7 Channel Encoder for retro transmitter conversions **V2 Dec 2019, updated Jan 2023**

This is a simple encoder which is very easy to implement using a variety of readily-available commercial boards most commonly made by DIY-More and sold quite cheaply on ebay, Aliexpress, Banggood or Amazon. Ultimately each type of board will cease production, but will be replaced by something similar:
The most recent board (as of 2026) is known as the “DIY-More CH340G Nano Strong” (!)

Though the physical appearance differs, all of these boards are basically an Atmel 328P Arduino.

Originally they were supplied with separate header pins, which made the option of a DIP switch possible – but more recently the header pins are always pre-soldered, so options have to be selected using bind-plugs, or can be wired to toggle switches.

Some of these boards require a simple modification, which differs with the type of board – so please use the appropriate section of this document for your board.

PLEASE NOTE THAT ANY BOARDS I SUPPLY WILL BE READY TO GO, NO MODS REQUIRED.

Edit: 3/12/2021
Added bespoke PCB by Mike Kitchen (page 10) and throttle reverse on switch D2 which was previously unused

Edit: 1/6/22
Added 60:40 mix activated by D6 AND D7 both on.

Last Edit: 18/4/26
Added DIY-More Nano Strong board

The encoder has standard 0.1” header strips and is wired with servo plug-leads which avoids any intricate soldering to the PCB – the only soldering is to pot tags, switches, buttons etc.

Facilities:
6 proportional channels, four on the sticks (A0-A3) and two auxilliary pots (A4-5)
One switched channel with servo-slow, and selectable 1 or 2 seconds transit speed (D3 dipswitch or link)
Variable 'Rates' or travel volume, from 100% down to 10% 'click off' for no rates (pot on A7)
True Futaba-equivalent variable 'Expo' on primary channels, 'click off' for no expo (pot on A6)
Servo reversing by holding the stick over on power up (throttle reverse on D2 dipswitch or link)
Hardware throttle lock switch (D9)
Software throttle lock – throttle must be fully closed before it can be opened
Throttle lock override alarm
Elevon mixer set to 75:25 for pitch-sensitive flying wings (D6 dipswitch or link)
V-tail mixer set to 50:50 ratio (D7 dipswitch or link). Both D6 AND D7 gives a 60:40 mix.
Single channel emulation mix built-in, compound (rudder & kick-up elevator) and sequential (rudder). (D11 & D10 resp)
The S/C option is a mix – the sticks remain active during S/C operation – and obeys all the reversing/mix/expo/rates controls.
Compound has selectable operating speed corresponding to light & heavy rattlers (D1 dipswitch or link)
Minute-minder for timing flights, can be extended or cancelled at any time (button on D8)
Inactivity alarm to remind you that you've forgotten to switch off :-)
Single-handed range check mode, flick the ch7 toggle three times to invoke, throttle is held off in range check mode
Three-point self-calibrating sticks, tolerant of inaccurate stick centring, saved to EEPROM during power-off , preferably needs mechanical trim stick units
User selectable channel order: (D4 & D5 dipswitch or links)
AETR, aux1, aux2, switched channel,
TAER, aux1, aux2, switched channel,
TAER, switched channel, aux1, aux2, with 400uS PPM timing for genuine Spektrum modules, or
ETAR for Futaba users with an unwanted channel mapping in their RF module.

Calibration:

To calibrate the sticks, centre all trims, hold the D10 or D11 button down, and do not release it until calibration is complete. Switch on, and still holding the button, move each of the sticks into all four corners a few times. Rotate the aux pots fully end to end. Then centre all the controls including the throttle and the aux pots. When done, you let go of the button and it saves the maximum, minimum and neutral values from each pot to flash. Every time you power-up it reads the calibrated values from flash and uses these for the stick maps. You can repeat the calibration as often as you like but it only needs to be done once unless you change the stick configurations. The 'calibrate' push-button isnt dedicated - its also the single-channel 'tone' button – either S/C input D10 or D11 can be used for calibration. The calibration will work regardless of the sequential/compound choices, as long as one button is present (which can be an internal link if S/C emulation isnt required)

This 'three point' calibration automagically corrects for sticks which dont quite centre accurately, making the encoder far more tolerant of old stick units with their original pots.

Single-Channel Escapement Emulation, rates, expo, and the switched channel 7:

The Single Channel button inputs are separate but could be used in 3 ways:

1) choose one of either the sequential or compound button (either also does calibration)
2) two separate buttons, one sequential, one compound (either also does calibration)
3) (my preference) one button in series with a change-over switch to select sequential or compound

I like switched pots for rates and expo, fully anti-clock clicks for no rates or expo, ***although the switch isnt physically connected, its more of a tactile thing***. The ‘click’ end of the track is negative so zero volts at the rates wiper is full travel, and zero volts on the expo wiper is no expo. Optionally you could add a separate toggle-switch in the rates pot positive for 'switched rates'.

Note that the elevon/vtail mixer selection is only active at the moment of switch-on and any subsequent operation of the mixer switch has no effect. This prevents you accidentally switching a mix on or off during a flight.

With the exception of either one of the calibrate buttons and the PPM output, all of the other D connections are optional. If you dont want a mixer, or throttle-cut, or whatever, just omit that particular switch and the wire to that pin.
On the analogue inputs however, if you wanted fewer than 6 channels, then I recommend that the unused ones should be tied to the wiper of a used one. This way all 6 analogue inputs see the calibration voltages - they shouldnt be left floating nor tied high or low. 'Floating' channels can be confusing – sometimes they will mimic the adjactent channel, sometimes not, so its better to fix their behaviour.
If expo or rates or both are not wanted, those pins (A6 & A7) should be grounded with a link

Channel 7 is a conventional 2-position switch for retracts, flaps etc and could be omitted – but as it also provides the single-handed range-check, you would lose this facility too.

Channel mapping:

There are four selectable mapping options using the dipswitches or links on D4 & D5:

D4 & D5 open	AETR (like Futaba) Ail, Ele, Thr, Rud, Aux1, Aux2, ch7
D4 open, lD5 closed	TAER (Like JR/Spektrum) Thr, Ail, Ele, Rud, Gear, Aux1, Aux2 with 400uS ppm pulses
D4 closed, D5 open	TAER (Like JR/Spektrum) Thr, Ail, Ele, Rud, Aux1, Aux2, Ch7
D4 closed, D5 closed	ETAR Corrects an unwanted OrangeRx mapping to Futaba AETR

Minute-minder (timer)

This can be ignored if not required. The timer is set by holding the D8 button and counting pips, each pip representing one minute of flying. For a four-minute flight you would hold the button, count four pips, then release it. When the four minutes have elapsed, an alarm sounds. The timer can be extended by holding the D8 button again, or cancelled by briefly tapping the button.

Using fewer channels, or fewer facilities – say a trad 4ch set:

Any unwanted analogue inputs (say for a 4ch set) should simply be tied to another one that is used rather than left floating.
For the stick calibration to work all the stick inputs need to be included, even if they're only mimicking another channel.
The toggle could be omitted but as well as losing the channel you would also lose the single-handed range-check.

The button gives a realistic single-channel compound escapement emulation but I did intentionally omit the quick-blip throttle - which I thought might not be safe in this context. The rudder & kick-up elevator accurately mimics the old Elmic escapements via the button, just like a true S/C set. The operational speed of the emulated escapement has a selectable speed which corresponds to the 'heavy' and 'light' rattlers on Elmic escapements. With D1 open, the speed is normal, dipswitch or link D1 selects fast.

The S/C emulation is actually a mix which is applied early in the processing chain, so the variable rates work on s/c too, so you can vary the amount of movement very easily - and so does the elevon mixer if anyone is brave enough to try a S/C flying wing!

Everything happens simultaneously, whilst flying 'on the button', s/c style, the propo sticks are still live as are the trims and aux functions. The s/c emulation follows any servo-reversing options of course.

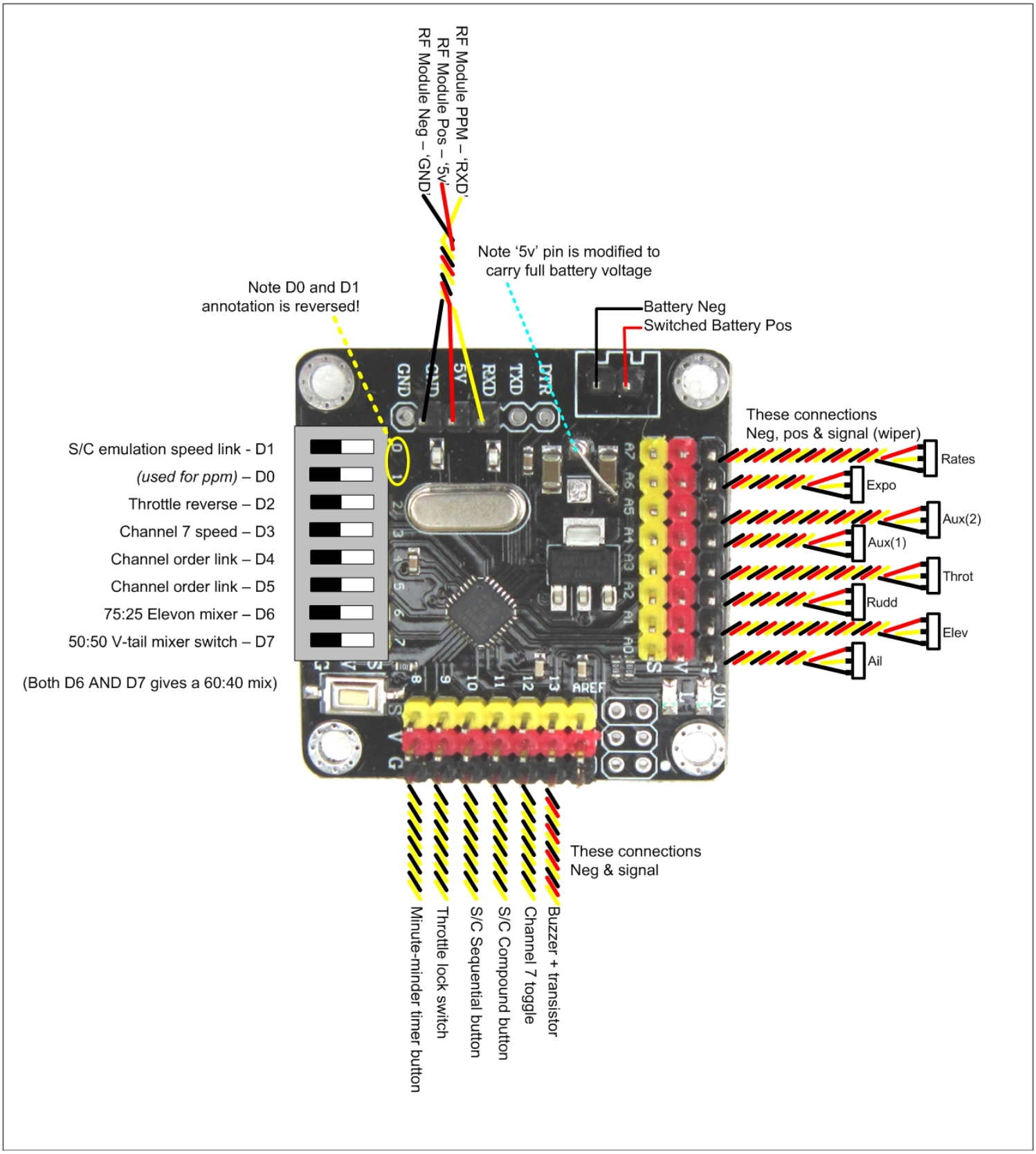
Heres the diagram showing how its all wired up.

PLEASE NOTE THAT REGARDLESS OF THE REQUIRED PPM CHANNEL ORDER (FUTABA AETR OR SPEKTRUM TAER), THE CONTROLS MUST BE WIRED TO THE ANALOGUE INPUTS AS SHOWN BELOW.

Options are selected using either the dipswitch or header links for which we need Spektrum bind plugs or something similar, connecting the signal pin to ground.

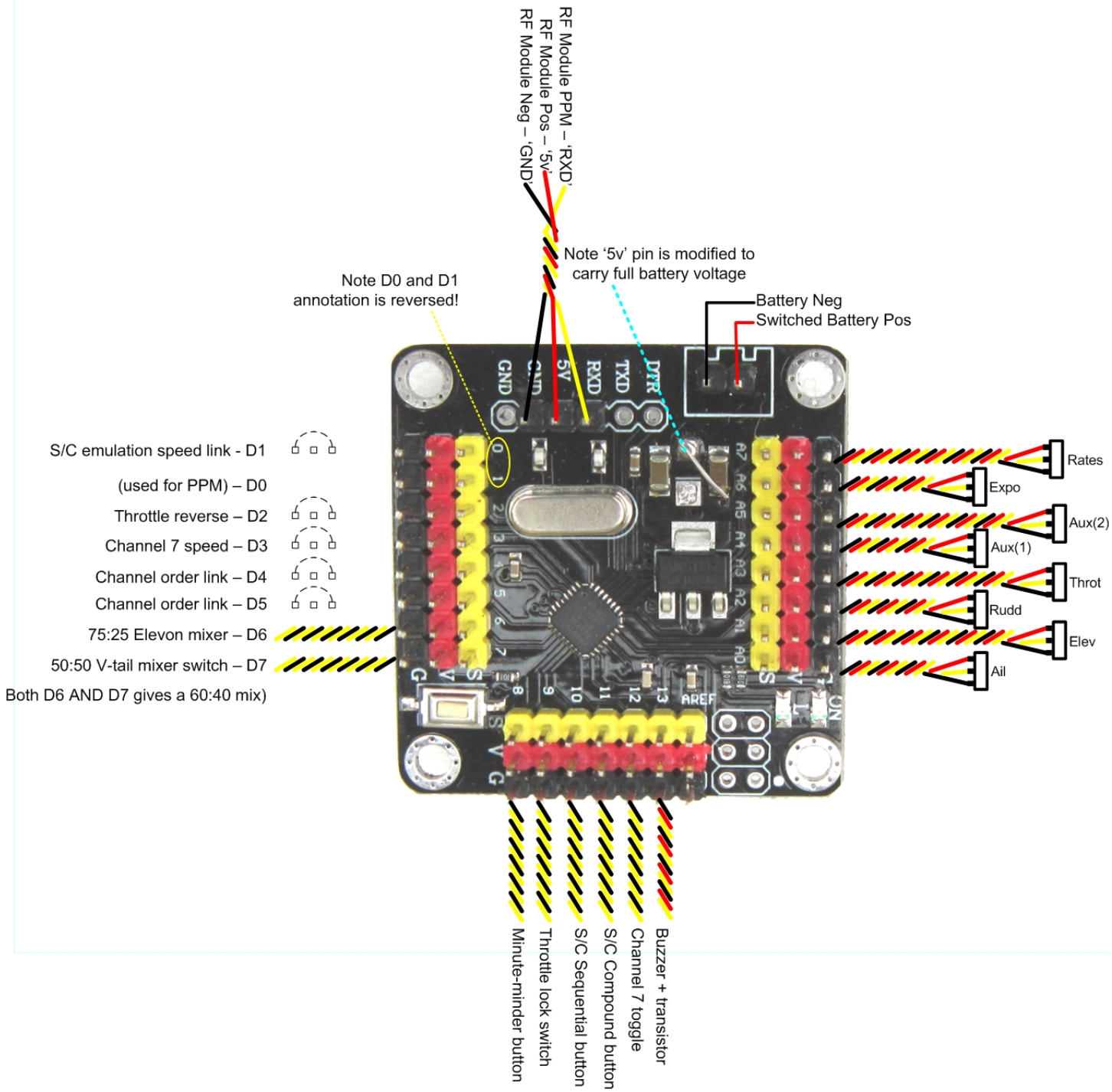
Beware the 5.08mm header shunts which appear to be designed for the job, but which actually connect all three pins, short-circuiting the neg to pos 5v which would probably damage the board.

Its your choice whether to use a dipswitch or headers, there are pros & cons - headers give you the choice of a remote switch or a link, whereas a dipswitch is just the switch which is inside the transmitter case.
Header links take up more room where the dipswitch is neater.
Headers allow you to reallocate pins should you modify the code.
So the dipswitch wont suit everybody but either way the code is the same (revised pinout Feb20, D6 & D8 swapped), ie both use the identical sketch.



The 'dipswitch' option is good if you want all the swicth options hidden inside the transmitter.

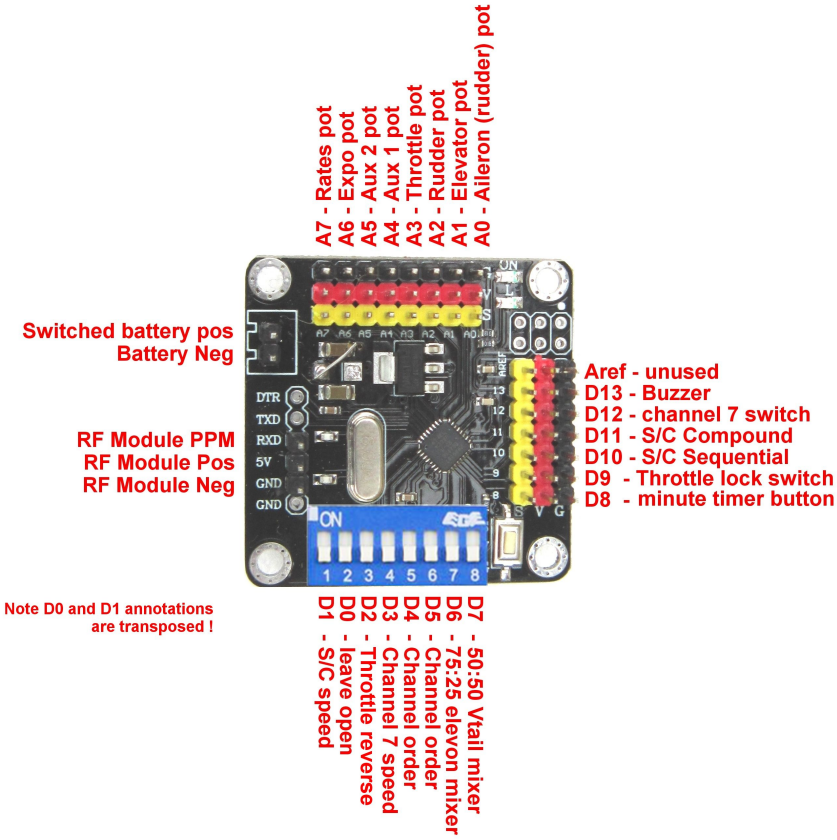
The 'header' option is better if you want all the options available on the transmitter facia.

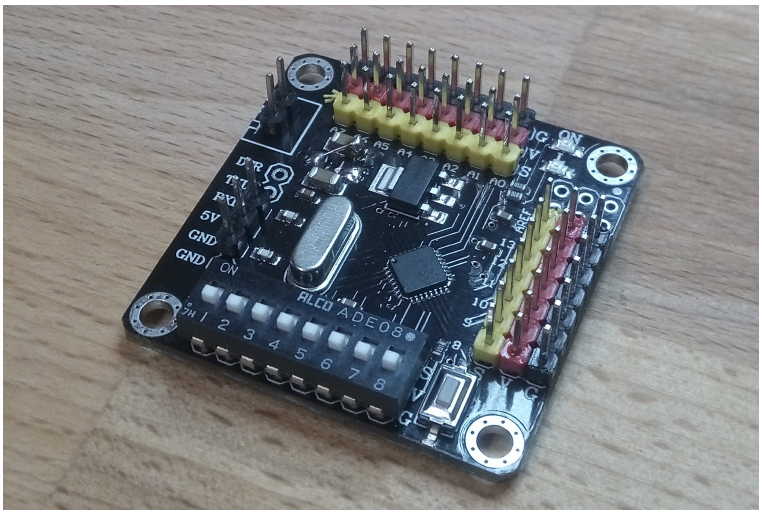

RF Module PPM – 'RXD'
RF Module Pos – '5v'
RF Module Neg – 'GND'
Note '5v' pin is modified to carry full battery voltage
Note D0 and D1 annotation is reversed!
Battery Neg
Switched Battery Pos
S/C emulation speed link - D1
(used for PPM) – D0
Throttle reverse – D2
Channel 7 speed – D3
Channel order link – D4
Channel order link – D5
75:25 Elevon mixer – D6
50:50 V-tail mixer switch – D7
Both D6 AND D7 gives a 60:40 mix)
Rates
Expo
Aux(2)
Aux(1)
Throt
Rudd
Elev
Ail
Minute-minder button
Throttle lock switch
S/C Sequential button
S/C Compound button
Channel 7 toggle
Buzzer + transistor

Dipswitch numbering:

Note: its unfortunate that most dipswitches are labelled **1** to **8** whereas we know the corresponding Arduino pins as D**0** to D**7**:

Dipswitch position 1 - D1 S/C emulation speed (Remember DIYMore board has D0 and D1 reversed)
Dipswitch position 2 - D0 is PPM out so this switch isnt connected
Dipswitch position 3 - D2 throttle reverse
Dipswitch position 4 - D3 channel 7 speed
Dipswitch position 5 - D4 channel mapping
Dipswitch position 6 - D5 channel mapping
Dipswitch position 7 - D6 75:25 mixer
Dipswitch position 8 - D7 50:50 mixer Both D6 AND D7 selects a 60:40 mix.



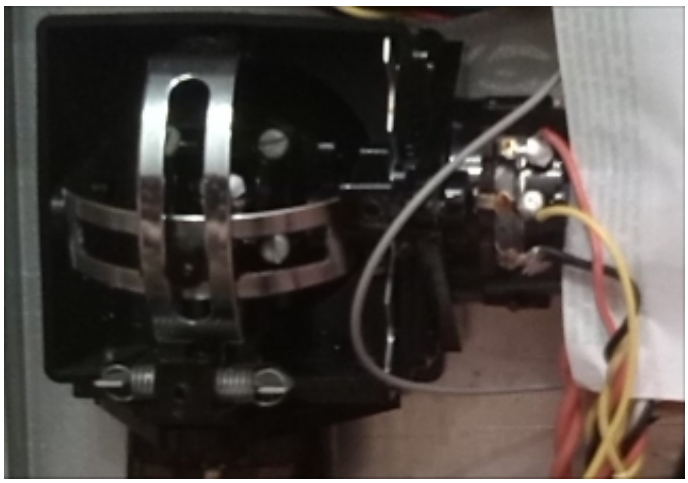


Stick units:

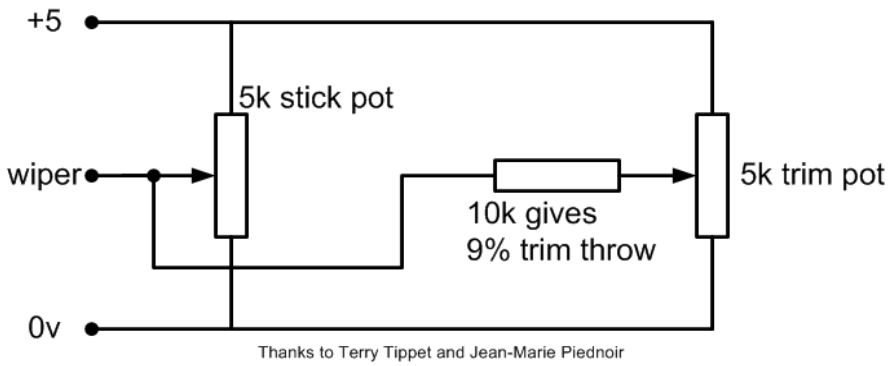
Note the neg end of the throttle pot is nearer the bottom of the transmitter.
For mode 2 (throttle on the left) (on the right as you look into the back of the tx!)



For mode 1 (throttle on the right) (on the left as you look into the back of the tx!)

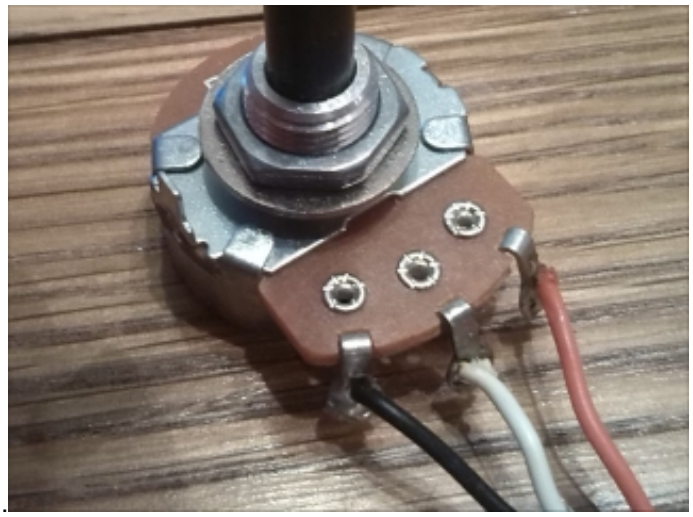


This particular encoder is intended for mechanical-trim stick units, there are no separate trim inputs, and in fact no spare analogue inputs to the Arduino processor where trims could be connected. For independent electrical-trim stick units, you can resistively couple trimpots (as some manufacturers did) – the fixed resistor determines the trim travel, 10% needs 11.25k, so we use 10k for 9%



Thanks to Terry Tippet and Jean-Marie Piednoir

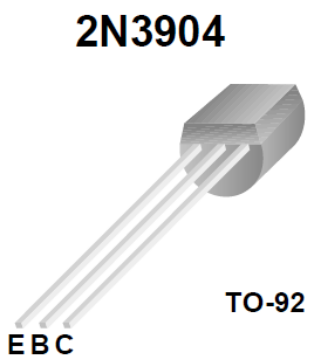
…and the neg end of the expo and rates pots is the anti-clockwise ‘click’ end



Buzzer:

This board needs an external buzzer adding for the minute-minder, the throttle-warning, and the inactivity alarm.
The circuit used is an emitter-follower which can be made on a servo extension lead that plugs onto the D13 header.
Buffering with a transistor helps to reduce inductive hash from the buzzer coil.
A 2N3904 is laid flat-face-down and the emitter soldered to the buzzer long leg (buzzer pos).
The 3-wire servo cable is then soldered to the buzzer neg, collector & base, then insulated with heatshrink or hot-glue.





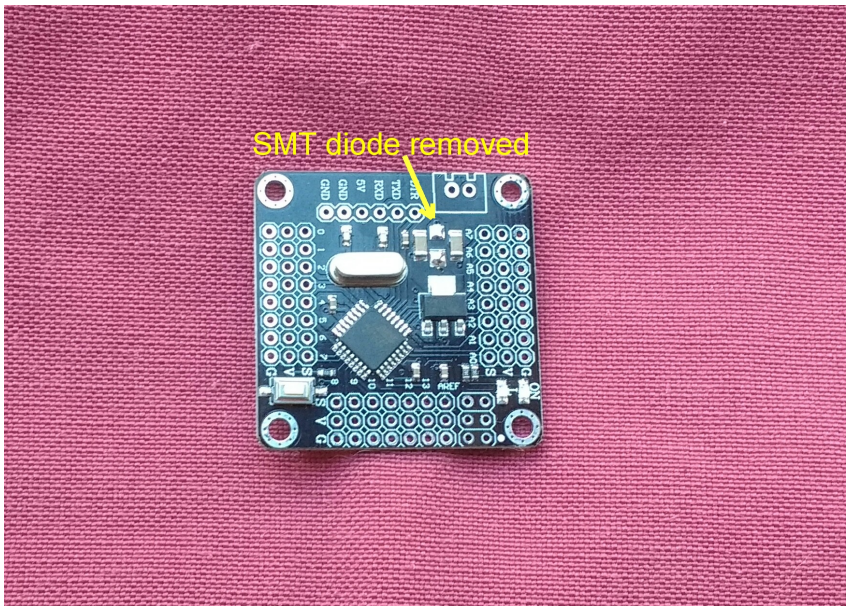
The completed buzzer assembly is mounted on the D13 header.
Any ebay-board encoders I supply will have the buzzer assembly ready-made & tested.

Some use an unbuffered buzzer directly powered by a AtMega328P pin. Its personal choice, I would advise against it as the buzzer is a highly inductive device which introduces a lot of hash into the processor pin, which is plainly visible on a scope. Buffering the buzzer almost completely isolates the hash.

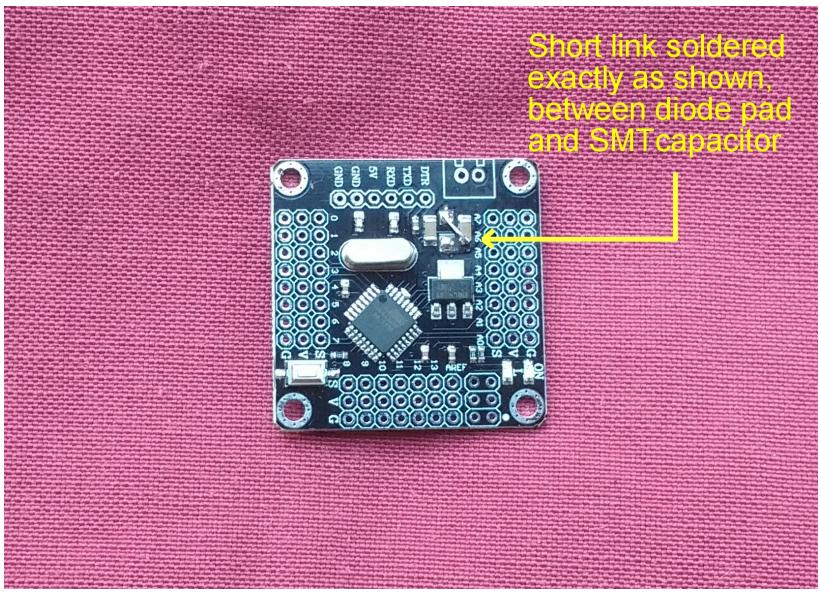
The "DIY-More Pro-Mini=Strong" Board:

The current DIY-More board is easily distinguished by having the 'servo headers' on three sides, and its 'Pro-Mini-Strong' label. It has a proper 16mhz crystal rather than a resonator, so timing should be more accurate, and it has a separate power in connector. It also has a 6-pin ICSP port.
It needs a small modification to provide PPM, battery and neg for the RF module, which is most easily done before populating the board with the headers.

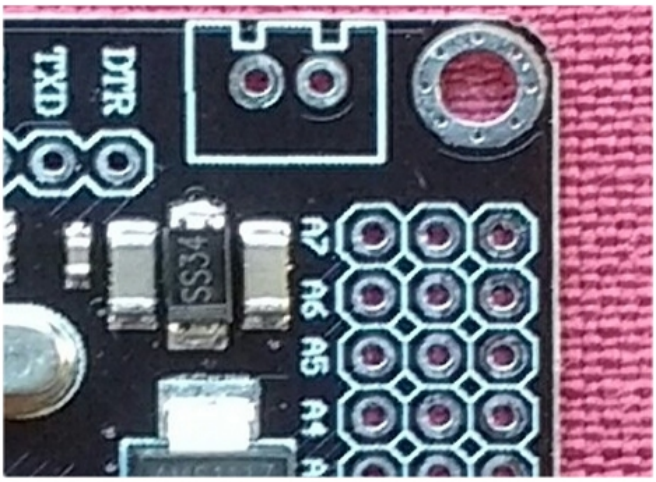
The mod is to remove an SMT schottky diode, then to bridge one of the vacated schottky pads to a nearby SMT capacitor:

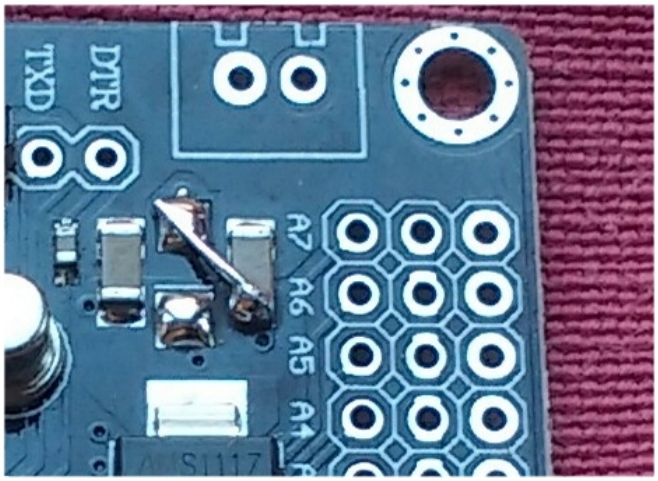


Removing the diode isolates the 5v input header, and we can now use it to provide battery voltage to the RF module.
This is done with a short diagonal strap connecting the upper diode pad to the lower end of the SMT capacitor.
A snipped resistor lead is ideal for this – solder the pad end first before cutting to length as its only about 6mm long!

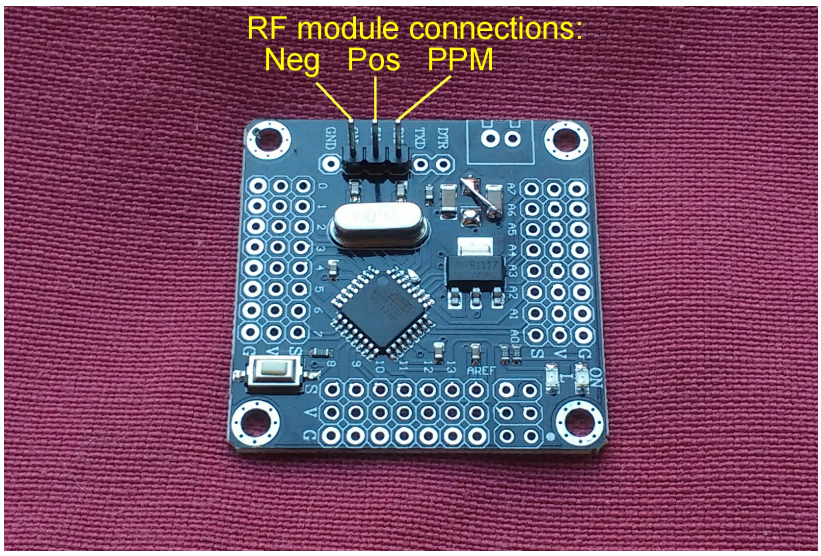


Heres a closer look:



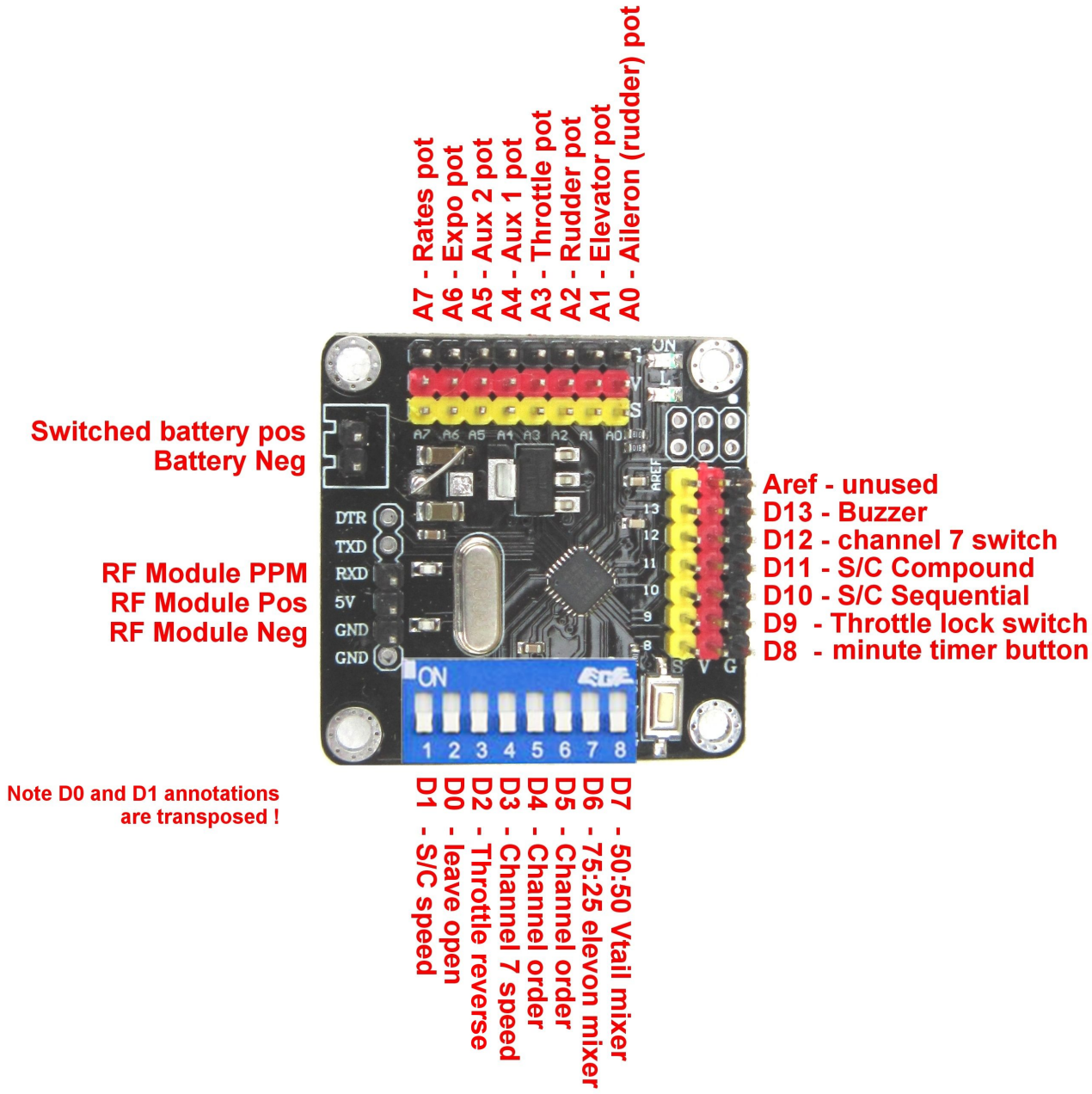


The new strap converts the pin labelled '5v' to full battery voltage suitable for powering the RF module, so the three wires to the RF module are '5v' for positive, 'GND' for negative, and 'RXD' for PPM (RXD is also D0) into which we solder a convenient 'servo plug' header:



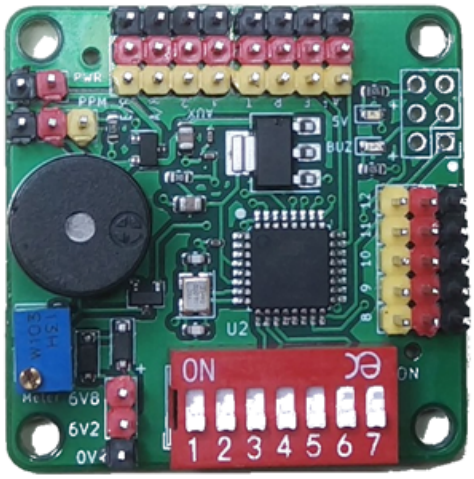
And here is a summary of the connections. Please refer to the diagram and notes throughout the document.

PLEASE NOTE THAT REGARDLESS OF THE REQUIRED PPM CHANNEL ORDER (FUTABA AETR OR SPEKTRUM TAER), THE CONTROLS MUST BE WIRED TO THE ANALOGUE INPUTS AS SHOWN.



The 2021 bespoke PCB by Mike Kitchen

This is almost identical to the DIY-More, but with inbuilt buzzer and optional meter connections. This board has a fixed DIP switch, ie pins are not an option:



A7 Rates pot
A6 Expo pot
A5 Aux 2 pot
A4 Aux 1 pot
A3 Throttle pot
A2 Rudder pot
A1 Elevator pot
A0 Aileron pot (rudder on RET)
NOTE: Pos and neg to pot outer contacts. Signal to middle wiper contact.

Power input
RF module output

Meter FSD adjust

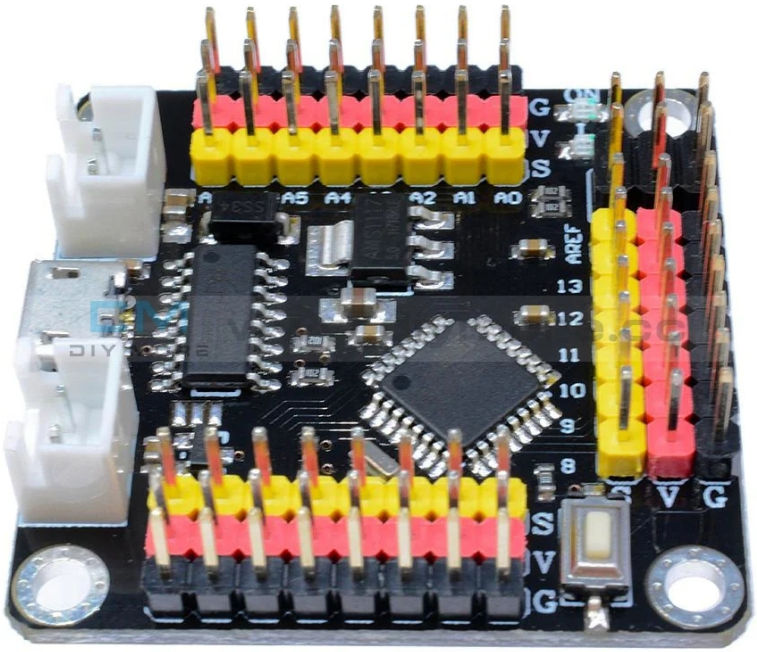
D12 Channel 7 switch
D11 S/C compound button
D10 S/C Sequential button
D9 Throttle lock switch
D8 Minute-minder button
NOTE: Pos is not used on any of these connections, only neg and signal to the switch or button. Insulate pos and tie back.

Meter connections 6v2 OR 6v8
S/C emulation speed D1
Throttle reverse D2
Channel 7 transit speed D3
Channel order D4
Channel order D5
75:25 Elevon mixer D6
50:50 Vtail mixer D7

(Both D6 AND D7 selects a 60:40 mix.)

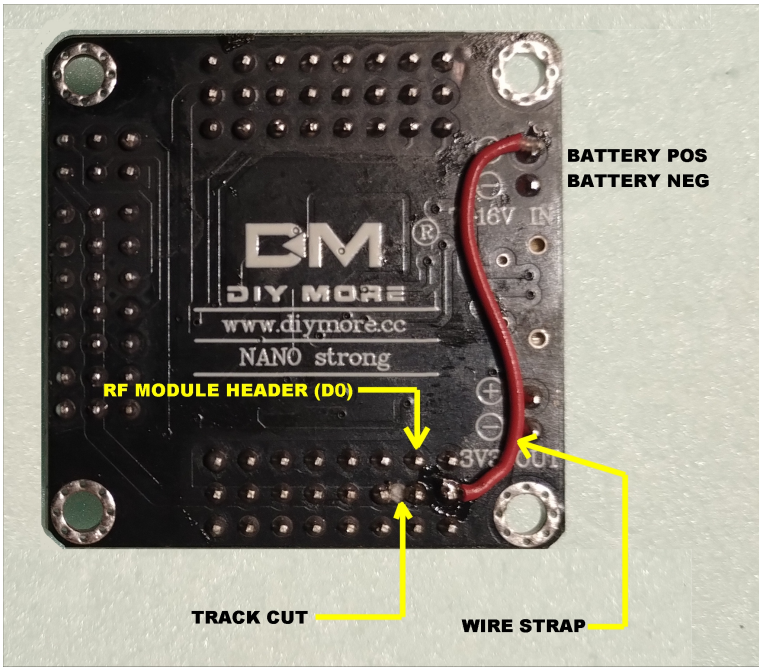
The DIY-More CH340G Nano Strong board (2026)

By 2026 we were finding the most popular DIY-More Pro-Mini Strong board almost impossible to source.
It seems to have been replaced by a very similar board which has the same physical size and layout, but includes a CH340G serial option for programming. This means D0 and D1 (serial transmit and serial receive) have to be used with consideration. The new board has a 3.3v socket which we dont use, but unfortunately doesnt have the header we have previously used for the RF module.



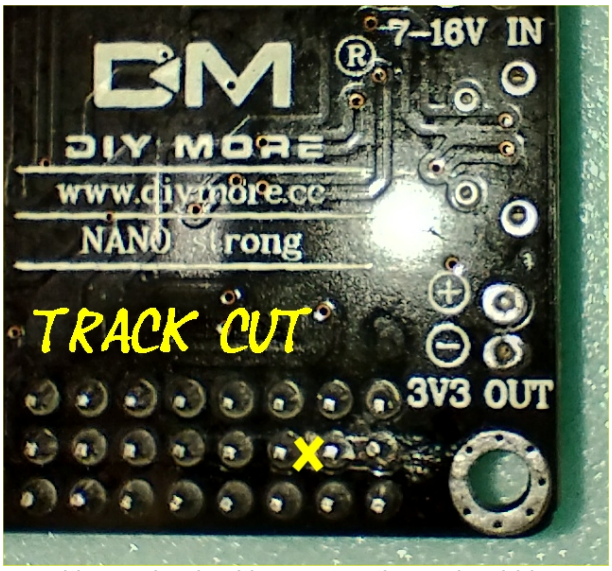
The following modification gives an RF module connection on header pins D0 BUT please note that as on the previous DIY-More board, the silkscreen annotation is wrong and D0 and D1 are transposed.

The mod consists of a single track cut, best done with a small drill bit (.8mm or 1mm) and a single wire strap:
The cut separates the positive pins of D0 and D1, and the wire strap connects these now isolated pins to battery pos.
Hence D0 (wrongly annotated as D1 on the silkscreen) becomes out RF module header. It doesnt matter that now D1 also carries battery voltage since D1 is used by the serial input and so isnt available to us on this board.

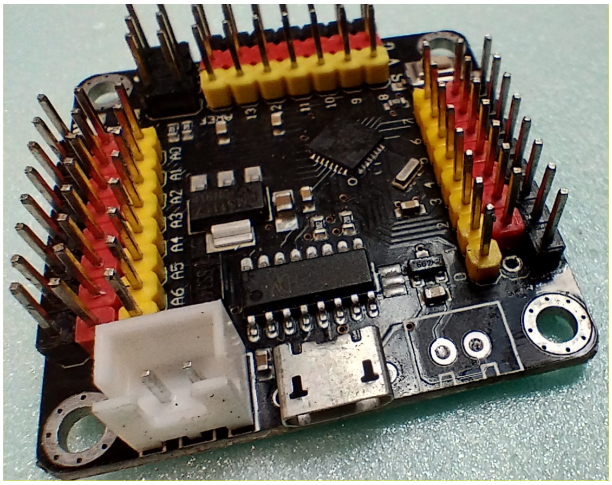


Following these two modifications the three-pin RF module plug (neg, battery, PPM) plugs into D0 which is the second from the right at the bottom of the photo above – not the first right as the silkscreen annotation on the component side suggests!

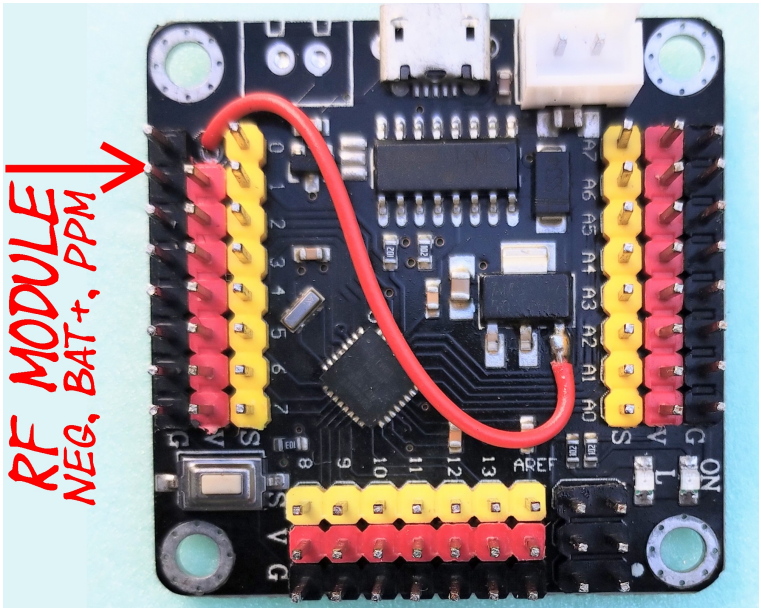
Here's an alternative method of providing the same 3-pin RF module header. Electrically its identical, its a bit of a faff to do, but might be neater. The positive track between D0 (wrongly labelled D1) and D2 is cut as before, but instead of the underside link as on the previous page, the positive in of the first D header is removed. This is wrongly labelled D0 but is actually D1. The link connects this vacated hole to the battery input of the voltage regulator:



Be careful only to cut the positive – check with a meter, there should be no continuity across the cut.



Positive pin removed from D1 (wrongly labelled D0) ready for the new battery positive link



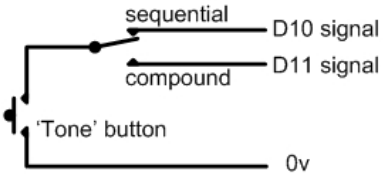
RF Module plugs into D0 (wrongly labelled D1) which now has the battery positive

This method is far more fiddly and time-consuming, and achieves exactly the same result so I'm not sure if its worthwhile :-)

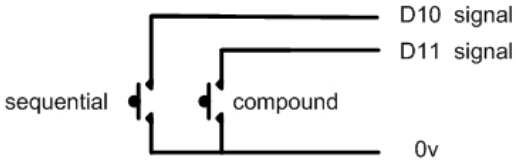
Digital Options can be set using Spektrum bind plugs, or can be wired using the signal & negative of a servo lead to a switch.
Unlike analogue inputs, unused digital inputs (ie unwanted facilities) can be left floating as they have an internal pull-up.
S/C can be a single button via toggle-switch selecting either sequential or compound, or two separate buttons.

Digital Options can be set using links like Spektrum bind plugs, or can be wired using the signal & negative of a servo lead to a switch. Unused digital inputs (ie unwanted facilities) can be left floating.
S/C can be a single button via toggle-switch selecting either seq or compound, two separate buttons, or a spring-centred toggle (one way seq, one way compound).

Single-Channel options: switchable



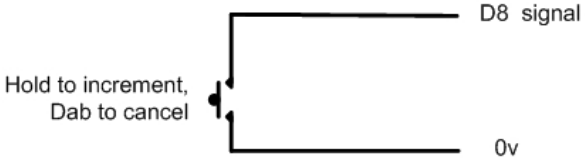
separate S/C buttons



S/C Compound-only

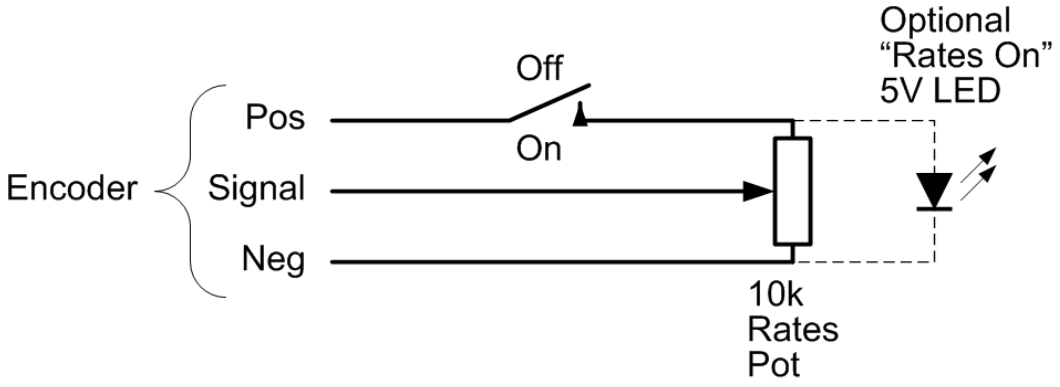


Minute-minder (flight timer) pushbutton:



<u>Switchable rates option:</u>

Optionally a small toggle switch can be used to switch the rates pot in and out of circuit. This allows the pot to be set to a comfortable 'low' setting and thereafter the set switched between 'rates off' (ie high rates) and the 'low rate' set by the pot.
PLEASE NOTE this isnt the rotary pot switch!!! it is an optional, separate panel-mounted toggle-switch.
The choice of a *switched* pot is purely for the tactile click as rates are reduced to zero, the switch has no electrical function.
A further option is to wire a 5v LED (or a normal LED with a 330Ω series ballast resistor) across the pot outer tags.
This will light to indicate 'rates on':



A few "Tips & Pointers"

Hopefully this clarifies the calibration process as I've had reports of 'throttle trouble' which in every case has been due to using the wrong calibration process, ending with the throttle stick fully open or closed. Others have switched off before releasing the calibrate button - it cant save calibration values if you've switched it off!
This is the most frequent email query of all, its probably because people cant endure my boring documents :D ... but calibration must be done correctly and in this order:

Calibration:
Centre all trims and dont touch them throughout the calibration process.
Press either S/C button and hold it in. Keep it held in until told otherwise! This bit seems to fox people.
Switch on. Keep it switched on until told otherwise!
Move all sticks and rotate auxiliary pots to both extremes a few times.
Centre all the sticks and auxiliary pots [i]including the throttle stick[/i]. This also seems to catch users out.
Release the button.
Everything should spring to life and because the throttle is central you should hear the throttle warning.
Now you may switch off when you're ready :)

Thats all, its really easy.

Optionally, and at risk of complicating a simple but inexplicably baffling process - the throttle response can optionally be made non-linear during calibration by 'centering' the throttle stick to say 2/3 rather than to neutral stick.

Calibration remembers extreme up and extreme down stick and also wherever the stick is when you let go of the button, so if your throttle is at say 2/3 when you come out of calibration, then the overall range of low throttle to high throttle will be normal, but 1.5ms will be at 2/3 stick. This means that half the throttle servo travel, mid-to-low is expanded into the bottom 2/3 of the stick movement and the other half servo travel, mid to high is compressed into the top 1/3 of the stick movement - where normally it would be half and half equally. This gives finer control at low throttle and courser at high. Of course throttle stick at centre no longer gives throttle servo at centre, though overall travel remains the same. Most IC engines are non-linear.
Its one of those things thats much easier to demo than to explain!

The actual reason for the dual maps is that the old code assumed neutral was midway between full left & full right, full up and full down. This worked out just fine until I converted a Waltron with Horizon sticks, these had a slight difference between mechanical neutral and electrical neutral. It was only slight but enough to be annoying. Two maps fixes it without any detriment elsewhere.

Mixers: For the mixers I use a 3-position switch, giving centre off, 75:25 one way and 50:50 the other way.
This needs two servo leads. Wire the common terminal (middle) of the switch to ground (black), either or both of the mixer connection negatives will do. Then on one side of the switch solder the signal wire of the 50:50 cable, and on the other side solder the signal wire of the 75:25 cable. The positive (red) wires are not used and should be insulated with heat-shrink and tucked away. If the mixers are not required then simply omit the connections. Both D6 AND D7 selects a 60:40 mix.

Single-channel Button: Similarly I have my S/C compound/sequential option on a 2-position changeover switch.
To do this, wire the common terminal (middle) of the switch to one side of your S/C button.
To the other side of your S/C button solder either or both of the compound and/or sequential cable negatives.
Then on one side of the switch solder the signal wire of the sequential cable, and on the other side solder the signal wire of the compound cable. The positive (red) wires are not used and should be insulated with heat-shrink and tucked away.

Refer to the circuit diagram above for clarification.

If you prefer two separate buttons for sequential and compound, just use the signal and ground wires and insulate the unused positives. Alternatively any unused wires can be clipped flush at the plug where it connects to the encoder.

If you will only ever use sequential (or compound) then just wire the one S/C input that you need, leaving the other one disconnected. Note that at least one Single-Channel button is necessary as it doubles for calibration duties – though again a Spektrum bind-plug could be used instead, plugging directly onto D10 or D11 on the PCB, but only during calibration.

Paralleling unused analogue stick inputs: This applies to channels 1 to 6 and though it isn't absolutely necessary, unconnected or 'floating' inputs can cause an unused channel to act unpredictably. This will never cause a problem in use, but leaving an unused channel to its own devices is untidy. Often an unconnected input will 'pick- up' the adjacent connection, sometimes it will stay at one extreme of travel, sometimes it will wander. The reason I suggest paralleling unused inputs to a used input is to ensure that unused channels behave predictably. The encoder always sends 7 channels.

Rates and Exponential: If these are not required, the pots can be replaced with a simple link connecting signal to negative – **don't leave them floating** or you'll get random amounts of travel and expo! Spektrum bind plugs are ideal for this, but do not use 5.08mm shunts as they short all 3 pins! Remember that rates and expo will also affect trims.

Unused digital functions: The throttle lock switch can simply be omitted if not required – it has an internal pull-up. The Single-Channel button **IS** required as it doubles for calibration duties – though again a Spektrum bind-plug could be used instead, plugging directly onto either D10 or D11 on the PCB during calibration.

Switched, servo-slowed Channel 7: connections can be omitted but besides losing channel 7 you will also lose the range-test sweep facility.

Buzzer: If you're an IC-only flyer you could omit the buzzer as its mostly a throttle warning for electrics, but you will also lose the inactivity alarm and the minute-minder.

Connecting up: We've found that twisted servo plugs make a much neater job than flat servo cable. If you're using a 35Mhz RF module then route the stick wiring away from the module and especially the aerial connection.

Power: A 2S LiFe or 3S LiFePo4 is ideal, 2S or 3S LiPo is ok though 3S is a bit high, so I add a series diode or two such as the 1N4001 or similar. 7 or 8 nimh are ok as it a PP3 Duracell.

If you do program your own board using this sketch, please disable the bootloader by programming via ICSP. This is important – the standard bootloader delays the startup of the encoder by a second or two, which can cause problems:

Problem 1:
Whats the first thing you do on switching on an R/C set? you wiggle the sticks to check that the servos move.
Switch on, wiggle stick, bootloader times out as the stick is deflected, the encoder software starts up, sees a deflected stick and thinks you want to reverse the channel.
Problem 2:
With the bootloader enabled, the encoder doesnt start to produce PPM until the bootloader times out.
This time varies from one manufacturer to another, its typically 1-2 seconds, Digispark is 5 seconds!
So the encoder cant start doing its job until 1-5 seconds after the transmitter is switched on.
This is a Bad Thing™. Some sets notably Corona have stupid default timing in the absense of a PPM stream. If a Corona or Jamara module is powered up without PPM, it defaults all channels to .5ms which is far enough outside the normal 1-2ms range to jam all the servos against their end-stop and possibly strip the gears.

More generally, my own feeling is that a tranny that doesnt produce ppm immediately on power-up is well dodgy, hence the advice to dump the bootloader and program via ICSP with a USBASP :)

This software has been extensively bench and flight tested. If you make any changes, please thoroughly test, test, test.
If you use this software either in full or in part, please acknowledge its source, philg@talk21.com , Phil_G on all the R/C forums. This is open source etiquette.

Finally I'd like to thank Mike Kitchen and the late Prof Dave Burton for their expo maths, Hasi for the interrupt-driven PPM, and testers Shaun, Ron, Paul, Frank, Al & others – ta!

Cheers
Phil
philg@talk21.com
Phil_G on all the forums

Edit: 16/1/2020
Code & doc amended to 'Dipswitch' version (swapped D6 and D8) D6 was timer button, D8 was 75:25 mixer, now vice versa
This will be now be the standard version regardless of whether a dipswitch or headers are actually fitted. Eventually I'll discard the previous version (the only difference is the swapped D6/D8) and tidy up this document.
When requesting a preassembled encoder, please let me know if you would like the dipswitch fitting.
For example, you may prefer to use external toggles for some of the switched options like mixers etc, in which case headers are more convenient than the dipswitch, but the header positions will be as per the dipswitch version - ie the minute-minder button will be on D8.

Edit: 3/12/2021
Added bespoke PCB by Mike Kitchen (page 10) and throttle reverse on switch D2 which was previously unused

Edit: 1/6/22
Added 60:40 mix activated by D6 AND D7 both on.

Last Edit: 18/4/26
Added DIY-More Nano Strong board

Kraft separate trims:

Kraft separate trim wiring - principle copied from original wiring Phil_G

Rear view:
Throttle pot neg should always be towards the bottom of the transmitter, in either mode

