is working.... don't we??

To eliminate this risk you set your unique binding phrase.

The second implication is that when you have set this up, in bold text above (underlined) the implication is that you get automatic binding anyway at every power up. We're wondering if

this will eliminate our problem of boat receivers occasionally dropping the bind when you start up.

Try the videos to explain further. The first video is probably best as it discusses both binding methods and the speech is easier to follow. It uses a Boxer transmitter, but the process is extremely similar on the TX15 and TX16.

<https://youtu.be/jkjlk-ahcto>

This video below describes the "old" three power-ups method to put your receiver in bind mode.

<https://youtu.be/DbzECzpG0nw>

And a third video

<https://www.youtube.com/watch?v=g4nvCzzP1R4>

6.0 Install in Boat

Same routine as normal really.

Make sure your receiver is properly bound to the transmitter, then power off the receiver.

Set your joysticks dead centre.

Aboard the boat, set the rudder dead centre and the mainsheet at the centre of its overall travel (measure with a ruler). If your boat has a swing rig, then it probably has a longer mainsheet throw than your smaller rigs - as a result the centre point will differ. Most probably your fully sheeted out position is the same for all rigs, but it is the sheeted in. point that varies.

We would suggest measuring and establishing the centre point of your mainsheet throw for the swing rig, and use that.

Connect the receiver to channels 1 and 3 of the boat (rudder and winch respectively). Check you understand the polarity of each plug as it sits in the receiver. Looking for the negative pin and the negative wire is easiest. Connect the receiver battery. It should all simply jump into life.

Things that could go wrong at this point :-

1/ Your mainsheet mid-point may appear to move if you have a recent model of Stinger winch. We think that this is because the winch software features a "throttle curve" on board, intended to make the mainsheet joystick less sensitive when you are close hauled. A few clicks of joystick when sheeted out results in more mms of sheet movement than when you are sheeted in. In theory you could apply a transmitter reverse throttle curve to remove this effect, but we decided to work with it. Simply know it might happen.

2/ When you power up, both mainsheet and rudder might slightly jump off centre a little. On the Marblehead in the workshop, this happened on both the rudder and winch. It may not be a problem - try adjusting your end limits in OUTPUTS on the transmitter. The end point can be 0-100 or 0-150 depending on transmitter model. It may be for example that even at the extreme of a rudder end point you cannot reach the deflection that you want. Simply put the rudder joystick on dead centre, remove the holding screw on the rudder servo, gently lift and rotate one spline at a time until you find the nearest spline to dead centre. Put the screw back!

This is not a characteristic of the transmitter - it was happening on both my Radiomaster and Futaba. It's a function of the servo fit up. The adjustment is tiny but effective.

If you plan to try some of the advanced features of this website, then you are best advised to get this perfect now. It may otherwise cause problems later on with the advanced features.

3/ Check rudder and mainsheet polarity and invert a channel if necessary (OUTPUTS screen). It's not unusual to have to do this, and lucky if you don't.

Next move on the "End Limits" part of this website.

7.0 Channels

7.1 Channel Inversion

is pretty normal to have to invert the direction of travel on either your rudder (Channel 1) or your Winch (Channel 3).

It is slightly different on Touchscreen to non-touchscreen, but in both cases you need to be in the OUTPUTS section of the Model MDL menus.

This is a good guide to doing it on TX series touchscreens:-

<https://www.youtube.com/watch?v=vDHgzvvp0tQ>

It's fair bit "easier" on non-touchscreen. Go to the OUTPUTS menu, click on the channel you want to invert (1 or 3), click EDIT and take it from there.

7.2 Relabelling Channels

We set up our sailing transmitters using "airplane" settings on the transmitter.

Flyers with fixed wing planes use the mnemonic AETR to help them remember what channel does what....

- A. Aileron
- E. Elevator
- T. Throttle
- R. Rudder

Sailors use the channels for Rudder on channel 1, and winch on channel 3.

During Model SETUP menu, you get an option to give the channels a 4 character name such as RUDD for channel 1, and WINC for Channel 3.

Beware that the original AETR allocation of names may pop up later and cause confusion. To make it worse, if we want to try "Pinch & Puff" using program mixers on the left joystick then well, what do you name channel 4....

If you want to try some of the more complex features on this website, it may just be better to train the mind strongly what the channels do in sailing. "Throttle" and "Mainsheet" are pretty close terms. They both adjust how much power you want. Then you only have to learn to engrave "Channel One is Rudder" on your heart, and you'll be fine.

(Ed: as you do more advanced features, such as "program mixing", aka "mixers" it is probably easier just to work with channel numbers)

8.0 End Limits

For the subject of this setup session, we used an F6 Marblehead fitted with a Stinger Winch (without the built in, onboard throttle curve) upon which we have a 32mm drum.

It is best to do the transmitter set up for the swing rig as it has a longer mainsheet 'throw'. When you have it working perfectly, we suggest then duplicating the swing rig model to form one for B Rig and one for C rig. Then rename the duplicate models properly so you dont get confused. Upon the B and C rig models you mainly just have to reset the end limits... though one or two small adjustments might be needed to get your preferences for sheet measurements precisely done.

TIP: On mainsheet/throttle/CH3 end limits we need a fair bit of space at each end of the spectrum - sheeted out and sheeted in. The way our advanced features (joystick pinch, double puff switch, VMG fine tuning) work is that they tend to focus when you are sheeted in. The transmitter pumps out a reading from the joystick, then the advanced features act as a multiplier on whatever the mainsheet reading is. It is quite possible that on one of your rigs you find you move the end limit to zero to get the sheeted in position properly. When the mixers multiply the mixer settings with zero - you still get zero. Nothing seems to work!! So

you need to fiddle and get a decent end limit number when you are sheeted in. A quite possible solution is changing your mainsheet/jibsheet lengths on their bowllies - or if you have to, pop a new mainsheet/jibsheet on with the needed length..

You will find the end limit settings on the "outputs" page of each model against channel 3. Adjusting them there is easy. It helps to place a ruler along the deck beneath the sheet to check all your measurements.

9.0 Advanced Mainsheet

<https://www.youtube.com/shorts/BeorfQ4jXeY>

Try this excellent overview video using the Radiomaster Boxer transmitter, by clicking on the above link.

Setting Up

We talk elsewhere on this website about the benefits/importance of setting up your main sheet centrally, and getting to nice ... relatively equal... end limits. Normally if you have 3-4 conventional rigs, only, this should be easy. If you have a swing rig plus conventional rigs this may not be as easy as it sounds.

The “Multiply by zero” effect:-

As you move between your rigs, the mainsheet throw on a swing rig will have much different characteristics to conventional rigs. It may turn out that one end-limit or the other will be a very low number or close/equal to zero. It wouldn't matter with simple use of the transmitter. With the advanced features offered on this website, a sheeted in scenario with an end limit of zero, or close to it, will provide challenges.

The reason is that Program Mixers operate by multiplying the mainsheet joystick output number number by a %age adjustment. If your end limit is zero, then multiplying it by anything will result in zero. Your advanced features may appear not to work.

Some adjustments operate not as a multiplier but as an offset. If somehow you get an adjustment which which moves the sheet beyond the end limit, everything could seize up, or sections of the joystick travel could appear “dead”.

(voice of experience speaking...!)

TIPS:-

1. Have a separate “model” for every rig
2. If you find one end limit is zero or nearly zero, measure the total throw of mainsheet that you need and try adjusting the end limits so that you get that throw – but further along the deck. You then need to adjust your mainsheet (bowsie) length to suit. In the event that the bowsie adjuster won't give you the right length, just pop a new mainsheet on your main and jib booms and cut the length so you do get it right.

Normally we think about adjusting our winch end limits to match our mainsheet. In this system, you might find yourself adjusting your mainsheet length to match your winch.

3. Two weeks (more experience) later : With the exception of flick gybe, the features on this website work at the "sheeted in" end of the winch spectrum. Experiments here have shown that an end limit there of 10 or below gives highly unpredictable results. It stays sub-optimal once the end limit reaches 40 or so. Then 50 and above is good. I have aimed at the 50-75 range. I'm sure the next boat I set up I can do better, but for now on this boat I have simply fitted longer sheets on the conventional rigs.

Mainsheet Management Summary

Advanced Mainsheet Management consists of four items, corresponding to four settings (1,2,3,4) of what we used to know as Pinch&Puff.. which only had three settings.

1. Using Left/Right moves of the joystick to bring you into Pinch Mode (1)... (left move of joystick) or easing sheets to tack (right move of joystick).
2. Use of a three position switch to bring you positions 2,3,4. Position 2 is "normal sailing", Position 3 is in gentle puffs, position 4 for strong puffs.

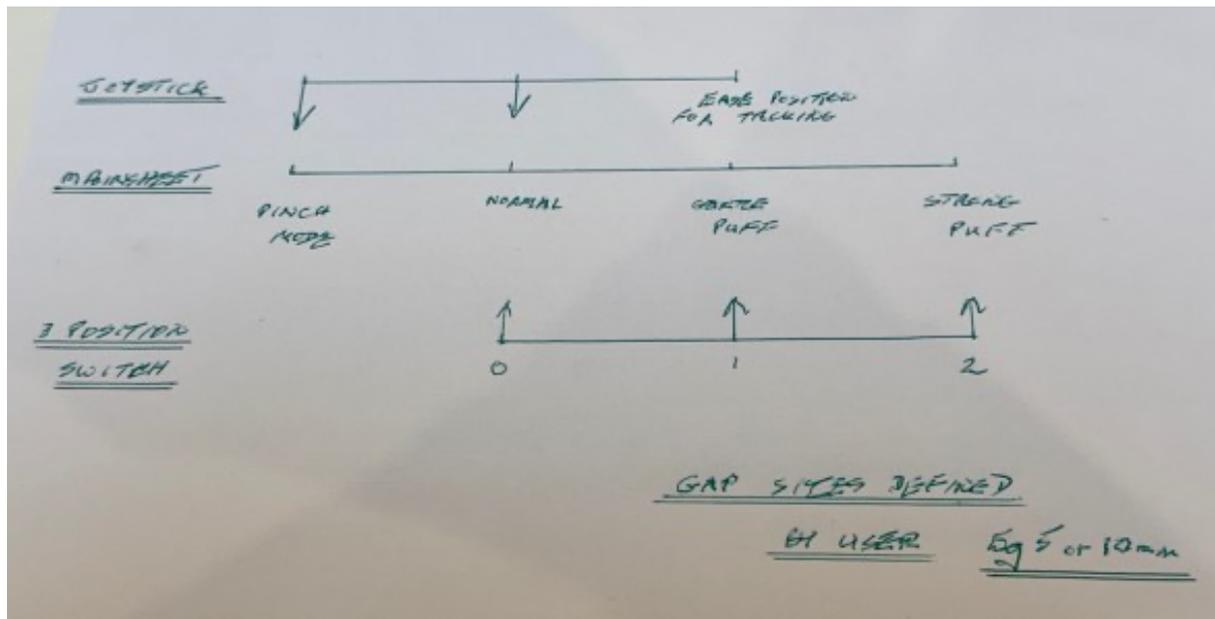
We also have the ability to trim the mainsheet on a dial to help find your optimum VMG... possibly the biggest competitive killer of all... especially on a changeable day.

We also shall show you how to use a "momentary switch" to perform flick gybes on the mainsheet.

In later sections of this website, we shall show you how to program these features on Radiomasters with a touchscreen interface - such as TX15, TX16, TX16s etc. Try this video that explains how to do what we need on the Radiomaster Boxer which uses the traditional screen:

<https://www.youtube.com/watch?v=ogtmrdZuEGs>

9.1 Pinch on Joystick - Four Position Pinch and Puff



In this interpretation of "Pinch and Puff" we are going to replace the traditional 3 positions with 4 positions - more granularity....

We shall see how the left position the mainsheet joystick when you pull leftwards gives you position 1 - the "Pinch Mode" of "Pinch & Puff" - and position 2 with the joystick centred is your neutral mainsheet setting, eg 10mm of sheet eased at the post.

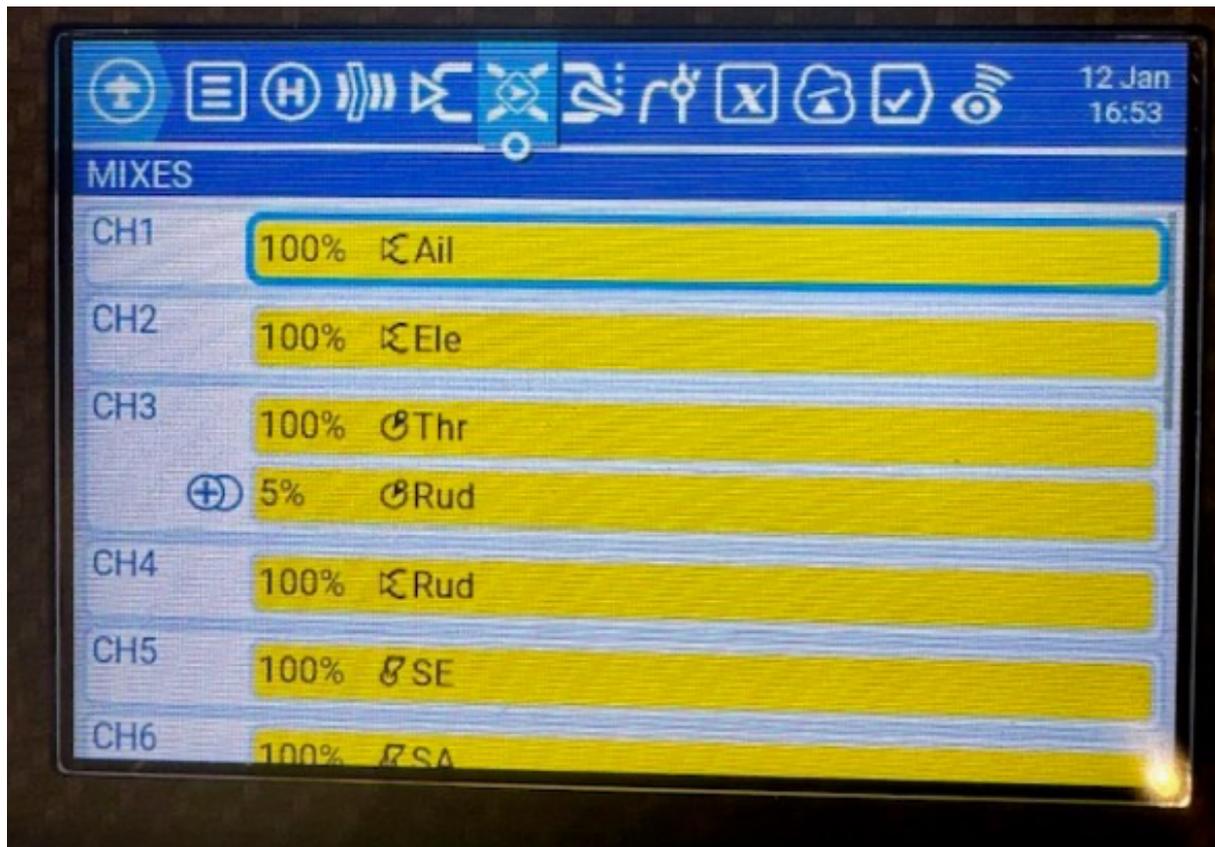
To set pinch mode on the left joystick (eg 10mm, but choose your own gap) we are going to create a new mixer.



In this example, the centre joystick position will be 10mm from the end of travel, so that when you throw the joystick leftwards, you take in 10mm of mainsheet in and centre the boom.

When you throw the joystick to the right, it also eases the mainsheet - for example during a tack.

Go to the Mixers panel and click on channel 3, then "insert after" to create the additional mixer on that channel



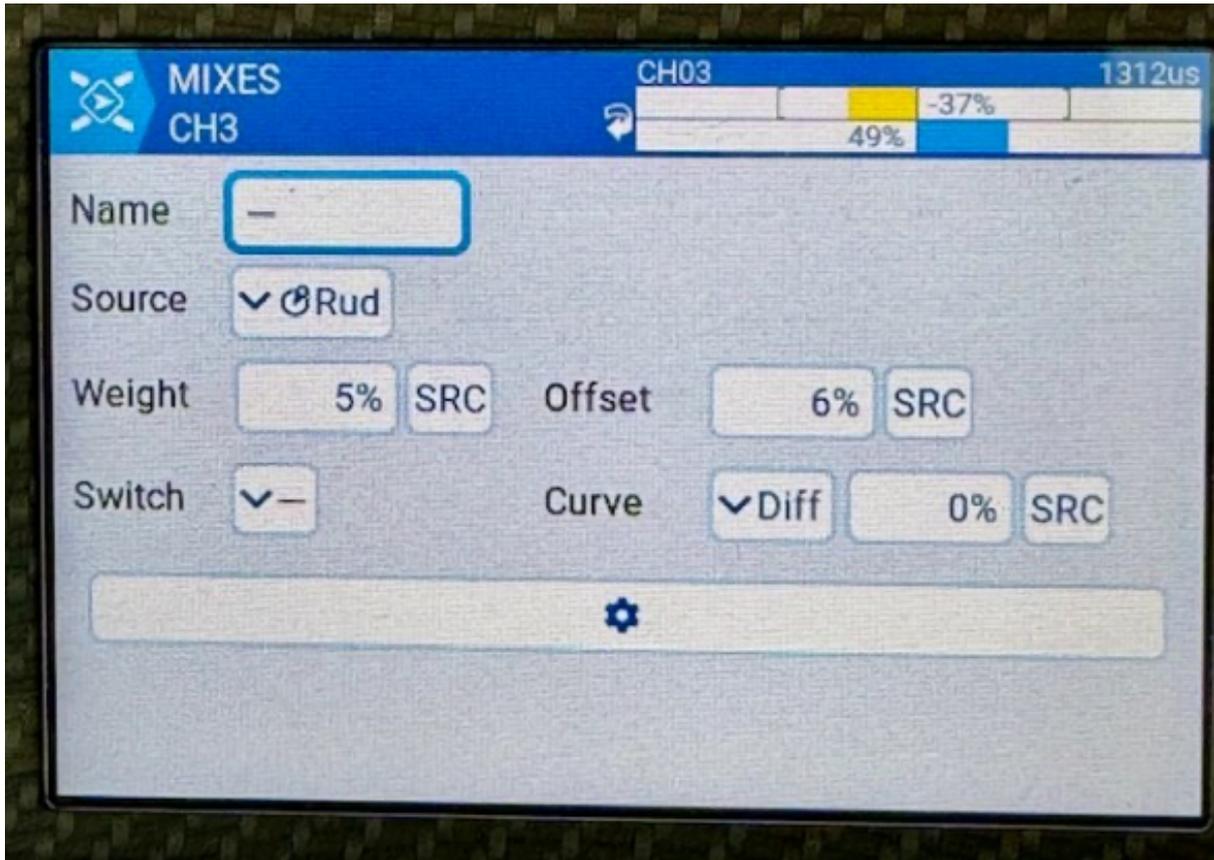
Adjust your mainsheet so it is centred - this will more easily allow you to see what is happening.

The Flying community on their planes call that left-right move of the joystick the "Rudder". Confusing, I know, but set its weight to around 5%. Try shifting the stick left and right and adjust the "Weight number" to give the shift you want. Measure it with a ruler on the deck.

Now you will want to pull your mainsheet in very gently to the windward full sheeted position. As you get close, stop and experiment with putting a value in the "Offset" field.

"Offset" adjusts where the centre point is. On our F6 Marblehead, an offset of 6% seems to bring the boom right up to the end stop when the joystick is fully back then pulled to the left.

If you get the wrong direction of movement, you can reverse it by using minus vales. On the Mixers summary screen (above) you should now see your 5% Weight value on the yellow strip.



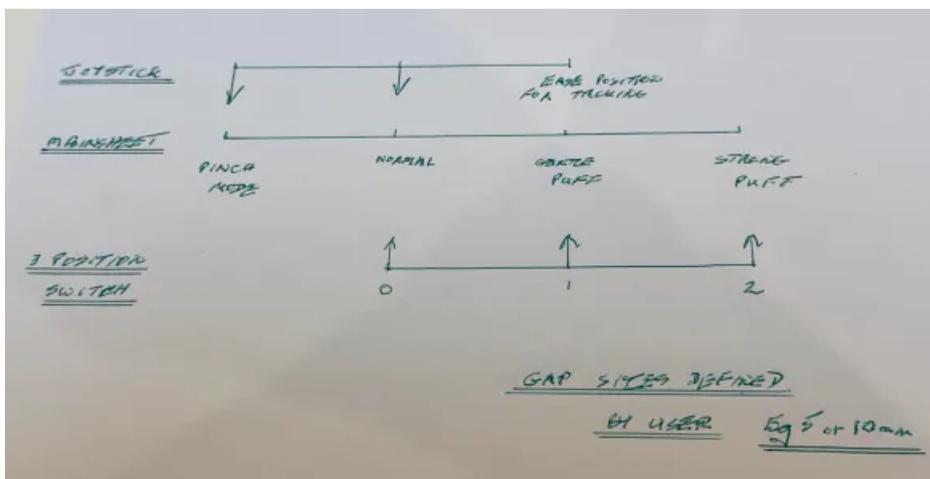
So now positions 1 and 2 of the 4 position pinch&puff mode are programmed.

Position 1 - pinch mode

Position 2 - neutral boom/mainsheet setting

© Datchet Radio Sailing

9.2 Puff Mode on 3 Position Switch



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In the previous section, we have seen how the centre of the left joystick when you pull left gives you position 1 of "Pinch & Puff" and position 2 is basically your neutral; setting, 10mm eased at the post.

Now we can use a three position switch to align our mainsheet with set boom positions 2,3 and 4 ...

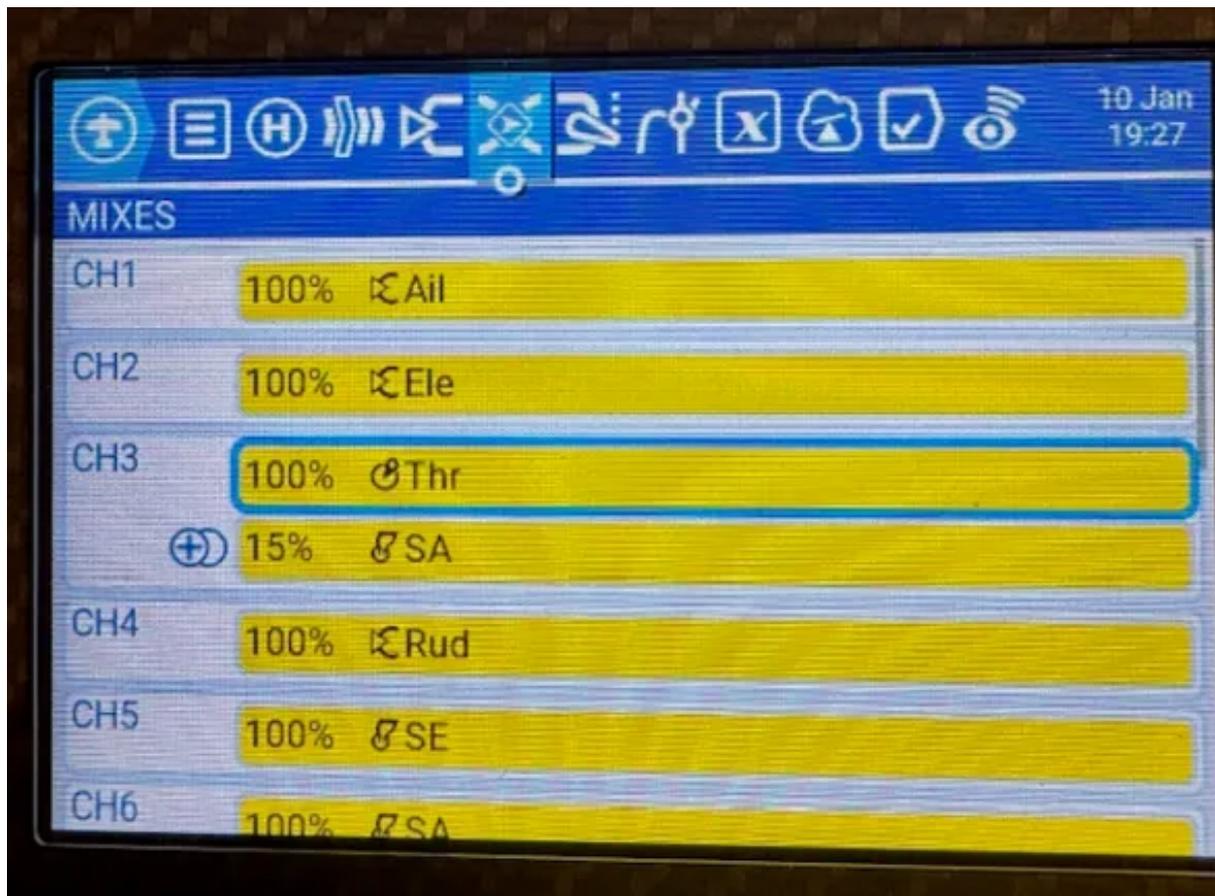
. setting 2 = neutral

. setting 3 is gentle puff mode

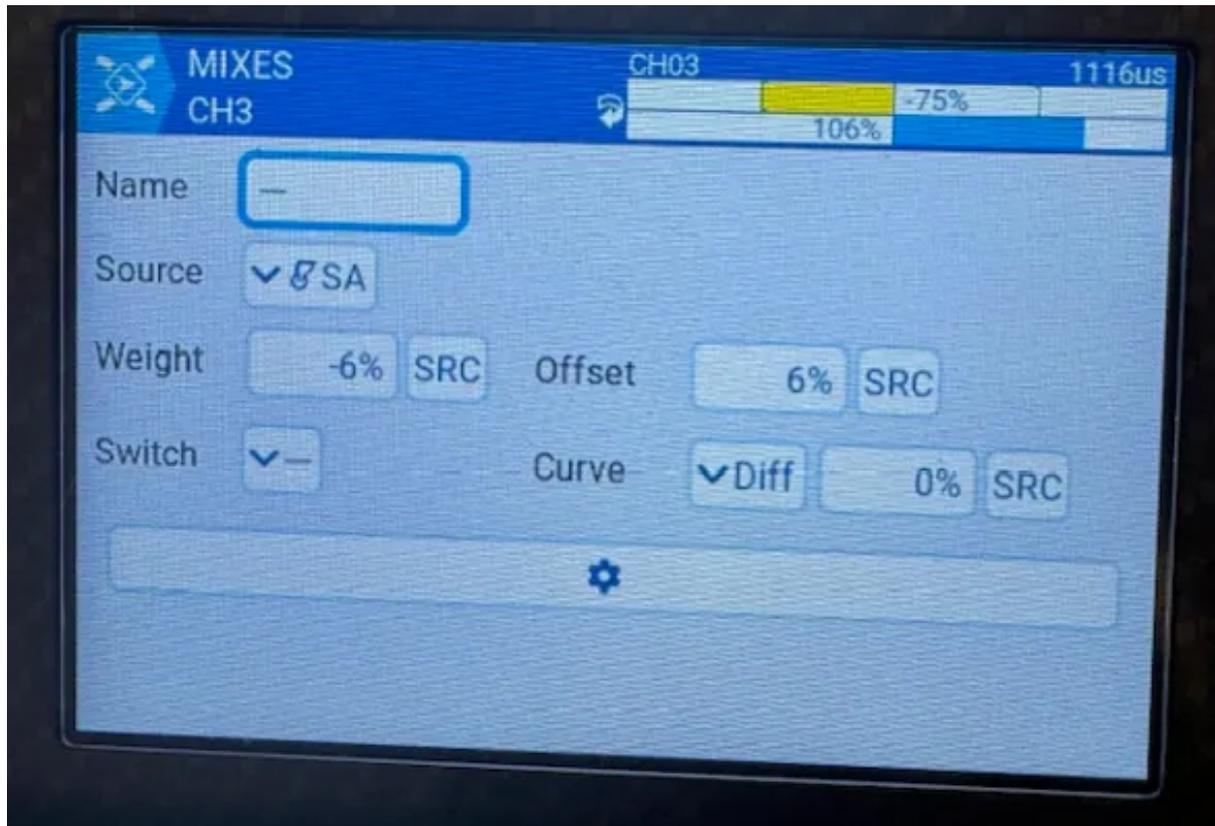
. setting 4 is strong puff mode

... or whatever interpretation you prefer!

In our example we shall use switch A ("SA") for this but you can choose any switch A-D, as you prefer. It seems to make sense to choose one on the "mainsheet side" of the transmitter. To do this, we are going to create our second additional mixer on CH3 and assign Switch SA to it.



Start with your mainsheet and joystick centred so you can see first what happens. Put your ruler on the deck beneath the sheet so you can measure everything.



Note the minus sign on the "weight" that I needed to reverse my direction to my preference - which is away from me for 'mainsheet eased'.

6% is giving me 10mm shift in the sheet I was looking for. However, when you next pull the mainsheet joystick right back, you don't want any "out of range" transmitter fault to arise. If you try values in the 'offset' field (6% in this example) it will adjust the centre point. When the switch is fully in towards you aim to have the measured distance of the hook 10mm from the end stop... in position 2 of 4. Remember you need that 10mm space available for when you apply "pinch mode" on the joystick left pull seeking position 1.

Try flicking the switch A forward one click, then two clicks. Measure that you are getting the number of mms sheet easing that you desire. If not, just fiddle with weight and offset until you get the effect you seek.

You now have positions 2,3,4 of Pinch&Puff programmed into your transmitter.

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9.3 2D Joystick for Ease and Squeeze

<https://www.facebook.com/share/v/1atZrSzPHk/?mibextid=wwXIfr>

You may have seen Craig Richards' little video on the Proteus Facebook Group, showing his 2D Mainsheet control. If you've not seen it, try clicking the link above.

The last couple of events at Chipstead in the fluky light, Craig has put in some enormous wins and keeps going while others stand still. You need to concentrate all the time!!

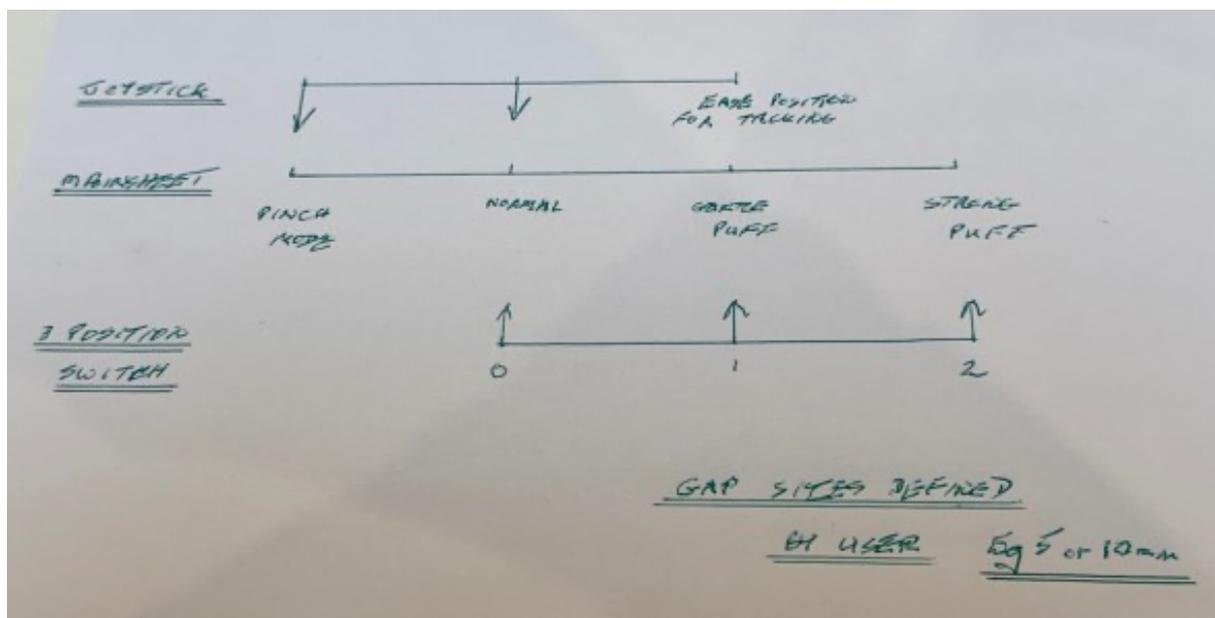
Craig has done this on his Spektrum, but you can also do this on your Radiomaster - see "Pinch Mode on the Joystick" in Section 9.1

10.0 VMG Fine Tune on a Dial

Some of our members feel this is the killer feature. While underway, to find optimum VMG, we can adjust the distance that the boom is away from the centreline in the neutral position using infinitely variable adjustments on a dial. On a variable day we can adjust the neutral position without coming ashore. We can even do it mid-race....

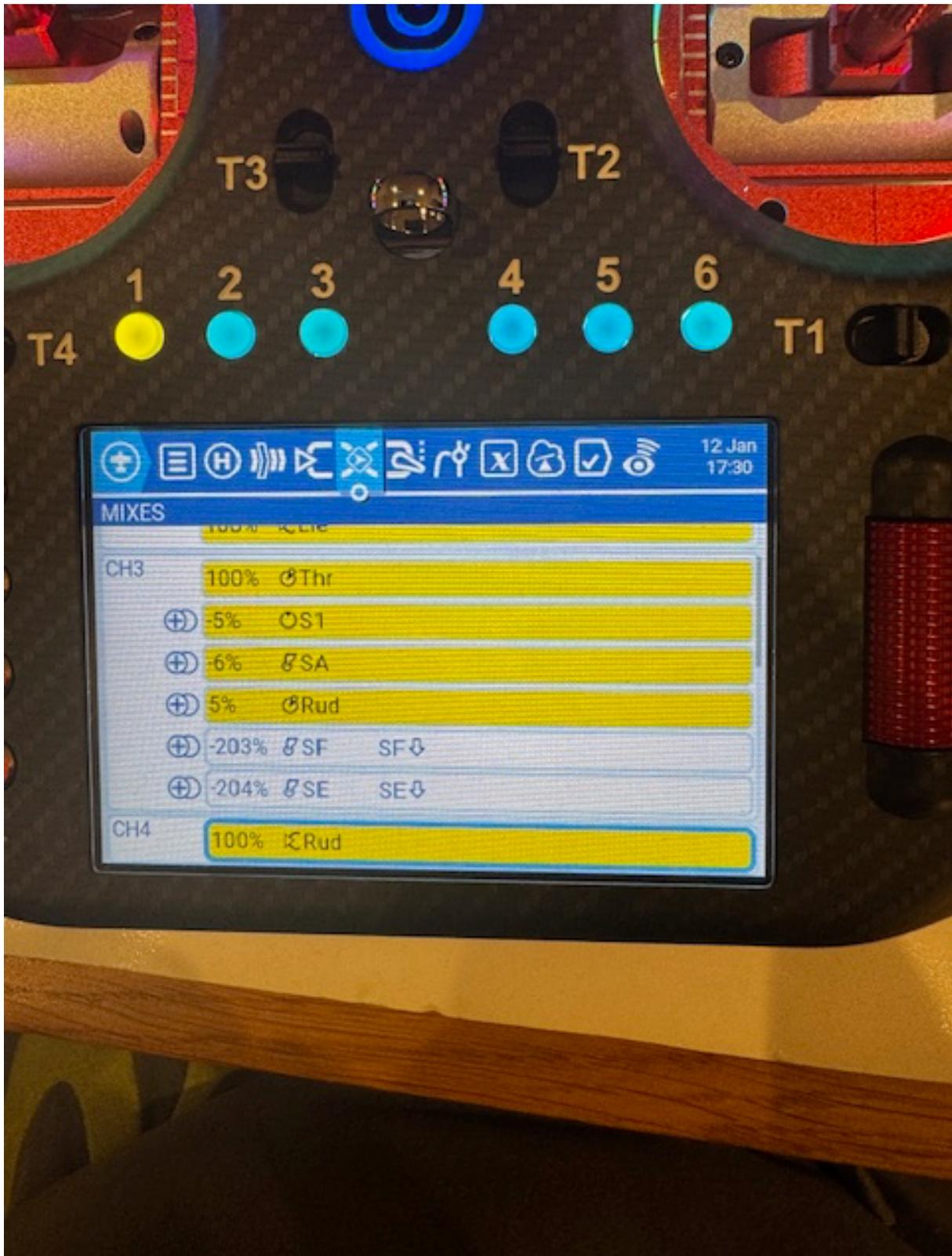
We are going to use the left of two "volume control" dials on the transmitter labelled "S1".

When the dial is centred (easy to feel a click under your fingers - try it), we are neutral. Dial clockwise to tighten the mainsheet, dial left to ease it out.

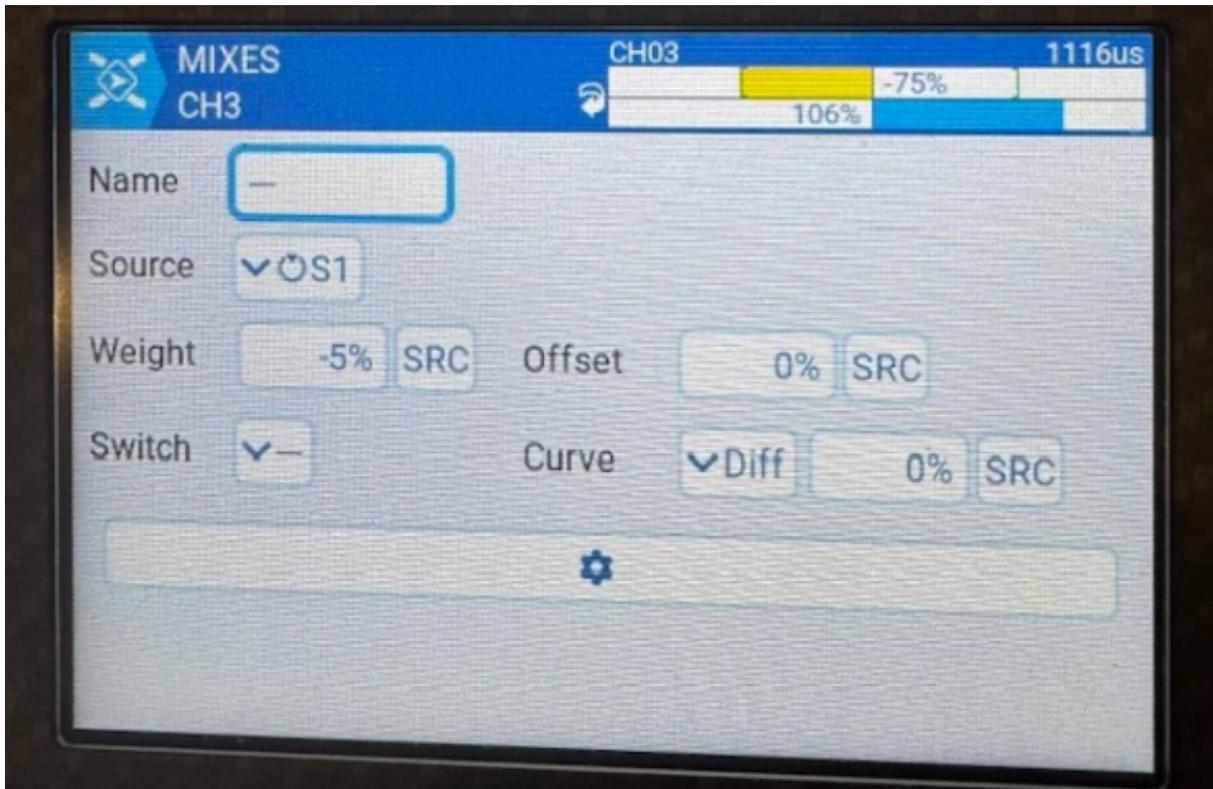


We shall aim to have the dial centred at the Neutral position 2 in the Pinch and puff model.

Go to the Mixers screen and "insert after" another additional mixer and tag it to the switch (dial) known as S1. You can see it in the photo below...



The settings I have used for 10mm throw each way are a weight of 5% (see below). Note that you may have to include a minus 5% if you get a direction of travel the reverse of what your brain expects. In my head, I turn it clockwise to tighten the sheet....



Pull your mainsheet joystick right back, pull switch SA fully towards you - your boom and mainsheet should now be in your "neutral" position.

Rotate dial S1 and you should see smooth alterations in your sheet position (each way).

If you prefer to only allow neutral boom position adjustments to be outwards, try altering offset to get the effect that you want.

© Datchet Radio Sailing

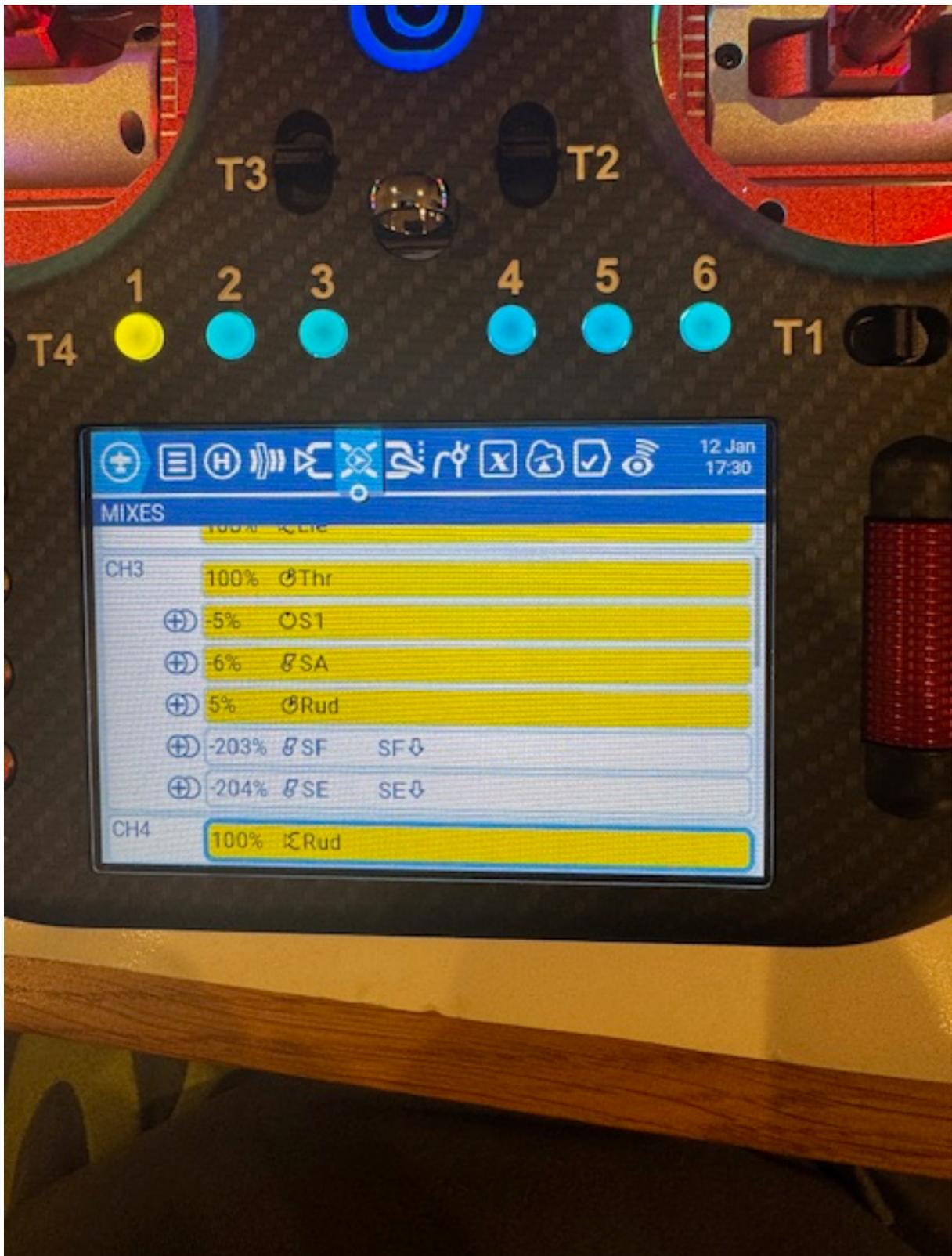
11.0 Flick Gybe on a Button

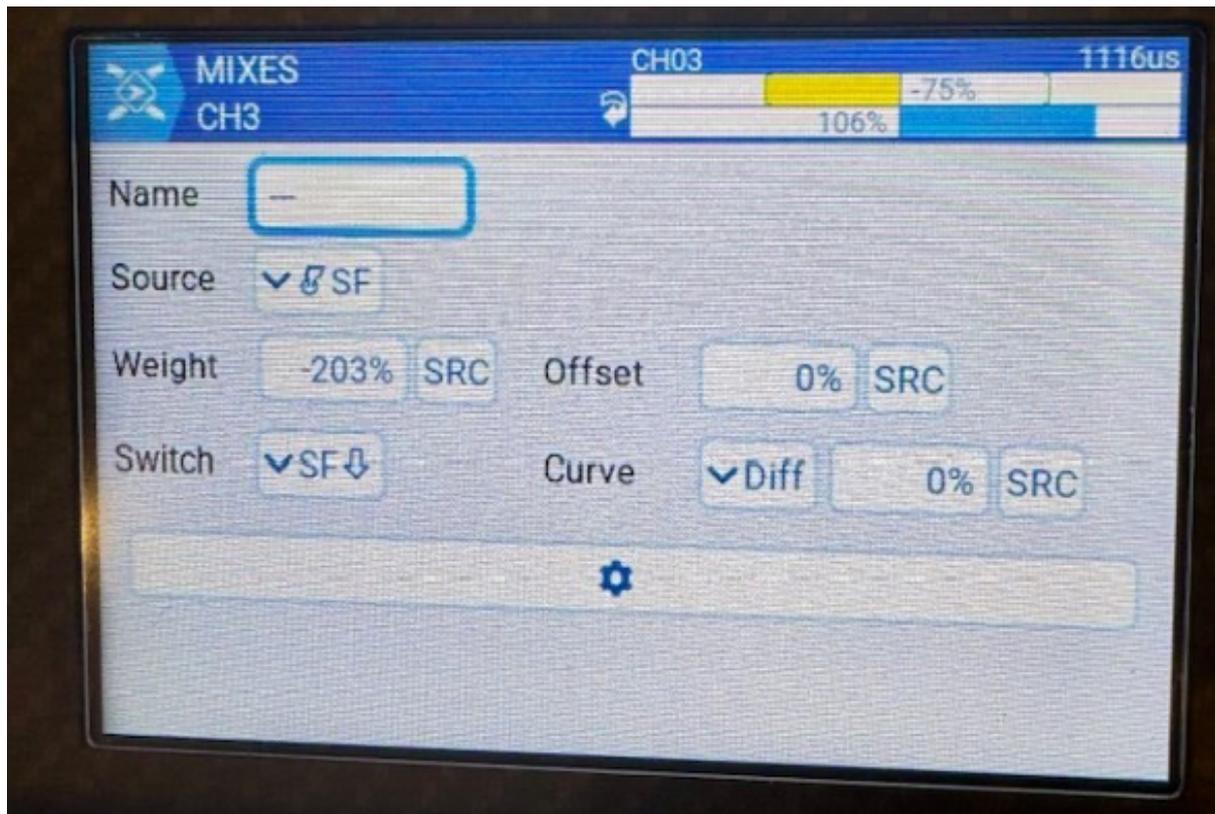
It won't be to everybody's taste, but we can arrange a flick-gybe facility on any transmitter switch, but the effect is best using the momentary spring loaded push button known as switch F ("SF"), which is located on the back of the transmitter at the right hand side.

Let your mainsheet right out in the dead run position. Press switch SF in with a spare finger and the boom comes quickly to the centre line, take your finger off and the boom goes back out to the dead run position.

©Datchet Radio Sailing

To achieve this, we need to insert our third mixer on Channel 3. Note that if you want to try flick gybe with your left hand, then you could create another (fourth) mixer for Switch SE (back left of transmitter). Switch SE is not a momentary switch - so push in to get the boom to centre, press again to let the boom out.....





Set the switch to trigger this mixer as switch SF.

To get the full pull on the mainsheet, from fully out to fully in, you will need a large "weight value". I need minus 203% to get the effect that I want. Just experiment with your boat and transmitter to see what works best.

As you will see above from the mixer menu screen I also added a mixer for Switch SE to do the same thing.

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12.0 Advanced Rudder Management

There are two classic enhancements skippers like try with their rudder (popularity varies!

- softening the rudder responsiveness by using EXPO on Channel 1. You may want this "off" in the light to flick your transom through the wind. You may want it "on" if, like many of us, tacking in a breeze reveals a strong ability to stop dead mid tack... they say because you push the helm over too quickly/firmly and the rudder acts as a brake.
- downwind in a breeze, we all know how easy it is to over-correct the helm and end up slewing all over the race course. There is a school of thought that it's better to reduce the amount of rudder arc available - so you cannot use more than maybe half or two thirds helm. This is called "Dual rate" and you can switch it on and off.

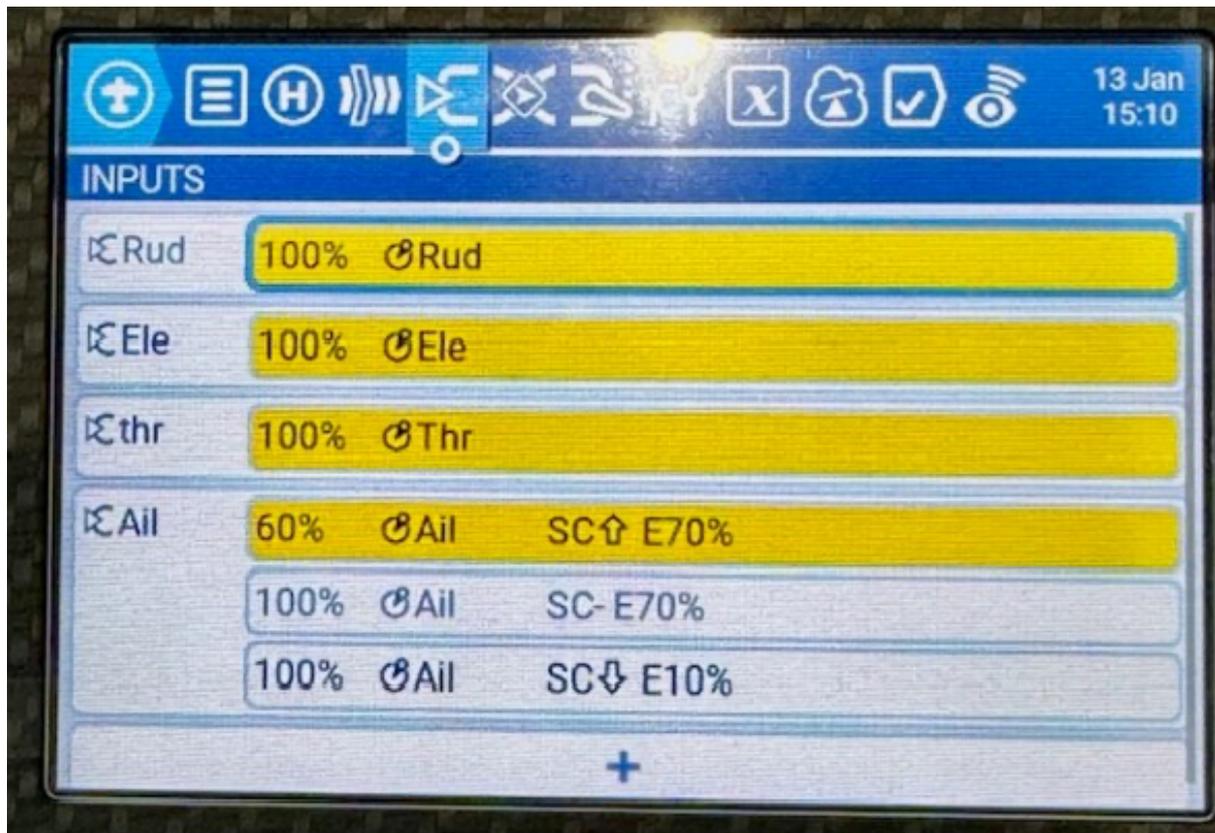
©Datchet Radio Sailing

In this example, we are going to set this on a single 3 position switch. We have used one of the two available on the rudder hand - switch SC.

Position 1 : towards you, no Dual Rate, minimal EXPO (10% in this example)

Position 2 : centre switch setting for no Dual Rate, but useful 70% EXPO applied.

Position 3 : switch away from you for both Dual Rate and EXPO applied.



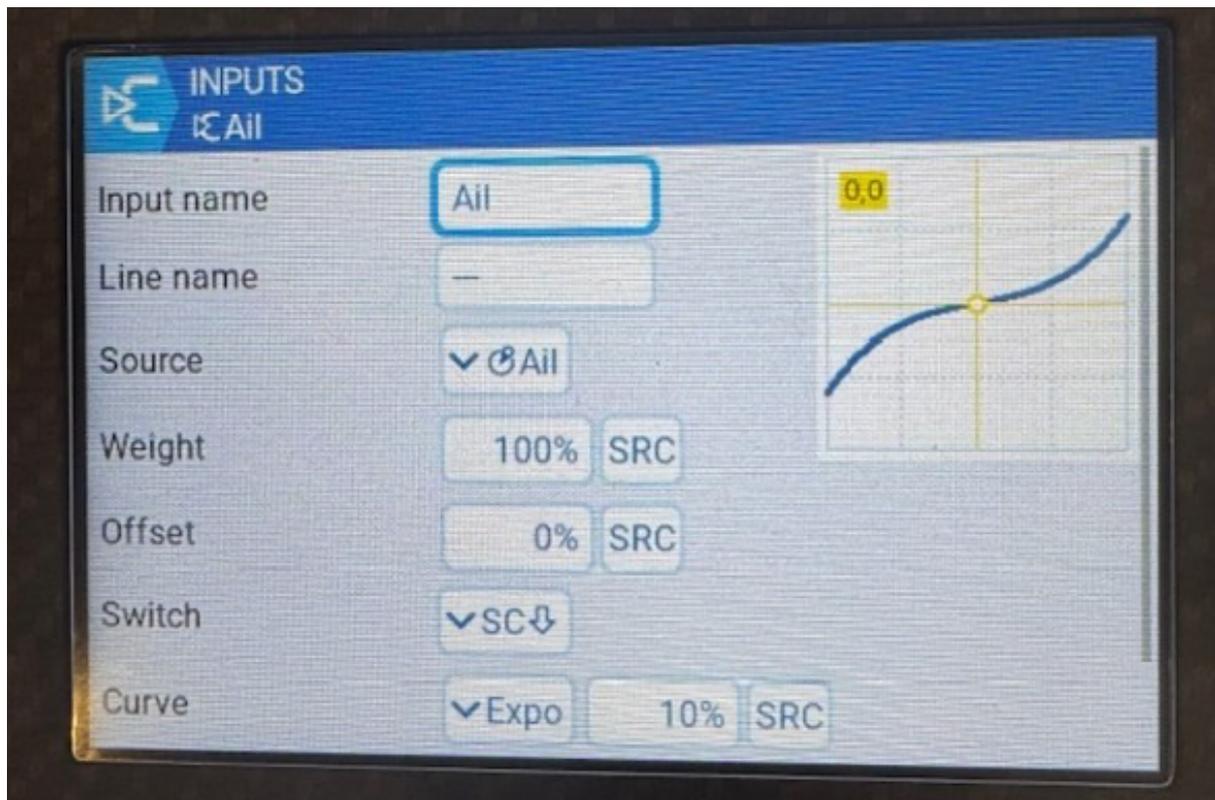
In Radiomaster, DR and EXPO are set on the Inputs menu and NOT on the Mixers menu. So we are going to activate differing rates of EXPO and Dual rate (DR) according to what position switch C has engaged. Take a look at the video above - it's useful to show you how to go about this.

When switch C is fully back towards you you will have 10% EXPO (just so you can see it on the menu). With Switch C in the middle position 70% EXPO will be applied to the rudder. When Switch C is fully pushed away from you, a Dual Rate of 60% of maximum rudder Arc will be applied, along with 70% EXPO. Choose the numbers best for you, but these percentages are mainly chosen to make the illustrations easier.

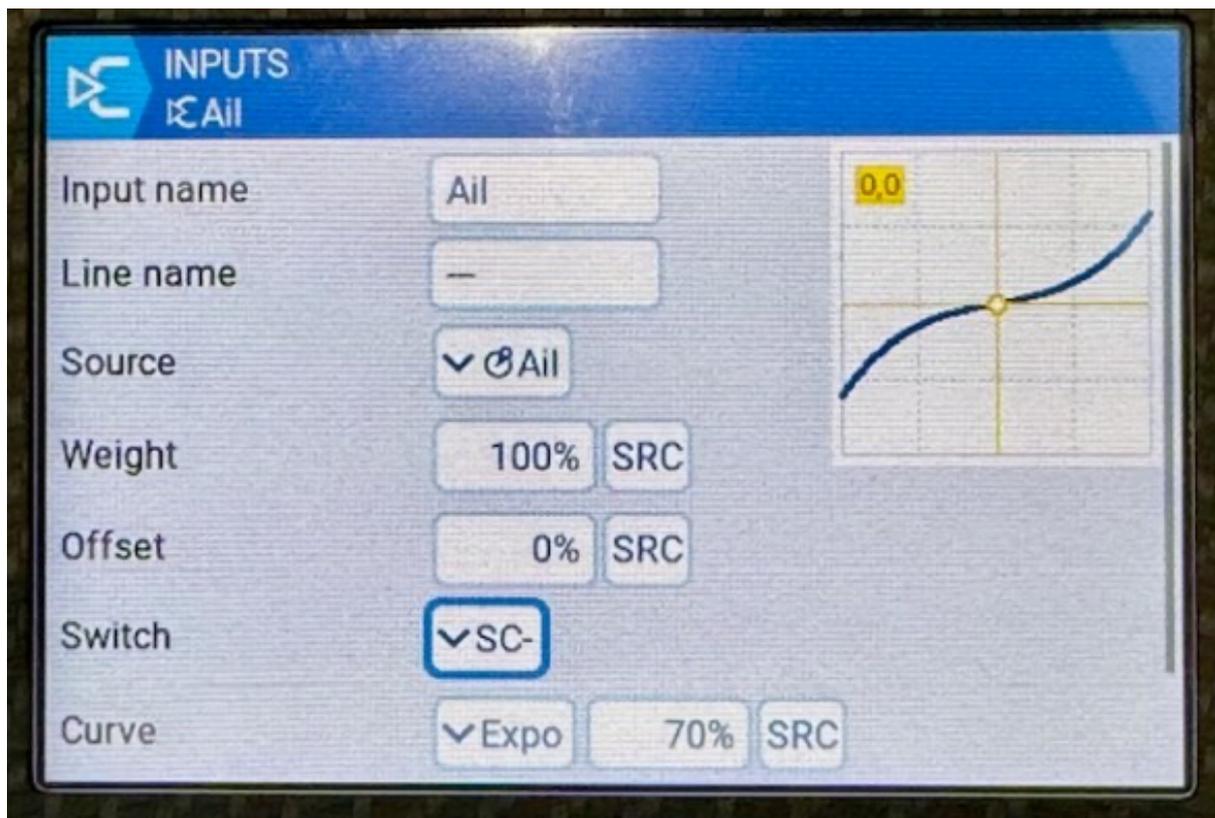
Go to the Inputs menu. Use your 'Insert After' routine to create two extra inputs beneath Ailerons (CH 1). Although for some reason Ch1 is the bottom of this list in this photo, it doesn't seem to matter. The key thing is "Ail" for Ailerons.

The video suggests creating both additional inputs at the same time, rather than one at a time.

The graphs in the top right corner of each edit screen look incorrect to my mind, so ignore them.

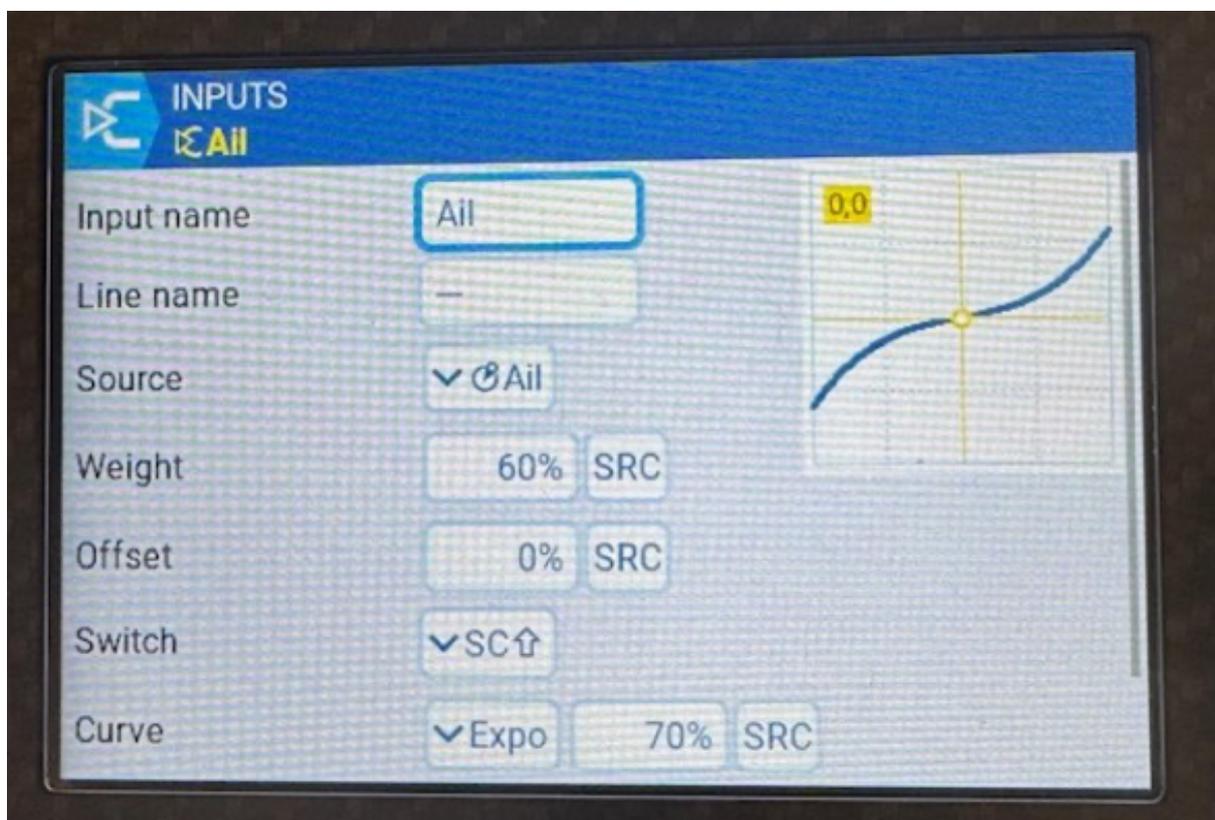


Use this 10% EXPO setting, but 100% weight with SC pointing downwards, corresponding to Position 1 as shown above. Choosing some EXPO like 10% means that you can easily see it on the main inputs menu. You might later turn it to zero.



Note the switch setting is central "SC-"

In this switch position we shall set 70% EXPO but no Dual Rate



Note the Switch is SC and an upward arrow, meaning pushed away from you. On this switch setting we have EXPO at 70% and Dual Rate at 60% meaning that the rider arc is restricted to 60% of its normal travel.

That's it !! You're done :)

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13.0 Receiver Telemetry

Receiver Telemetry for Radio Sailing

Telemetry range and transmitter range are two separate things. On the Radiomaster TX15 the telemetry range is around 50-60 metres when standing at the water's edge (maybe further if you stand up an embankment). The pilots refer to it as "fly by telemetry". It's not "on" all the time.

So if you feel your receiver battery voltage is holding up suspiciously well, it maybe that you are outside telemetry range. When you sail back in to telemetry range, the voltage might take a big step down.

On a Radiomaster, you will know when you leave telemetry range by:-

1. If you have a full touch-screen transmitter like a TX15, the telemetry readings "grey out".
2. The transmitter will give you a spoken warning ... which your fellow competitors would love you to turn off !!!

What Useful Telemetry is available for the Radio Sailor?

In radio sailing, we are taught by the transmitter brands that the telemetry we want is

- transmitter battery strength
- receiver battery strength (i.e. on the boat)
- receiver signal strength (those same little bars you see on a mobile phone)

That is all we need, but is there more?

It turns out in the Radiomaster there is a whole flood of telemetry sensors available, both in the transmitter in your hands and on board the boat. Your choice of what you display and how, will probably depend on whether you have TX Touch Screen or not.

On models without touch screen, you press TELE and page through your displays. It's OK, but admittedly a little clunky.

©Datchet Radio Sailing

On the TX models with Touch Screen, you most likely will select and show everything you need on the Home Screen. You will not need to press TELE as the sensors will always be visible to you.

It's important to remember that Telemetry is NOT set up for the transmitter (counter-intuitive perhaps), but rather it is set up for EACH MODEL individually. This implies that when you want to create new models (eg for different rigs) it is better to use Model copying into a new memory rather than creating new each time. Worth reflecting on this.

You can read about most of the list of telemetry sensors available here here:-

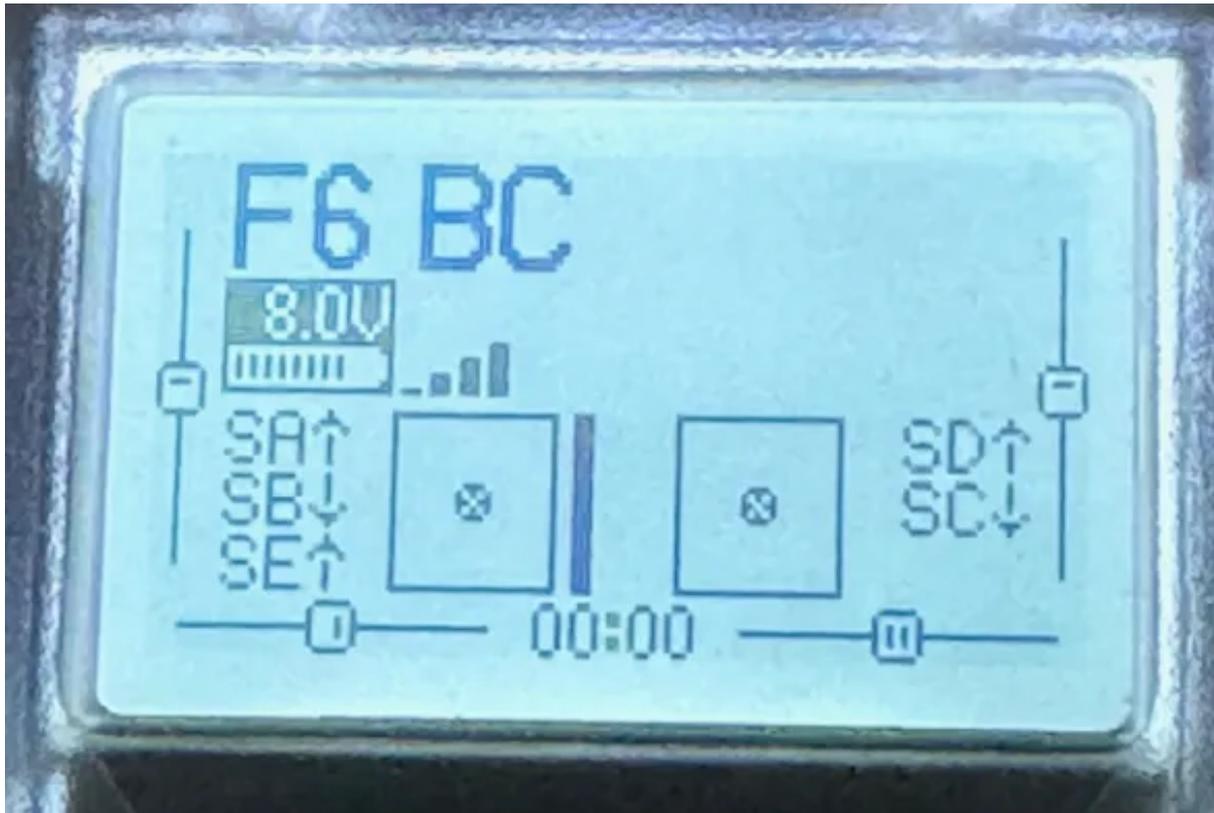
<https://manual.edgetx.org/bw-radios/model-select/telemetry/common-telemetry-sensors>

If the sensor starts with a "T" then it's usually in the transmitter, if it starts with an "R" it's usually in the receiver on the boat. There are exceptions - like the transmitter battery sensor is named "BATT".

It is necessary to explain telemetry in two ways - for pre touch screen transmitters, and then for TX Touch Screen transmitters. First, lets deal with Pre-Touchscreen models:-

Pre TX Touch Screen Telemetry

Transmitter Battery Strength and Receiver signal strength should be showing on your Home Screen automatically, like this



In this example, 8.0v of battery and 4 bars out of 5 for Receiver Signal Strength.

Try this video from Bill Clark, but ignore the idea of extra wires that is talked about here. For sailing purposes, life needs not be that complicated.

And for a more general tutorial on telemetry sensors watch this second video by the same author

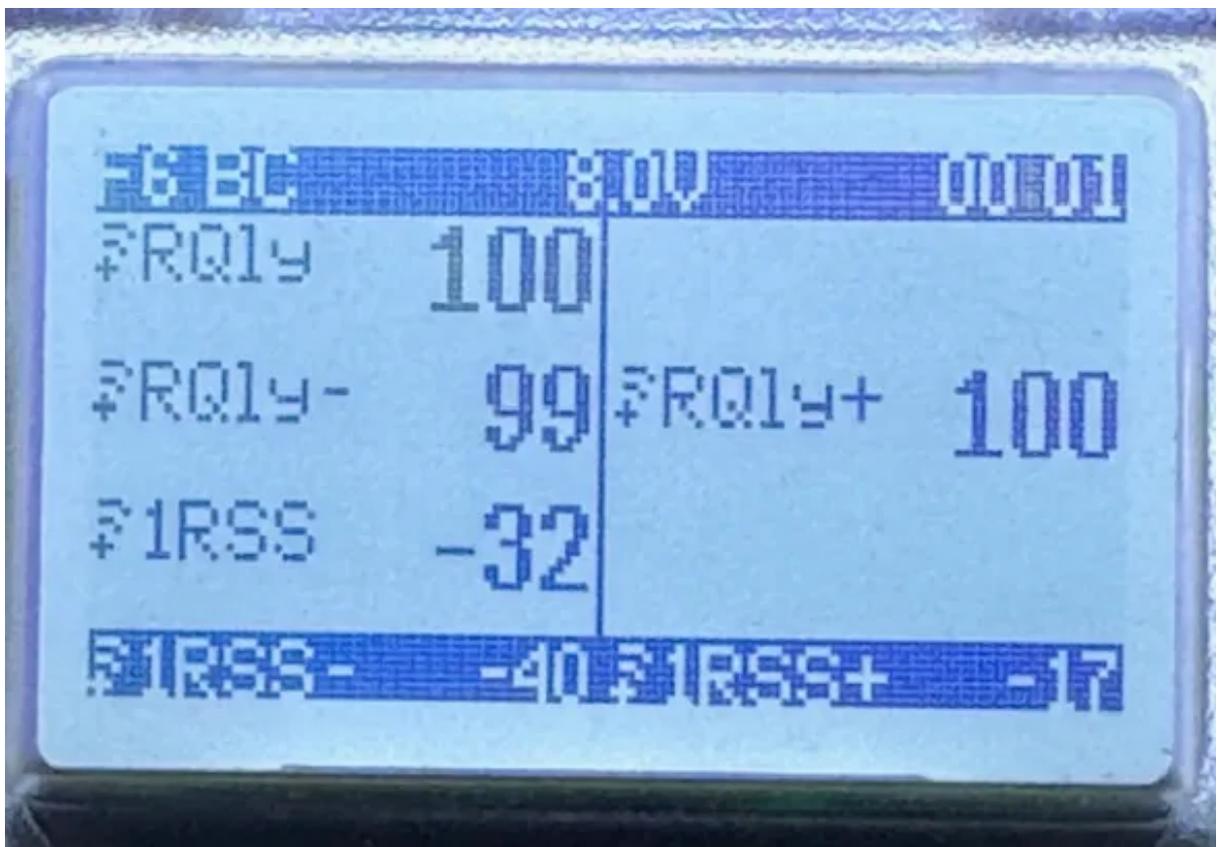
Before we show you what might be useful in radio sailing, it should be noted that some sensors seem to appear three times - with their name, then with a + sign on the end and finally with a - sign on the end. The plus and minus suffixes indicate fields where the software will record the highest readings and lowest readings of the sailing session. Could be useful.

To read the telemetry screens, press the TELE button on the transmitter. If you have more than one screen of data to display, you get to those screens by pressing PAGE+

Take this output as an example:-



(Screen 1)



(Screen 2....RSSI is the sensor for Receiver signal strength that actually appears on the Home Screen as "bars". RQly is the sensor for Packet Receipt Quality at the Receiver)



(Screen 3 - simple bar charts of the same data as an example)

The example selects numeric displays

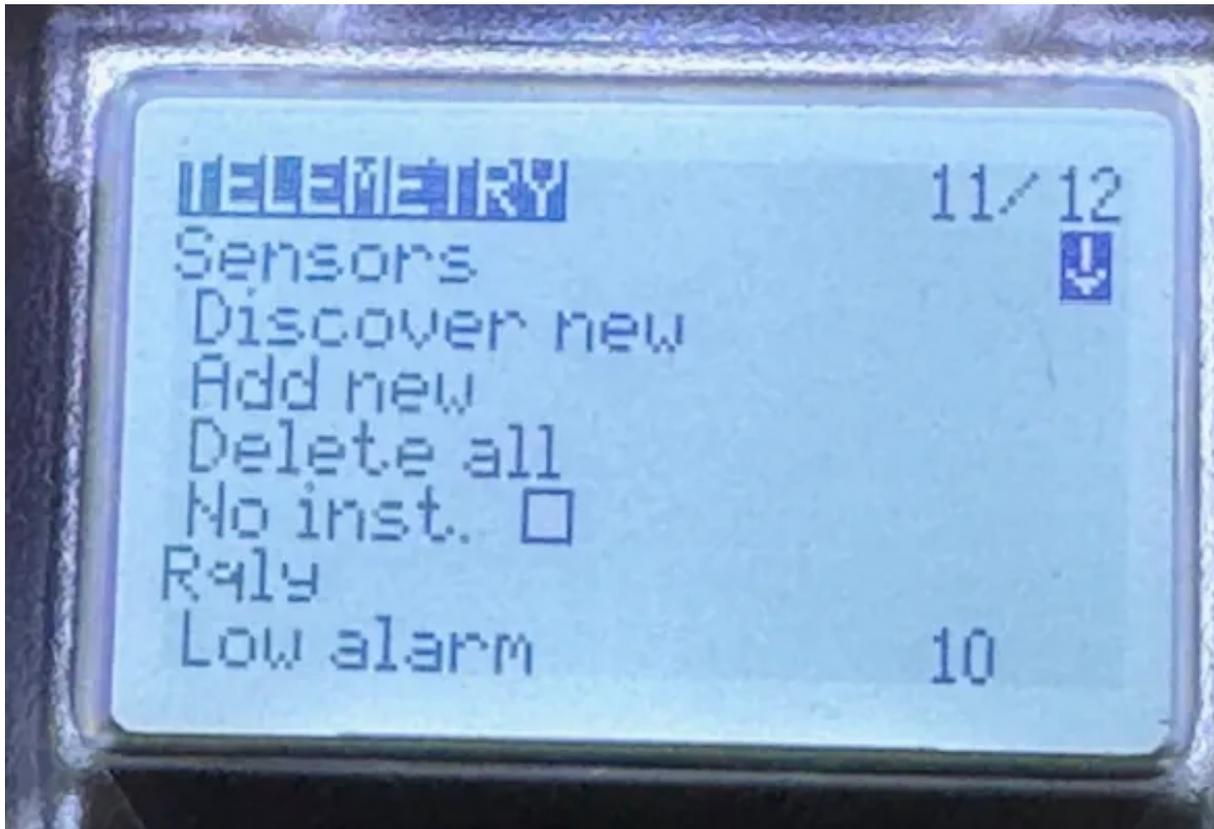
As we get transmitter battery and receiver signal strength automatically on the main screen, we mainly want to additionally display the Receiver Battery voltage, "RxBt". When you get into it, you will find there is also a receiver sensor showing the health of "packets arriving" at the receiver, so if some go missing (think "long distance range"), then you should see something going on with this sensor named "RQly".

Telemetry is set for each "model" in the transmitter individually. You control, telemetry from screen 11/12 of the model menus, and you control the Display of telemetry data from screen 12/12 of the model menus.

First : wire up your receiver to a battery and check that it is successfully paired and talking with the transmitter.

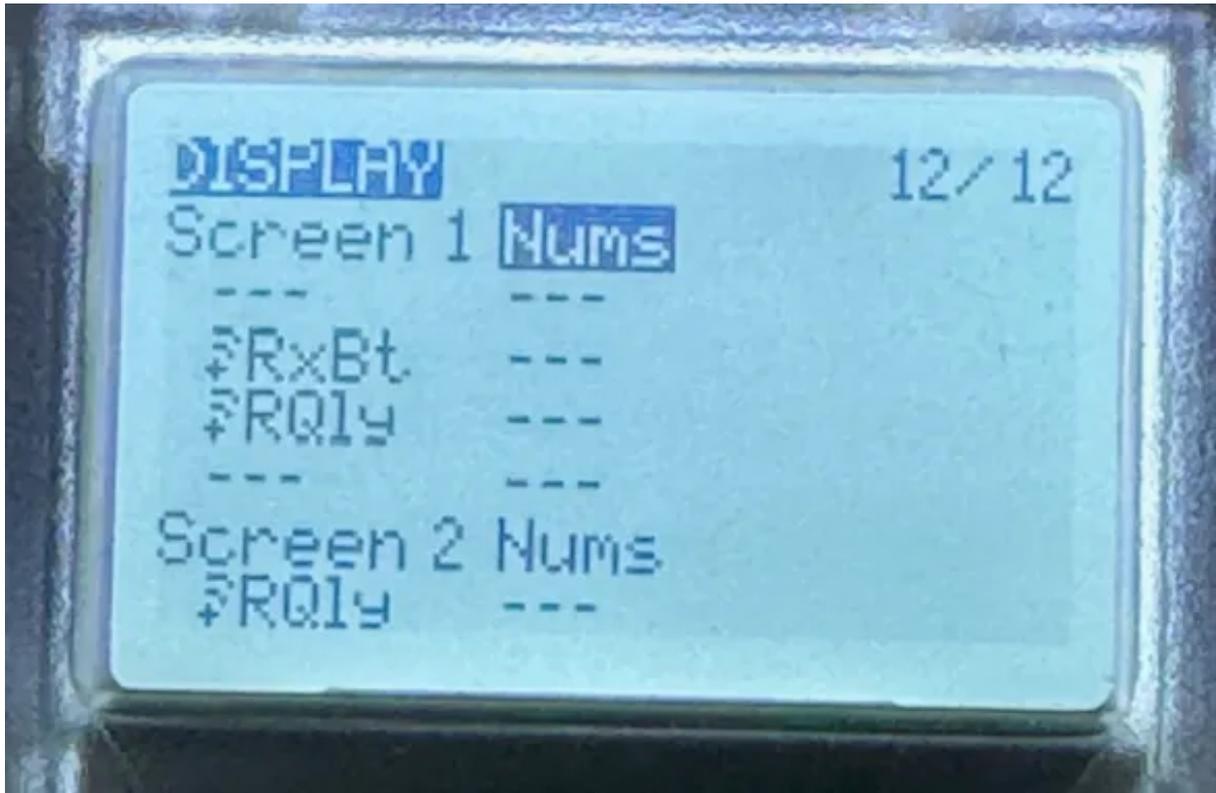
©Datchet Radio Sailing

Go to screen 11

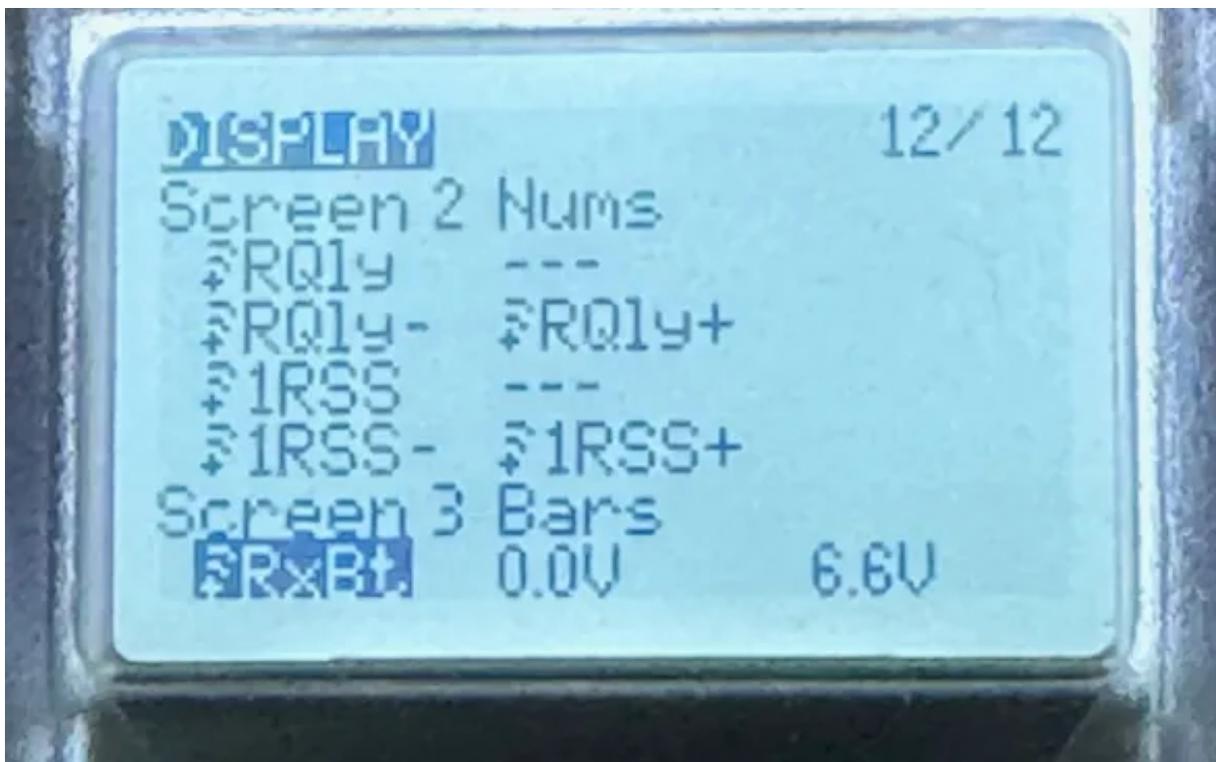


To get this right, with your receiver connected, issue a "Delete All" followed by "Discover New" and you will see what the ERC3 receiver can supply.

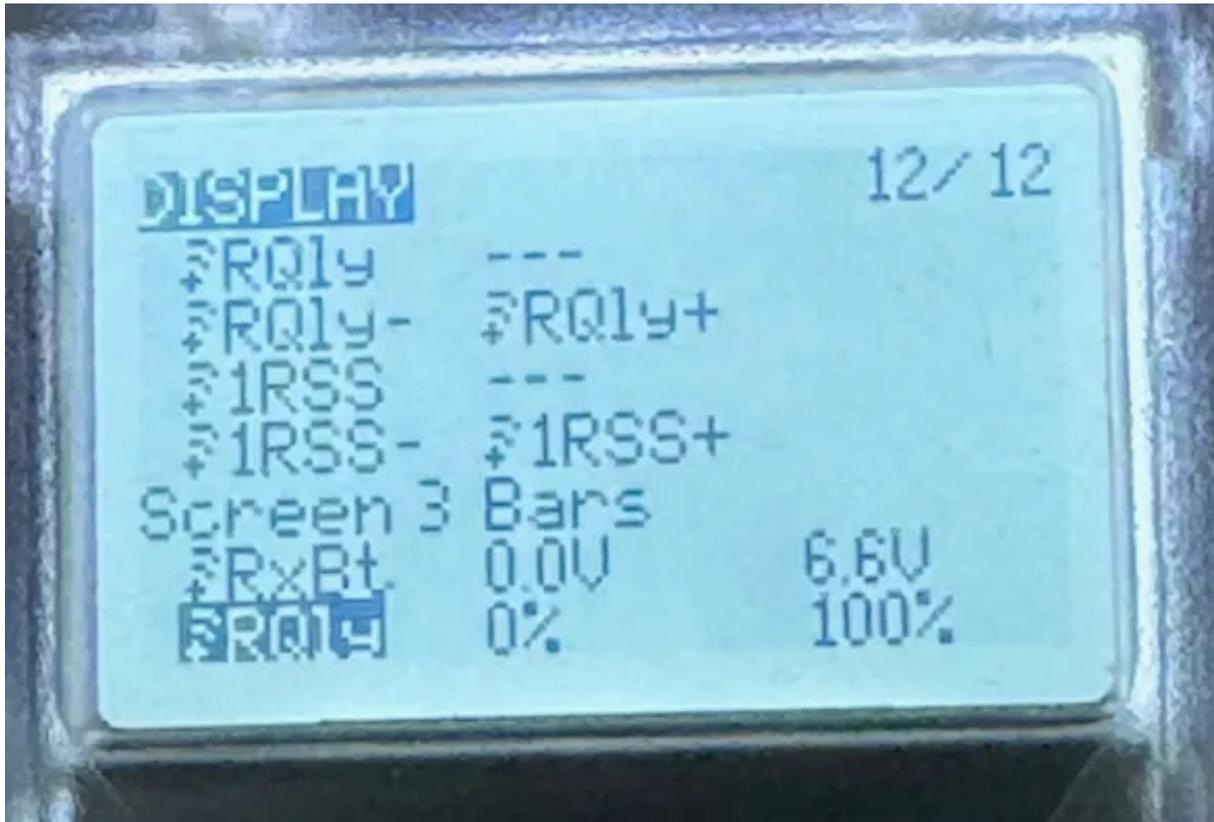
Now to configure the TELE screens to display your sensors. You can have 1-4 screens, and if you choose more than one, use PAGE+ to display through them in turn. In this example we have three screens of telemetry. Go to the DISPLAY menu which is menu 12/12 - a shortcut is to press MDL for your selected model and click "PAGE-" once.



For the first two screens NUMS (numbers) was my choice of display.



And for the last screen, this example experiments with simple (very) bar charts.



Give it a try - keep it simple at first ! At least try and get your Receiver Battery voltage to display.

TX Touch Screen Telemetry

Telemetry is a lot more appealing if you have a TX Series Transmitter. A radio Sailor can likely view all they will ever need on the Transmitter Home Screen.

To tailor range screen, use the Widget tool on the displays panel.



Photo ©Datchet Radio Sailing

From a large library, you can display 7 sensor widgets across the top of the Home Screen (see above). This example has:

- a text box (eg reminder of "time to recharge" battery voltages, or your name perhaps)
- Receiver battery voltage on board the boat (vital)
- Receiver packet reception quality on board the boat
- Transmitter battery voltage
- Battery level graph and Receiver signal strength as a bar chart
- Time and date, or maybe your name

For the main body of the screen, there is a large choice of basic screen layouts to choose from. In this example I have chosen two columns and three rows - then in each of the six boxes you can display a telemetry widget. For radio sailors, the examples here are

- Name of Current Model in use "F6SWPPM" in this example
- Receiver battery strength coloured in red
- Receiver Packet signal quality as % (%age of packets arriving safely at the boat)
- Receiver signal strength known as RSS
- Receiver Packet Signal quality low and high in this session (at the boat)

Here is a great little video explaining the basics

Extra Tips:-

1/ As above, it's useful to delete all and issue "discover new" commands. You will see it keeps scanning looking for more until you click the "STOP" scanning command.

2/ At first glance you might think the telemetry fields are missing. If you click on "Values" you will find them all there. Just scroll through and pick what you want.

3/ You can choose font size, alignment and colour for the fields you display. It is worth playing around to find what suits your preferences best.

- in the example above, we found that use of "shadow" didn't really help.
- in the top row on the basic dark blue background, white characters show well.
- on the main body of the screen, white colour text shows less well, so we have used black and red as examples.
- there are about six sizes of font - we have used XL size in the example. We left justified the sensor name and centre justified the data read out in bold text.

It's all there for you to choose and experiment with.

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All Photos ©Datchet Radio Sailing

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