

Sentinel Automatic Antenna Tracker

LITE

USER GUIDE – CONFIGURING TO USE ELRS

VirtualPilot

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This use of device can be impacted by ferromagnetic / electromagnetic and GPS interference.

Patents

Patents pending

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Introduction

The Sentinel AAT supports tracking utilising ELRS CRSF protocol over ESP-NOW in addition to its default intend use of video telemetry. This enables the use of the tracker for systems using digital video or FC's that do not support video telemetry – such as digital or pixel OSD based Flight Controllers.

This guide shows the steps required to use the Sentinel AAT in ELRS tracking mode.

Setting up - Requirements

- AAT tracker with release 5.0 minimum (CRSF option)
- ELRS TX that supports backpack
- ELRS release 3.4.0 minimum
- FC (Flight Controller) that can output CRSF telemetry to ELRS RX

Setting up - Quick Start overview

This is intended for users who think they know what they are doing:

1. ELRS TX must be receiving GPS telemetry from RX
2. ELRS backpack must be using same bind phrase as ELRS TX
3. ELRS backpack and telemetry enabled
4. AAT telemetry enabled and must be bound to ELRS backpack
5. ELRS telemetry ratio increased for a stable AAT RSSI display

Setting up – ELRS step guide

This is intended for users who want a step by step guide:

ELRS CRSF telemetry. This is simplest setup.

1. ELRS: ensure firmware is 3.4.0 minimum (turn off ELRS before flashing)
2. ELRS: ensure backpack is enabled
3. ELRS: ensure backpack telemetry is enabled
4. AAT: ensure firmware is 5.0 minimum (and flashed with CRSF option)
5. AAT: connect PC to Wi-Fi hotspot of AAT (Leave ELRS TX powered on)
6. AAT: browse to 192.168.4.1 and select external telemetry from menu
7. AAT: set external telemetry = enabled
8. AAT: set type = ELRS
9. AAT: set protocol = CRSF
10. ELRS: enable bind mode
11. AAT: select “Bind”
12. AAT: Bind UID of ELRS should be displays – select “Confirm binding” to save and reboot AAT
13. ELRS: Increase telemetry ratio for a stable RSSI > 25%

AAT settings

Telemetry: **enabled**

Type: **ELRS**

Protocol: **CRSF**

Reset home at arm: when **enabled**, the AAT will set automatically set its home location when it is launched. It is typically more accurate than when disabled as the GPS will usually achieve a more accurate location than when first powered up.

Reset home at arm: when **disabled**, the AAT will set its home location as being the GPS coordinates of the aircraft when the tracker is powered up and receiving its first good GPS fix. You should power up the aircraft next to the AAT and wait until home set is indicated by the tracker positioning.

Consider using this mode if you move slowly from launch point with a multi-rotor (less than 10m in 8 seconds).

Home set is less accurate and accuracy at distances less than 100m might be noticeable.

You can power cycle the AAT after aircraft has a good long-established fix provide for a better accuracy for proximity tracking in this mode.

Notes:

In both modes, the home is always set once only.

10 seconds of 6 or more satellites are required for the tracker to set home. the AAT will point vertically and due North to indicate to the user that home fix is set, and the AAT is ready. "Ready" will be displayed on the OLED.

Should I use ELRS or video telemetry to drive AAT?

Most UAV using antenna trackers are used with a FC that has RTH capabilities and in those situations the failure of the tracker is not usually a concern for the loss of signal and aircraft, however impact in video quality from reliability and loss of flight time is one of the most frustrating elements.

If you are in the proximity of either 2.4G video or other 2.4G RC transmitters, these *may* have a detrimental impact causing the ESP-NOW connections to become unreliable. A working setup that works fine for a solo flier may be impacted when flying in proximity with others.

Another consideration is telemetry range vs video range. Whichever is greater will give better range performance.

User guide – visual indicator and operation

Initial power up state: the AAT will center pan and point at an angle slightly above the horizon. The unit can be manually aimed for manual tracking if required. This state will remain until a valid telemetry signal is received.

AAT receiving telemetry – waiting satellites / home: when the AAT receives telemetry, but satellite fix is low or not fully established, it will point horizontally and due North to indicate to the user that the AAT is waiting. 10 seconds of minimum of 6 satellites is required to set home position.

AAT receiving telemetry – home set: the AAT will point vertically and due North to indicate to the user that the AAT is ready. This state will remain until the FC enters FC armed state.

AAT armed state > 10m: when the aircraft is armed, once the aircraft has moved outside its activation perimeter (10 meters), it will engage and point at the aircraft.

AAT armed state < 10m: if the aircraft moves back within the activation perimeter, the antenna tracking will stop until outside the activation perimeter.

AAT disarmed state: the AAT will point vertically and due North to indicate to the user that the AAT is ready. (Full ELRS mode only)

User guide – OLED indicator

No HB: No heartbeat / data being received.

Wait: Waiting for good sat fix.

Set H: Setting home.

Low S: Low sats – tracking suspended.

Ready: ready to fly / tracking.

X / Y: Packet count per 5 secs: Heartbeat / GPS.

External: Tracking using ELRS or other external telemetry.

NOTES: ELRS telemetry speed settings

ELRS default settings are more favored for racing configurations and have a relatively low telemetry packet rate. This is likely to trigger the sentinel lost signal alarm as it expects to see quite high rates of up to 60hz from video telemetry.

Increasing the “Telem” ratio will increase the number of data packets. The recommendation is to increase until the Sentinel RSSI indicator is > 25%. A bandwidth of >150bps as per the link should achieve this:

<https://www.expresslrs.org/info/telem-bandwidth/>

NOTES: Set home position when armed - operation

When using CRSF, arm/disarm is not available from the ELRS data sent by the TX. To improve accuracy of the home position, the GPS co-ordinates are saved every 7.5 seconds until distance > 10m in a 7.5-15 second period. Once launch detected it uses an earlier GPS position saved before launch is detected. This should give a much more accurate home position and altitude however requires care by multirotor users to launch and exit the 10m guard zone quickly.

With “arm at home” = disabled: home is set once only. It is not so accurate but is useful for iNAV “SAFEHOME” or if plane is launched away from tracker. Arming is as above.

AAT ELRS – Troubleshooting

First, please read the Quick Start configuration guide steps to make sure no steps have been missed.

AAT – Troubleshooting #0 – Not connecting

1. Check Backpack is enabled
2. Check ELRS telemetry is enabled
3. Check the AAT is bound to the backpack. ELRS backpack must use the same bind phrase as TX if you have flashed a specific bind phrase.

AAT – Troubleshooting #1 – No tracking Telemetry

1. Ensure Ensure the OLED / GUI shows telemetry data – must be higher than 0/0

Document revisions

1.0	Initial release
1.1	Minor corrections