

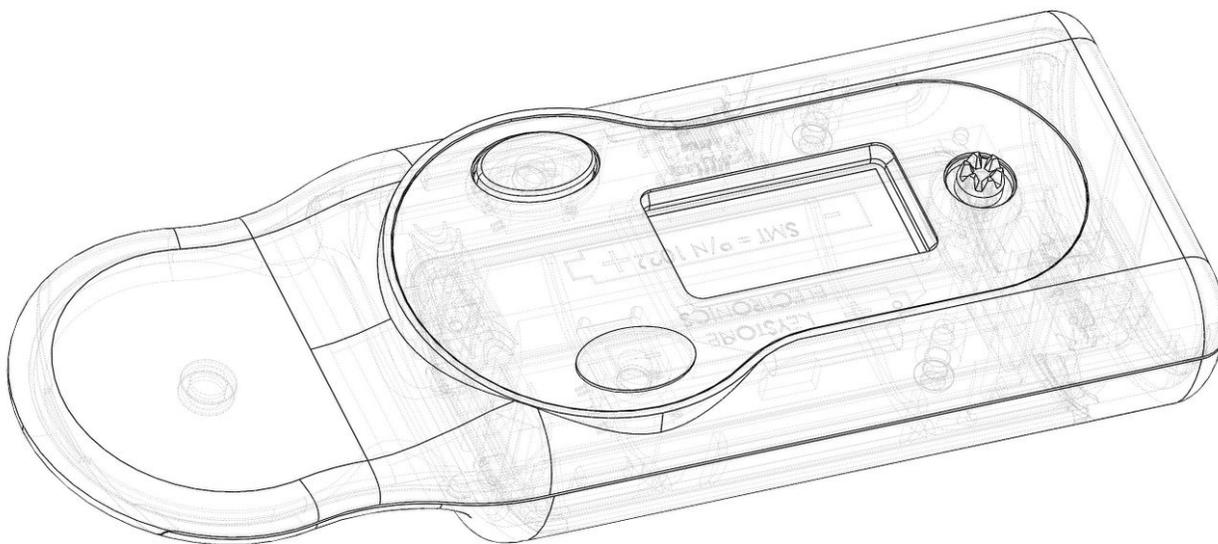
TNR

TNR Mini-Wand

Mini-Wand : Personal Edition

Preliminary Operator's Manual

International edition, Rev 0.9 - Sept 2016



Specifications

Power	
Batteries	2 x1.5V AAA Alkaline cells
Battery Life	TBD (For heavy use at a race event, it is good to have at least one spare set)
TNR (Touch'n'Race)	
NFC Standard	ISO 15693
Range	Approx 10mm with correctly mounted TNR Tag
User Interface	
Display	128 x 64 OLED, 0.96"
Pass/Fail Indicator	24-bit RGB LED
Environmental	
Storage Temperature	TBD
Operating Temperature	TBD

Introduction

The ImmersionRC TNR Mini-Wand is a unique touch-free tool for programming video transmitters for FPV Racing.

The unique **Touch'N'Race** (TNR) system was designed with the following goals:

- 1) Eliminate DIP switches as a way to set vTx frequency
- 2) Eliminate confusing button/LED UIs as a way to set vTx frequency
- 3) Allow transmitter frequency to be both queried, and set without powering up a quad.
- 4) Dramatically reduce race inter-heat deadtime while setting race quads to the correct frequency.
- 5) Eliminate 'powering up in the pits' as a way to create dangerous situations in race events
- 6) Give control of race events to race directors.

Touch'N'Race (TNR) for Casual Use

When arriving at a local park, and asking what frequencies other pilots are using, a TNR wand may be used to safely set a Tramp HV, or other TNR-equipped quad to an unused frequency, and appropriate power level.

Programming quads for a race is easy, using the 'Heat' mode of the wand. Pre-configure the frequency and power level of each pilot 'slot' to meet local regulations, and then quickly wand each quad before flight to ensure that they are on the chosen frequencies.

Touch'N'Race (TNR) for Racing Events

When arriving at a race event using ImmersionRC TNR Technology, a pilot's quad is placed in 'Race Mode' during pilot registration. This is achieved without powering up the quad, and without any physical connection, using the TNR Wand. Registration can therefore take place simultaneously with racing.

When in Race Mode (identified by a blink code on the internal LED), the transmitter will not transmit unless requested by the race director's TNR Wand. This typically happens during preparation for a race, while the previous heat is running.

Quads are 'wanded'* safely while their batteries are disconnected, and assigned their race band, channel, and transmitter power level. When powered up, the quads will transmit on this assigned channel until the battery is disconnected, at which point they will return to the race-director assigned mode.

A race organizer may choose to allow quads which are not racing to transmit a very low power level on a 'Pit Frequency' to allow quads to be set up, and debugged, without interrupting a race. This pit frequency is defined by the race organizer to comply with local regulations.

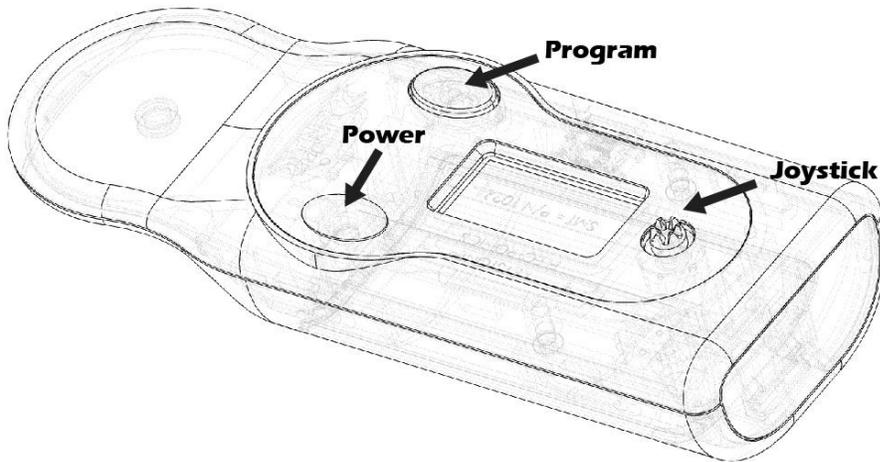
This Pit Mode also allows quads powered up for equipment inspection to transmit an image.

* **wanded**: *The act of touch-free programming a racing quadcopter, soon to be submitted to the webster English dictionary.*

Using the Wand - Personal Edition

The TNR wand is operated using a joystick and the Program button. The joystick navigates within the on-screen menu. The Program button executes the action selected on-screen.

The power button powers-up the wand, and an automatic shut-down turns it off after 5 minutes idle time (or optionally via the menu).



Main Menu

>Fly Setup Status
Power Off

Fly Menu

The **Fly** Menu is the most commonly used for casual use. Get the frequency of a transmitter without powering up, and set it if required.

To set multiple transmitters use the **Start Heat** option.

>Set Freq. Start Heat Get Freq.

Set Freq Menu

Set Freq/Pwr

IRC CH1

5740MHz@25mW

Program button to set the frequency.
Left/Right stick to select frequency. Up/Down to select power level.
Press joystick to go back to the **Fly** menu.

Start Heat Menu

Start Heat

Pilot #1

Race 1

5658 25 mW

Program button to set the pilot's frequency.
Left/Right stick to select pilot.
Press joystick to go back to the **Fly** menu.

Get Freq Menu

Get current freq.

IRC CH1

Norm: 5740MHz@

25mW

Program button to get the current frequency.
Press joystick to go back to the Fly menu.

Setup Menu

>Cfg Heat

Cfg Heat Menu

>Nbr of Pil

Pilot Freq

Nbr of Pil(ot) Menu

Set the number of pilots in the heat. Each with a pre-programmed frequency and power level

```
Number of  
Pilots  
8
```

Joystick up/down to change the number of pilots in the heat. |
Press joystick to go back to the **Fly** menu.

Pilot Freq

Set the power level and frequency for each pilot in a heat. Note that this only needs to be done once, to set-up frequency and power limits for each pilot in a heat. Use the **Start Heat** menu to quickly program transmitters between heats.

```
Pilot #1 Freq\Pwr  
Race CH1  
5658MHz@ 25mW
```

Joystick right/left to change the band and channel.
Joystick up/down to change the power level.
Program button to move to the next pilot.
Press joystick to go back to the Fly menu.

Note: Using this feature you can increase power only on channels with high levels of external interference, while leaving other pilots running lower power levels.

Status Menu

```
>Check Com.  
Get Tx Ver  
Get Temp.  
  
About  
Batt. Inf.
```

Check Com(munication) menu

This option allows the complete communication path between wand, NFC tag, and Tramp to be tested. Very useful in a race event where a cabling problem is suspected.

This tests that the Tramp is powered, the cable to the tag is intact, and not broken in any way, and that the tag is fully operational and has not been damaged.

Program button performs the test.
Press the joystick to leave the menu.

Get Tx Ver(sion)

Read the firmware version that is running in the Tramp HV. Should be at least 1.26 for a production tramp (earlier for pre-production models used at race events).

Note that the regional settings of the tramp are also shown alongside the version. INTL, USA, or EU.

Program button reads the version.
Press the joystick to leave the menu.

Get Temp(erature)

Communicate with the Tramp, and read the board temperature used by the automatic thermal protection mechanism.

Requires one read to 'prime' the system, following reads will show the board temperature.

Program button reads the temperature.
Press the joystick to leave the menu.

Note that the displayed temperature may vary slightly from a temperature measured using an IR thermometer for example since the temperature read is the internal temperature of one of the ICs on the board.

About

Displays the version number of the wand firmware (also shown in the splash screen on power-up).

Press the joystick to leave the menu.

Batt(ery) Inf(ormation)

Displays the current battery voltage. Two new AA cells should show 3.00 V.

Press the joystick to leave the menu.

Regional Locking

In order to ensure that our hobby/sport remains legal worldwide, ImmersionRC, and it's resellers, are forced to follow certain rules regarding use of the radio spectrum.

Because of this, there are three variants of the Tramp HV (and other ImmersionRC products that emit RF). Resellers may choose which of these they sell to different regions.

- 1) International version, most commonly used frequencies in the 5.8GHz band, up to 600mW
- 2) EU version, restricted to channels within the ISM band, 25mW max. output power
- 3) USA version, restricted to channels within the US Ham band, 600mW max. Output power.

How does this affect the wand?, simple, the **personal wand** is only capable of setting frequencies and power levels which the regionally-locked tramp is permitted to transmit.

In order to support international racing events, the **race director's** version of the wand can unlock frequencies and power levels according to local laws, and special permissions in place for events.

As an example, a european pilot travelling to the US for an event would be able to use frequencies and power levels permitted in the USA.

Best Practices

Batteries

Even though rechargeable batteries may be used in the wand, the higher voltage of Alkaline cells is preferred, especially for race use.

TNR Board

The TNR board must be placed on your quad so that it is easily accessible using the wand.

If you have a flat carbon fibre top plate (which is the case for 99% of the quads out there), you may stick it to that plate with some double-sided tape. Use the thicker ~1mm thick foam tape instead of the very thin 'carpet tape' to ensure that the close proximity of the frame doesn't affect the TNR range.



Bands, Channels, and Frequencies

It is highly recommended to understand the rules and regulations in your country before using any video transmitter. Transmitting outside a legal band is something frowned upon by the authorities, and may result in a fine, or confiscation of equipment.

As a rule of thumb, the following charts should help understand which frequencies are legal in each of our main markets.

International Version

	1	2	3	4	5	6	7	8	
1	5740	5760	5780	5800	5820	5840	5860	5880	IRC/FS
2	5658	5695	5732	5769	5806	5843	5880	5917	RaceBand
3	5705	5685	5665	5645	5885	5905	5925	5945	Band E
4	5733	5752	5771	5790	5809	5828	5847	5866	Band B
5	5865	5845	5825	5805	5785	5765	5745	5725	Band A

ITU Region 2: The Americas

	1	2	3	4	5	6	7	8	
1	5740	5760	5780	5800	5820	5840	5860	5880	IRC/FS
2	5658	5695	5732	5769	5806	5843	5880	5917	RaceBand
3	5705	5685	5665	5645	5885	5905	5925	5945	Band E
4	5733	5752	5771	5790	5809	5828	5847	5866	Band B
5	5865	5845	5825	5805	5785	5765	5745	5725	Band A

ITU Region 1: Europe

	1	2	3	4	5	6	7	8	
1	5740	5760	5780	5800	5820	5840	5860	5880	IRC/FS
2	5658	5695	5732	5769	5806	5843	5880	5917	RaceBand
3	5705	5685	5665	5645	5885	5905	5925	5945	Band E
4	5733	5752	5771	5790	5809	5828	5847	5866	Band B
5	5865	5845	5825	5805	5785	5765	5745	5725	Band A

Firmware Updates

In the unlikely event that the firmware in your mini-wand requires an update, use the following procedure:

- 1) Power down the wand
- 2) Hold down the **Program** button and connect via USB to a Windows/OSx PC
- 3) Download the firmware from the mini-wand page on the ImmersionRC Website
- 4) Install the firmware using the [Vortex Configurator](#) chrome app

Revision History

V1.0.1

Initial Revision