

## Tx21v2 User Information

Tx21v2 is a hand-held wireless transmitter intended to control one model railway locomotive engine. It has main controls for throttle and inertia plus a push button and a 3-way toggle switch for control of auxiliary circuits such as lighting, sound card triggers and couplers.

Tx21v2 can be used for Micron receiver programming using the toggle switch to step through programming levels. Programming details for each receiver may be accessed from the web page for the receiver.

Tx21v2 is available in 2 versions for use with an appropriately configured receiver:

- with centre-off forward and reverse on the large throttle knob, or
- with low-off speed control on the throttle knob and direction control on the toggle switch.

The 3-way toggle switch type is biased centre-off on the forward/reverse version and non-biased on the low-off version.

## Technology

- Tx21v2 uses the 2.4GHz band which requires no frequency channel control and is very resilient against interference. All radio frequency components are contained on the internal Tx2 module. There are no user adjustable parts on this module and it should not be modified.
- Tx21v2 is compatible with all DSM2 receivers; this includes all Micron and Deltang receivers.
- Any number of receivers can be bound to your Tx21v2 but only one should normally be switched on at a time to operate them independently.
- Range is suitable for indoors and small outdoor sites; the outdoor free-air range to a receiver is at least 50m. Range indoors is affected by building construction materials, furniture, people and receiver installation.
- The throttle control knob and bind push button action are transmitted as separate R/C 'channels' which must match the receiver configuration:

Throttle:	R/C channel 1
Toggle switch:	R/C channel 3 (up or forward = channel high, down or reverse = channel low)
Bind button:	R/C channel 5 (up = channel high, down = channel low)

## Battery

Tx21v2 uses a PP3 9V battery, preferably Alkaline or NiMH / Lithium rechargeable. The maximum working voltage of the internal electronics module is 10V and there is a protection diode wired in series with the battery lead. This allows the battery voltage to be up to 10.7V. If the battery voltage is above this value, the internal regulator will shut down and the transmitter will not operate.

To replace the battery:

- Make sure that the power on/off button is off (up) before adding or removing a battery.
- Remove the lid at the bottom rear of the case by sliding it downwards. When Tx21v2 is new this will require a bit of effort to slide it past the retaning 'click'. The image at the right shows the case rear with the battery lid removed.
- Remove the battery from the compartment and pull the battery clip off the terminals. Replace the clip



on the new battery which will only fit one way round. TAKE CARE, if force is needed, the connector is probably the wrong way round.

- Replace the battery cover by sliding it up from the bottom making sure that the retaining tab goes under the case rear. The battery is held in place with a piece of foam attached to the cover and you will feel some resistance as the cover is pushed down onto the battery.

## On/Off Toggle Switch

Tx21v2 has a latching toggle switch for power with a separate indicator LED. Power is on when the toggle is down. The LED lights continuously when the transmitter is on and flashes when Tx21v2 is in bind mode (see below). It is best to switch the transmitter on before the receiver. If a receiver is switched on with Tx21v2 off, it is likely to enter bind mode with rapid flashing of the LED on the receiver board. If you did not intend to bind, switch the receiver off, then switch Tx21v2 on followed by the receiver.

## Speed / Throttle Knob

Tx21v2 is available with a centre-off or low-off throttle control. The throttle type is actually implemented in the receiver, transmitter differences are the front-panel label and whether there is a centre-click on the throttle.

centre-off

Off/Stop is in the centre of rotation when the white dot is pointing toward the top of the transmitter; a 'click' will be felt as the knob is centred. Rotating the knob to the right (clockwise) will move your loco forwards. If it goes in reverse, you need to swap the two wires connected to the motor in your loco.

low-off

Off/Stop is at the fully counter-clockwise rotation of the knob and speed increases as the knob is rotated clockwise; the toggle switch is used to control direction. The receiver will change the motor direction only when the throttle knob is at zero.

## Toggle Switch

The 3-way toggle switch is used to select forward/reverse with receivers that have 'low off', full-range motor control. it can be used to control lights instead of direction with receivers that have 'centre off' motor control.

## Bind Button

**Note:** holding the bind button for longer than 20 seconds will result in strange things happening (see [Calibration](#)).

If a receiver has not previously been bound, it has to be 'paired' with the transmitter. Binding is only required once per receiver.

1. Put your receiver into Bind mode (if a Micron receiver, switch it on and wait for the LED to flash fast).
2. Press and hold the Bind push-button on the transmitter.
3. Switch the transmitter on by pushing the Power button and then release the Bind button.
4. Binding is complete when the receiver LED stops flashing.

The bind button also operates R/C channel 5 and this can be used to action auxiliary functions on the receiver - e.g. operate a servo to sound a steam whistle or trigger a sound card.

## Inertia / Momentum Knob

Inertia 'dampens' or slows down changes to the throttle control; this affects both acceleration and deceleration. The Speed knob sets a 'target' and inertia changes the transmitted throttle value slowly until it reaches that target. The LED flickers while a change is in progress.

**To stop quickly both throttle and inertia controls must be in the 'off' position** Inertia is off when turned fully to the left.

## Receiver Programming

Tx21v2 can be used to program all Micron receivers and Deltang Rx6x receivers using the 'SOS' method. Deltang Rx4x receivers do not support this method and cannot be programmed using Tx21v2. You need to refer to the receiver's programming instructions for details of the available functions and the programming sequence to modify the functions.

### To Enter Programming Mode:

1. Centre the toggle switch
2. Switch the Tx and Rx on and wait for the Rx LED to stay on solid; you should now have normal control of the model
3. Wait at least 5 seconds without touching any controls
4. Tap out the morse code 'SOS' on the Bind button (... --- ...)
  - dots (...) will be a quick press of the button and must be less than 0.7 seconds in duration
  - dashes (---) must be greater than 0.7 seconds and shorter than 5 seconds – 2 seconds is a reliable time
  - the time between each dot or dash must be less than 5 seconds
5. If the SOS pattern is recognised, the Rx LED will display a repeating single-flash (1-flash pause and repeat)
6. If you do not get the 1-flash, go back to step 3 and repeat the SOS
7. Switch the Rx off at any time to abort

### To make changes to receiver settings:

One programming change requires up to five choices to be made. These are called 'levels' and each has several options. They are documented in the programming table which is found via the receiver's web page (go there or follow the link from the Micron R/C web page for a particular receiver). Completion of a programming change exits programming mode and requires the SOS sequence to be entered again for the next change.

You have to remember which level you are changing and the repeating LED flashes display the current option for that level. It is a good idea to write the programming sequence on a piece of scrap paper and cross off each digit as it is entered. You always start at level 1. For example, the first choice is the Menu number (programming group). The first option (1-flash) is for changing 'H' outputs, the second (2-flash) is Menu 2 to change P outputs for servos, 3-flash is for Menu 3 to change P outputs for on/off switching, etc. Refer to the Programming Table for your receiver to find the number of options and what they change. Each level is in a separate column, 1 to 5 left to right.

For example, to configure output P4 to switch on (3.3V) when channel 3 is high (toggle up), the programming sequence is 3,4,1,3,3, where:

- 3 = menu 3
- 4 = P4
- 1 = momentary on/off
- 3 = R/C channel 3
- 3 = output idle 0V, 3.3V when channel is high (toggle up)

The general procedure for entering a programming sequence is, for each level:

- move the toggle switch down and back to centre to increment the Rx LED flash count; repeat this until the Rx LED is showing the correct flash count for the programming level
- move the toggle switch up and back to centre to accept the current flash count for the current level and move on to the next level in the programming sequence

When you make a choice with the toggle switch (up or down), the Rx LED will briefly flash rapidly and then:

- up toggle: display the current flash count for the next programming level or light solid when the end of the programming sequence is reached
- down toggle: display the next flash count for the current level; each programming level has a maximum flash count, the flash count returns to 1 with the next down toggle

Changes are saved automatically when the LED lights solid at the end of a programming sequence. If a mistake is made mid way through a sequence, switch the Rx off to abort.

## Calibration

All ready-to-use transmitters are calibrated as the final manufacturing step. This sets the throttle control centre position and normally only needs to be done once. If you suspect that the throttle control is not operating correctly or you have replaced any of the internal components (e.g. throttle potentiometer), your transmitter may need calibration.

If the bind button has been inadvertently held down for longer than 20 seconds, the previously stored calibration data will have been overwritten and you could find that the throttle control behaves strangely.

To perform calibration:

- Centre the throttle knob
- Switch the Tx on
- Within 60 seconds, press and hold the bind button
- After 20 seconds, the Tx LED will:
  - go out for 2 seconds
  - come on for 3 seconds
- Release the bind button, the Tx LED will stay on

The throttle control centre position is now calibrated.