The Binding Blues

This is about indoor RC planes that use auto-bind receivers and/or DSM micro receivers with brushed motors.

For my definition of "auto-bind" and "multi-protocol transmitter" see the foot notes at the end.

Some planes that use auto-bind receivers…...

Volantec/Eachine

- Ranger 600 (don't buy the Ranger 400!)
- Train Star
- Warbirds series including the Mustang, P40, Corsair and Spitfire

WL Toys/XK

- Warbirds series including the Trojan, P40, and Rare Bear

Spektrum

- Vapor / Night vapor
- Other E-Flight or HobbyZone series with linear servo bricks such as the Sport Cub S

Some micro "jets" and other small RC planes also use auto-bind receivers.

There have been issues with binding these planes to the radio at all our indoor aviation sites.

From my research, it appears that the problem is most likely transmitters having too much power.

For those of us who are using one of the **multi-protocol transmitters** such as a Jumper T-Lite or T-Pro or a Radio Master Zorro or TX12, or an FrSky Taranis with an external multiprotocol module, these transmitters are designed for outdoor flying and have an output power of 20 DBm/100 milli watts. This is often overwhelming the receiver when trying to bind if the radio is too close to the receiver.

So, *before binding*, set your transmitter to **low power**.
On a multiprotocol radio go into the MODEL SET UP screen.
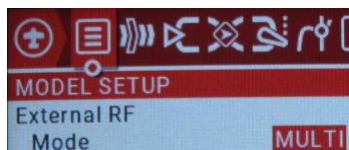
Go down to the "External RF" or "Internal RF" section, whichever your radio uses, and find the "Low power" check box.
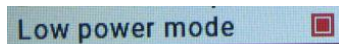
More on this in the DSM section below.

Then *leave* your transmitter on low power. This is perfectly adequate for flying at our indoor venues and means the air is not so full of unnecessarily powerful signals.
This should also lessen potential interference to other flyers when they are binding their plane.
When you open the model on the radio it will warn you, you are in low power mode. That's fine for indoor flying, just accept that option.

CAUTION When you fly the same model outdoors, switch low power off!

On the topic of binding Indoor rc planes.

For many of the planes that we fly indoors, the receivers are auto-bind.

It should **not** be necessary to rebind to your auto-bind receiver every time that you fly that model.

Order matters!! Let's explore what happens.

When the receiver first turns on, it tries to re-connect to the transmitter with which it was last bound. If, after a few seconds, it cannot find that transmitter, then the receiver goes into auto-bind mode and attempts to bind to *any* nearby radio that is using the same protocol.

So…. after an initial bind with a new plane, the plane's receiver should remember the transmitter it bound to.

To use that existing bind.

1. Turn on your transmitter *before* you power on the plane's receiver.
2. When finished flying, unplug the plane's battery *before* you power down the transmitter or change models. Otherwise, the receiver will look for another transmitter and try to rebind.

Several other binding tricks

V761 protocol binding wobbly

I found that after binding to my Volantec Train Star, often the motor was not enabled after the bind.

I thought this was a binding issue, but it is not.

It is a safety issue!

If you have more than +/-15% trim on any control, the V761 protocol will not allow the motor (actually the ESC) to "arm" i.e., the motor will remain disabled.

So, you can't have a permanent trim of more than around +/-14% on any control for models that use the V761 protocol.

DSM type receiver

Use **low power** when binding on a multiprotocol radio.

Leave the radio set to low power if the transmitter has that option (for indoor flying).

If you are binding to DSM using a multi-protocol transmitter, first try using the "**auto**" sub protocol option (if it is available). The multi-protocol module will then endeavour to find the appropriate DSM sub protocol and the radio will set this for this model when binding.

The Binding Blues Pt 2

After binding and considering the steps above, the ***propeller still won't spin***.

First: The ***ESC*** is the "Engine Speed Control" It is built into the receivers most of us use for indoor flying.

1 - Have you calibrated your ESC?

You should do this for all RC models with the possible exception of the "Ready To Fly" (RTF) models that come complete with transmitter.

Here are the steps that work for most ESCs.

1. Make sure the Thr trim is centred.
2. Bind receiver to transmitter.
3. After binding, turn off radio and receiver.
4. Remove bind plug if appropriate.
5. Take off prop.
6. Turn on radio and set the throttle to maximum.
7. If you have a throttle cut switch, then make sure it is set to allow the throttle to work.
8. Turn on receiver.
9. Motor should NOT spin.
10. After a series of beeps/tones from the ESC it will probably finish with 2 beeps. This indicates the maximum throttle value has been stored by the ESC.
11. Gently pull the throttle down to minimum. Once there, wait a few moments and you may hear another set of "musical" tones/beeps from the ESC, indicating that the minimum throttle value has been stored by the SEC.
12. Turn off receiver then turn receiver back on. See if you now have throttle control. If not, then try the following.

2 - Arming the ESC – for some models (Thanks to JJ)

Even after correctly binding and calibrating the speed controller, the motor won't run on some models unless you advance the throttle fully and then go back to zero.

The prop may spin briefly at the full throttle point indicating the speed controller is now armed.

This is not the same as the trim safety issue above.

This approach is needed for most Volantex/Eachine model planes.

3 - Leveling the plane to activate the controls – for some models (Thanks to JJ)

Some stabilised models with auto-levelling (e.g. SAFE) will not respond to controls unless the plane is set close to level after power up. The Sport CubS for example needs the tail lifted until the plane is level, before it responds with control surface excursions and is ready to go.

The Binding Blues Pt 3

DSM type receiver with brushed motor - **still no motor after trying the above.**

There are quite a few things you can try. The most likely candidates are at the start of the list of options.

Also see https://www.youtube.com/watch?v=6dpkkkezQsk

"Brushed motors ESCs tend to not enable ESC at start up if Throttle is not 988us or lower".

Even if this sounds gobble gook to you, please read on.

In essence, it means when the throttle is fully down the radio must send a signal of around -105% rather than -100%. In practice I have found this works more reliably if you aim for -115%.

There are several suggestions that you can try to achieve this.

First make sure your throttle trim is centred before trying any of these options.

Option 1 - for any type of transmitter
1. First push the throttle all the way down, then…
2. Push the throttle trim as far down is it will go.
3. Power down, then power up your plane. Do you have throttle control now? If not, put the throttle trim back to its mid-point.

Option 2 - for any type of transmitter - use unique model numbers (Thanks to GP.)

E.g. on a multi-protocol transmitter, when you create a new model, it is likely to default to model number 00.
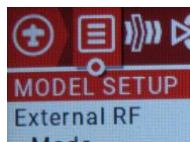

Set this to a number not already in use on **your** radio, **before** you start the bind process.

**The following options only apply if you are using a multi-protocol transmitter.**

The starting point for all the options below is the **MODEL SETUP** page.

Then, scroll down to the Exte**rnal RF** or Inte**rnal RF** section, depending on whichever your radio uses.

Option 3 - Use "Max Throw" (Thanks to GE).
1. On a multi-protocol radio go to the MODEL SETUP page.
2. Tick the "Enable max. throw"/"Max Throw" - if it exists.
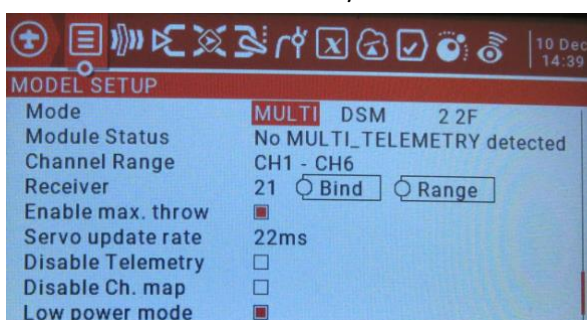
3.

4. Power down, then power up your plane. Do you have throttle control now? If not try…
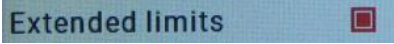
Now we are getting into the 'heavy' stuff.

Option 4 - Set minimum throttle output to -115%

1. On a multi-protocol radio go to the MODEL SETUP page.
2. Press the "Page >" button a number of times until you get to the "Outputs" page.
3. Find Ch3 (Thr) output and set the minimum value to -115%. If the radio will not allow you to do this, then try the next option below.
4.
5. If you were able to set minimum Thr (Ch3) output to -115%, power down, then power up your plane. Do you have throttle control now? If not try…

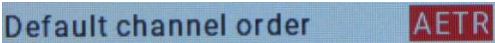Option 5 - Extend limits, *then* set minimum Thr output to -115%

1. On a multi-protocol radio go to the MODEL SETUP page.
2. Scroll down a bit and find the "Extend Limits" or "E Limits" (on smaller screen).
3.
4. Tick this.
6. Now follow the steps in the previous section. THEN: Power down, then power up your plane. Do you have throttle control now? If not try…

Option 6 - Still no joy?? Oh dear.

1. Try all the previous options together.
2. Power down, then power up your plane. Do you have throttle control now? If not – hmm see below.

A few other thoughts that might help if you are still having no joy.

Option 7 - Makes sure the channel order of the inputs/mixes/outputs is set to "AETR"?

1. Assumes you are using a multi-protocol radio.
2. "AETR" is NOT the standard DSM channel order, but the multi-protocol module sorts that out automatically before transmitting the data.
3. Set this with System->RADIO SETUP.
4.
5. Don't confuse this with MODEL SET UP -> Centre Beep.
6.
7. This is where you can nominate which inputs will beep when in their centre position. E.g. to set throttle to beep at mid position, edit the line and click on "T" for throttle and it will get a dark background.

The Binding Blues Pt 4
Other Binding Hints

XK warbirds

On a multiprotocol transmitter, some protocols provide a "frequency fine tune".

I have found that some models e.g. XK warbirds (which use the protocol 'WL Heli V911', Sub protocol 'E119') appear to benefit significantly by having this "frequency fine tune" adjusted to the particular model/protocol.

Once this has been done, it seems to help in the binding process and seems to help retain the bind after the receiver has been turned off. This is set up on the Model Setup screen, in the Mode/Protocol setup area.

For an overview have a look here.
https://www.multi-module.org/using-the-module/frequency-tuning

The set-up procedure is covered here (and in a number of YouTube videos).
https://oscarliang.com/rf-freq-fine-tune/

The Binding Blues Pt 5
Foot notes

What is a "auto-bind"?

This type of receiver looks for a transmitter to bind with if it can't *immediately* find the transmitter it was last bound to.

What is a multiprotocol transmitter?

The *multi-protocol transmitters* mentioned above, allow you to bind to many, many types of receivers/planes by choosing an appropriate protocol and/or sub protocol for that model. So, you should be able to use the one radio with most models we fly indoors and most models you fly outdoors. All on the *one* transmitter.

To explain…..

In the world of humans there are different languages e.g. English, Hungarian, Romanian, Swedish etc.

In the world of radio controlled planes, there are also lots of different languages e.g. DSM, FrSky D16, V761 etc. These languages are known as protocols. They all tell the planes what to, do but so in slightly different ways.

The receiver and the transmitter **must use the same protocol** (language) to be able to communicate.

A multi-protocol transmitter provides many different protocols. For each of your models you can nominate the protocol to use for that model.

These transmitter modules are either built into the actual radio or can be a module you plug onto the back of the radio if it has a suitable "JR bay".

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