

## Encoder for converted period GG sets using on-board GG Re-coder & Rand or Tobe actuator.

This is a simple 3 function encoder having proportional rudder, proportional elevator and a progressive throttle via either a two-way toggle or by separate up and down buttons.

Its intended purely for the conversion of 'period' Galloping Ghost transmitters used with either a Tobe GG actuator or with a genuine Rand LR3 or Controlaire Ghost actuator, and an on-board recoder whose job it is to produce a variable mark-space and rate pulsed drive to the actuator, from the receiver rudder and elevator channels.

Throttle up = D9, Throttle down = D10 button (or toggle) grounds D9 or D10 signal wire  
D7 is an optional throttle cut button or throttle lock toggle to ground.

Stick calibrate button or link = D11

Power on with link installed , move stick around extremes, remove link.

**Do not switch off during this process**, it cant save the calibration if you switched it off!

### **Rates:**

The encoder has individual potentiometers on analogue inputs A6 & A7 for rudder & elevator travel adjustment (ie separate rates)

Rudder travel = A6 pot wired with neg to anticlockwise tag, signal to wiper, pos to clockwise tag

Elevator travel = A7 pot wired with neg to anticlockwise tag, signal to wiper, pos to clockwise tag

These individual trimpots enable setting up of the actuator, which as a non-feedback type is dependent on linkage friction and inertia, battery voltage, temperature etc.

Calibrate & throttle buttons use signal and negative, pos is unused (insulate and tuck away)

**Servo reversing** is by holding stick over on power up

The throttle operates in either of two modes, selected by an option link on D8:

The difference is in the way the actuators operate. With a Tobe actuator installation, throttle is controlled conventionally either with a throttle servo or an ESC for electrics and works independently of the Galloping Ghost emulation. If either the throttle up and down button is held, the throttle moves slowly in the appropriate direction, but in normal use they are pulsed to 'nudge' the throttle a little at a time.

With a genuine Rand, the throttle is operated by allowing the actuator to cycle on 'full tone' or 'no tone' conditions. This winds a screw thread connected to the carburettor. To emulate this, the encoder throttle channel is at 1.5ms neutral with neither throttle button pressed. The 'up' button takes the channel to 2ms, and 'down' takes it to 1ms. Using this signal change the recoder will cycle the actuator for up and down throttle.

Note that Rand throttles were very coarse – typically 5 settings from low to high.

Summarising the throttle options, throttle up = D9 button, throttle down = D10 button (or a two-way toggle for both – ground to common, up and down to either side contact).

Link on D8 to enable two-way, self-centering throttle channel for Rand cyclic throttle

Leave D8 open for progressive throttle (for direct IC throttle servo or ESC).

If used, this link is left in position.

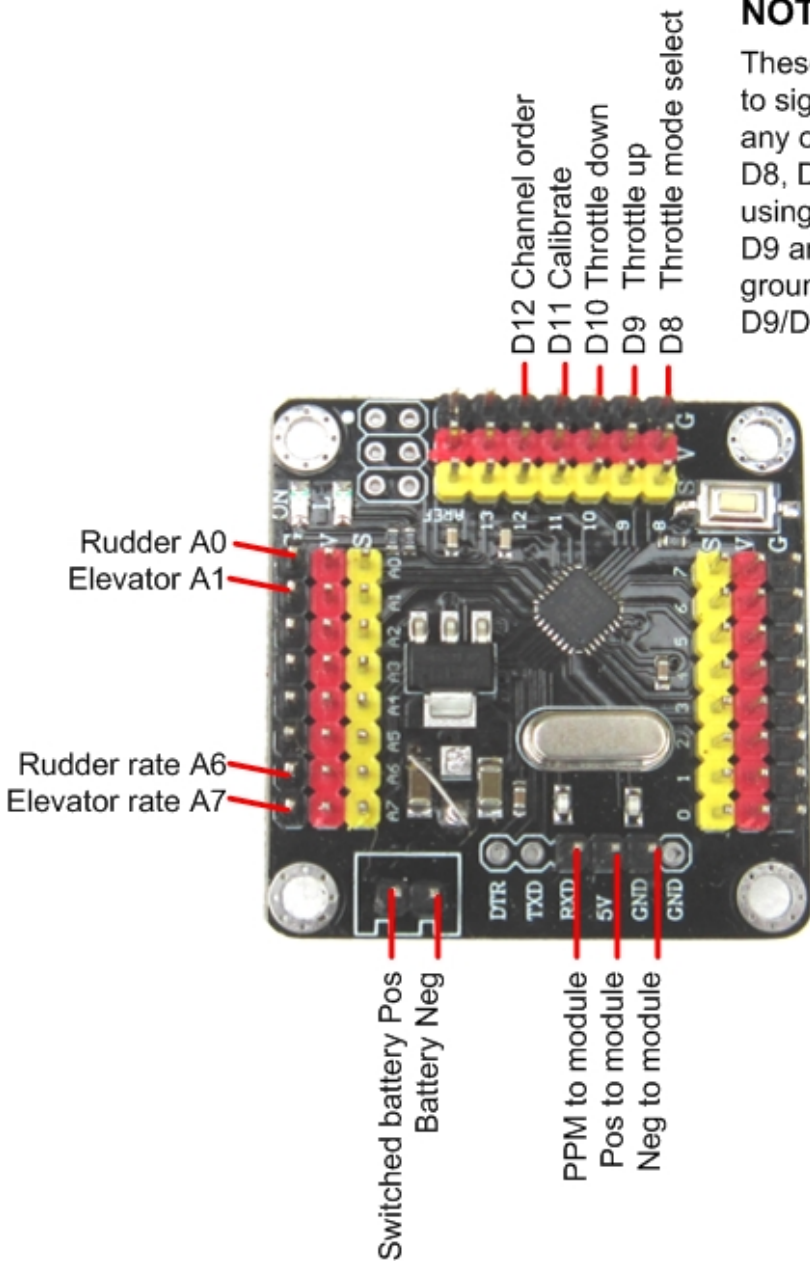
D7 is an optional throttle cut button or throttle lock toggle to ground.

D12 selects JR/Spektrum TAER channel order if linked, otherwise without a link the channels are in Futaba AETR order. This link is left in position.

**PPM output** = D0 for ebay DIY-More 'Strong' board via the three-pin header marked GND, 5v and RXD. The schottky mod provides full battery voltage to the module via what was the 5v pin.

Calibrate & throttle buttons use signal and negative, pos is unused (insulate and tuck away)  
 Frsky V8 and Corona DIY will need ppm protection, 1k series resistor in ppm line, not necessary for  
 DHT, Orangerx, Flysky etc

**The DIY-More 'Strong' board:**



**NOTE:**  
 These are all links from ground (black) to signal, positive (red) is not used on any of D8 to D12.  
 D8, D11 and D12 can be selected using a Spektrum bind plug.  
 D9 and D10 are either buttons to ground, or a toggle, centre ground and D9/D10 either side.

D7 Optional throttle lock toggle or cut button

D0 to D6 not connected



To select the throttle option, I've found these links on ebay, they're identical to Spektrum bind plugs:  
Please dont use standard 5.08mm header links as they short all 3 pins together!

Last update 21/07/2023:

Added D7 as an optional throttle cut button or throttle lock toggle to ground.

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