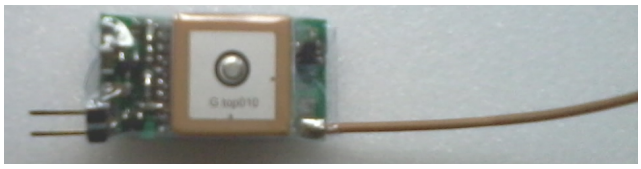
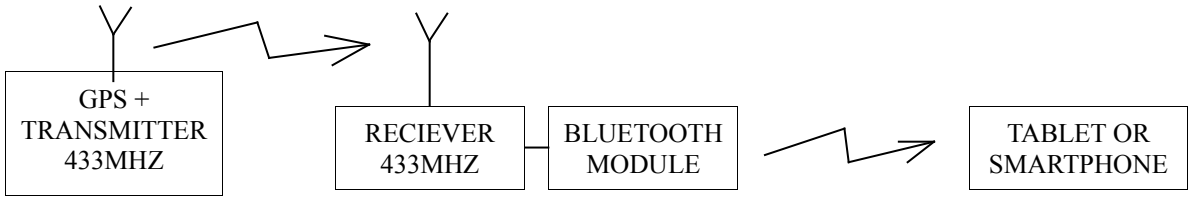
PEDRO GPS-Mini 4
instruction manual



Transmitter with GPS module

Four channel receiver

PEDRO GPS-Mini 4 is a system for tracking and location the model using of the GPS navigation and the radio path for data transmission over long distances in the 433 MHz (868 MHz, 915 MHz on request) band. It enables autonomous work in the area devoid of mobile GSM network.



Block diagram of GPS tracking system

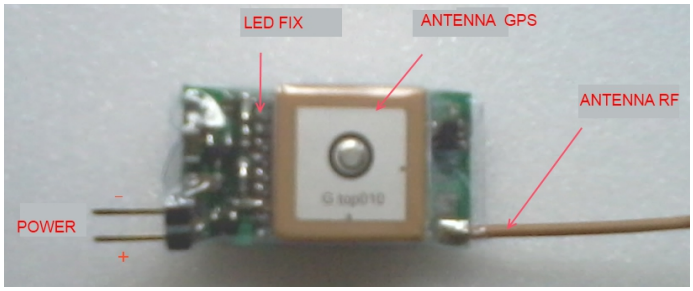
Set contains RF transmitter which sends GPS data to receiver. The receiver is connected via Bluetooth module to a smartphone or tablet.

It is possible to use many GPS trackers in the same place, each one has unique frequency channel.
One receiver can work with four transmitters, to select one of them use channel switch.
Conducted tests on the ground and in flying models showed no interferences between Pedro GPS System and radio control transmitters/receivers in the bands 27 MHz, 35 MHz, 40 MHz, 2,4 GHz or used in the model class F1 RDT device - Aeris Italian production. Transmission ranges for the model lying on the ground was ranged from 450 to 950m, depending on the terrain:

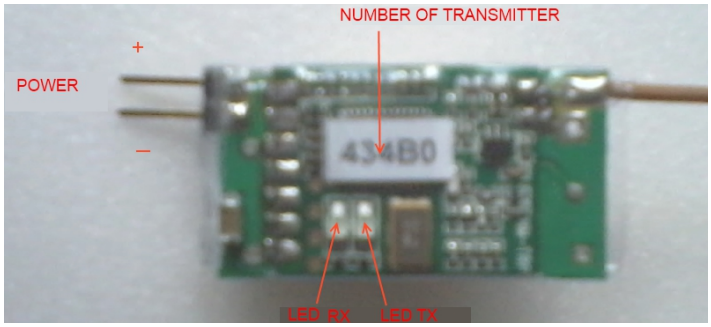
- Lower values were obtained with veiled hills transmitter,
- More on a flat grassy and shrubs.

When the transmitter was installed in the model, the signal was received by the entire flight.
Loss of communication occurred when the aircraft located a few kilometres was a few meters above the ground, but the last received GPS position is recorded and displayed all the time. Of course, as you do not switch your receiver to another channel, which gives the next transmitter.
GPS position is transmitted once per second and even flying in the strong wind made the position is given at max. several meters (distance flight model with the wind at the time of 1s).
Receiver can work with one to four transmitters. It is possible to order for example the receiver with two transmitters and after few months buy next transmitters working on free channels of receiver.

Description of GPS transmitter



Transmitter with GPS module (top view - GPS antenna side)



Transmitter with GPS module (bottom view)

Each transmitter has a sticker with unique name, e.g. 433B0 - where the last digit indicates the channel number that must be selected in the receiver to work with the transmitter.

Description of the LED signals in GPS transmitter.

LED FIX – green LED flashes once per second during the position seeking,
after GPS position fix green led lights continuously.
LED TX – red LED flashes once per second in the moment of transmission of GPS data to receiver.

Technical data of GPS transmitter:

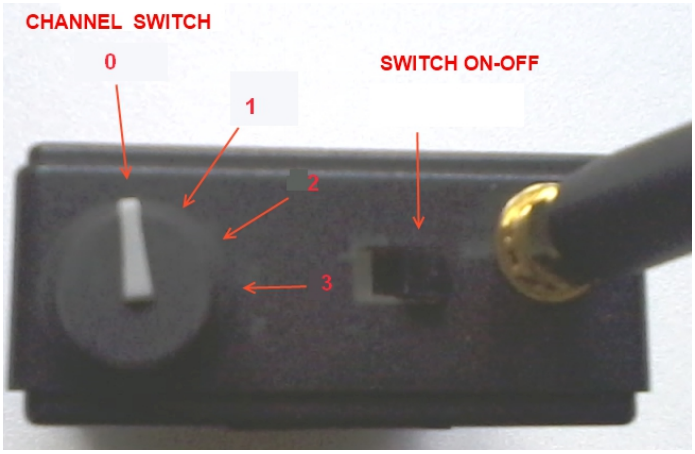
Dimensions: 30x16x10mm,
Weight: : about 9g,
Supply voltage: 3,7-6V / 30-40 mA, / 1 cell Li-Pol or 4x Ni-Cd/Ni-Mh/

Transmitter is protected against a reverse voltage (not working).
Maximum supply voltage 6V, higher voltage can damage circuit!!!
Working time about 3h on 100mAh LiPo.
GPS fix update rate – 1s.
Position Accuracy GPS: 2,5-3,0 m
/ May be greater under adverse conditions, signal reception from satellites /
/Position error of the model is the sum of the errors- model's GPS and smartphone GPS/
Installation of the transmitter in model should be performed so that the GPS receiver antenna facing upwards and was not covered by any metal or carbon containing element, metallized films and metallized paints. It is allowed to place the antenna under a thin laminate glass fibres or Kevlar. You can make a kind of window through which the GPS antenna will „see satellites" and protect against dust and water droplets plate with PVC / PET (e.g. from the bottle or blister). The window must be larger than the size of the antenna. It is recommended that trials before the flight in order to find the optimal location of the module in the model.

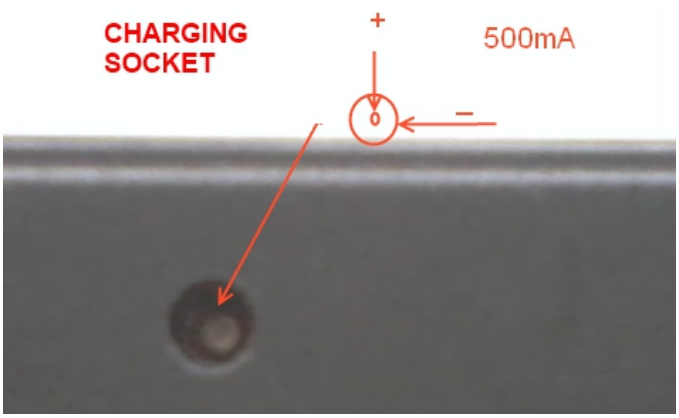
Top view of the module mounted in the model /module channel 3/

RF transmitter antenna should be mounted vertically to the axis of the model. Lead should be protected from accidental pull-out antenna from module.

Description of four channel receiver with Bluetooth module



Receiver top view



Receiver side view of the charging socket

Receiver /front view/

Four-channel receiver is ready for operation element of the system **PEDRO GPS-Mini 4.** It is equipped with a Li-Pol with a capacity of 1500 mAh, channel switch and antenna. Compact size allows for easy carrying in your hand or in the pocket or special holder on the arm. Built in Bluetooth module enables data transmission to the tablet or smartphone without useing of uncomfortable wires.

Technical data of GPS receiver:

Dimensions: 100x58x24mm
Included power supply 1500mAh Li-Pol (1S)
Charging current max.: 500mA, charging time approx. 3h.
Working time - the battery is able to ensure the operation of the receiver for several hours.

Description of the LED signals in the reciever.

RX - flashing green LED, receives data from GPS transmitter.
TX+RX - RED+GREEN lights together when channel are switching.
LINK - fast green LED flashing - looking for Bluetooth connection, flashing once per second - Bluetooth module paired with device (smartphone or tablet), flashing twice per second - working with application.
STATUS - yellow LED light, connected with device and application.
LO BAT - light red LED - low level of supply voltage, battery should be charged.

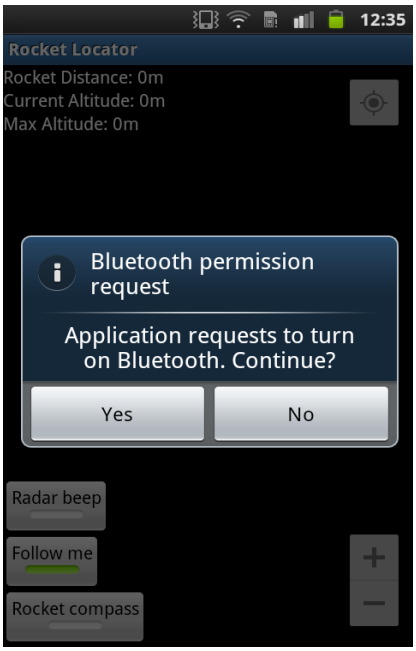
To visualize the position received by radio location system is necessary tablet / smartphone running the Android version 2.3.3 and later equipped with GPS and Bluetooth.

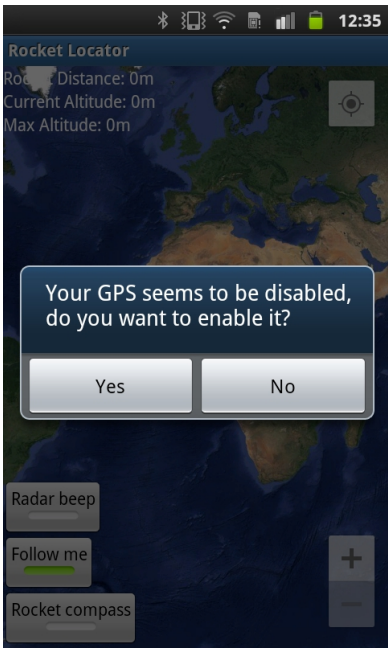
Applications to visualize the position :

- **"GPS Rocket Locator"** apps from Google Play,
- **"Rocket Track.apk"** - by email /application works like Rocket Locator, but there are problems with it off, you have to perform them from the device manager - which is troublesome/

GPS Rocket Locator first installation and configuration step by step:

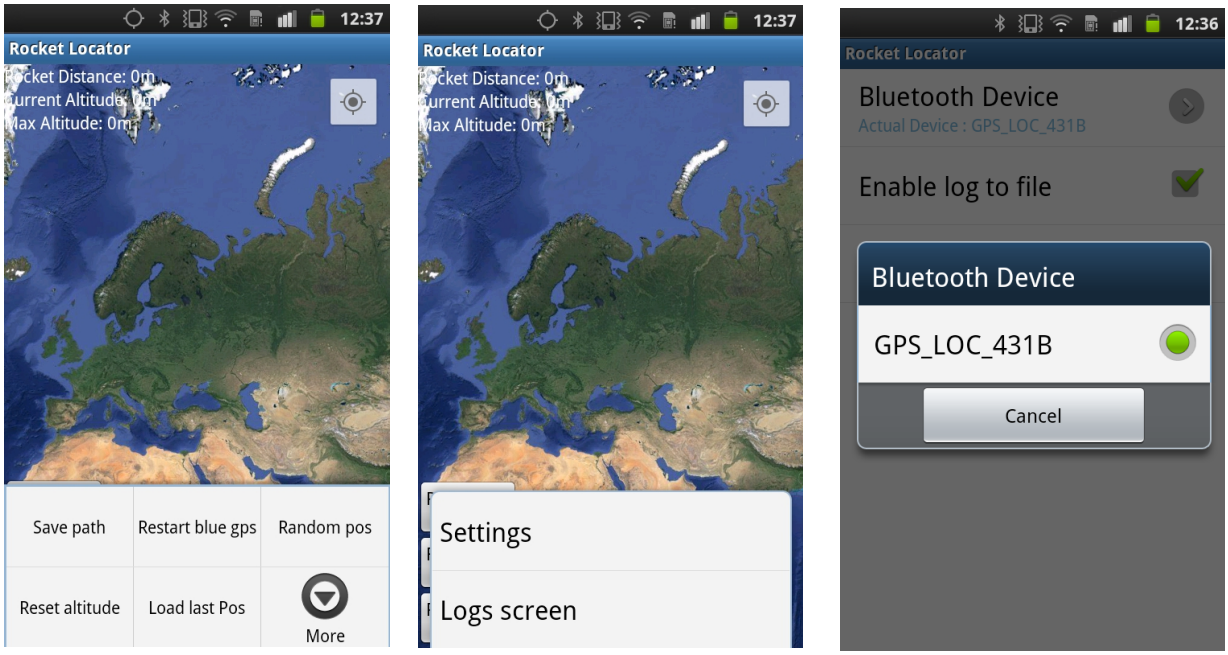
- Install GPS Rocket Lockator from Google Play on your device
- Turn on PEDRO GPS-Mini 4 receiver - green LED status flash quick
- Turn on Bluetooth in your tablet or smatphone
- Scan bluetooth devices, look for your receivers name - GPS_LOC_4XXX for example 433A, 4XXX is unique name of your receiver, you can find it on a sticker on the back side of receiver.
- Enter the PIN 1234, after pairing procedure green led STATUS in receiver should flash once per second
- Turn off Bluetooth in your device.
- Run the application, turn on Bluetooth and enable GPS.





After a few seconds application runs and shows your position on the map, if you have a conection to the internet (application works with free google maps).

To connect with your reciver use menu – **Settings** – **Bluetooth device** and select your receiver name. See below.



If the receiver is conneced with application yellow LED STATUS lighs up and green LED LINK flashes twice per second.
Select also option enable log to file.
After this, system is ready to use.

Using the system PEDRO GPS MINI 4

To have good GPS signal start the system outside.
Distance beetwen yor tablet or smatphone and receiver is less than 5m /within Bluetooth/

1. Turn on the transmitter, green LED flashes once per secon during the position seeking, after GPS position FIX green led lights continuously.

Waiting for FIX can take 35-45sek, but in new localization even more.

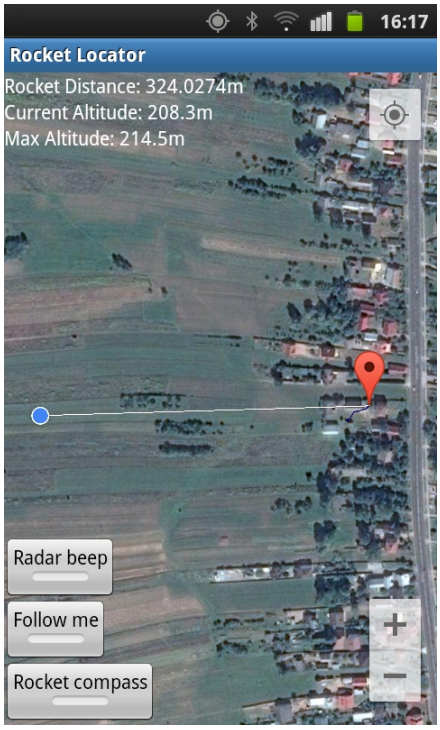
2. Turn on the receiver, green LED RX flashes once per second, green LED LINK flashes quickly.
3. Run application GPS Rocket Locator and turn on Bluetooth and enable GPS.

But only the GPS without the help of other GSM network or Wi-Fi, etc.
In the open, they introduce large errors even hundreds of meters in position smartphone / tablet.

LED LINK in reciever should flashing twice and STATUS LED should light continuously .
After a few seconds application runs and shows your model position on the map.
Your position is shown on the map by blue point, your model position is red one.
These two points are connected white line.
Blue trace on the map indicates the route on which the model moves.
The movement of the receiver changes the blue point to arrow in line with the direction of your movement.
The sound from the tablet/smartphone speaker signals the correct data from the GPS in the model.
Lower soud means errors in the transmission due to work on the range border or disturbances.

In the upper left corner you can find the information about your model:
- Rocket Distance – show distance to your model,
- Current Altitude, - Max Altitude
In the left down corner you can find three functions:

- Radar beep turn on/off beep
- Follow me - moves the map along with the movement of the tablet / smartphone
- Rocket compass - rotate the map in accordance with the directions of geographic useful feature to adjust your position to your preferred setting map's terrain features / or the direction in which we assume to move.



In the lower right corner are buttons to zoom in/out the map. You can do it also by touching the screen.

Additional functions of GPS ROCKET LOCATOR

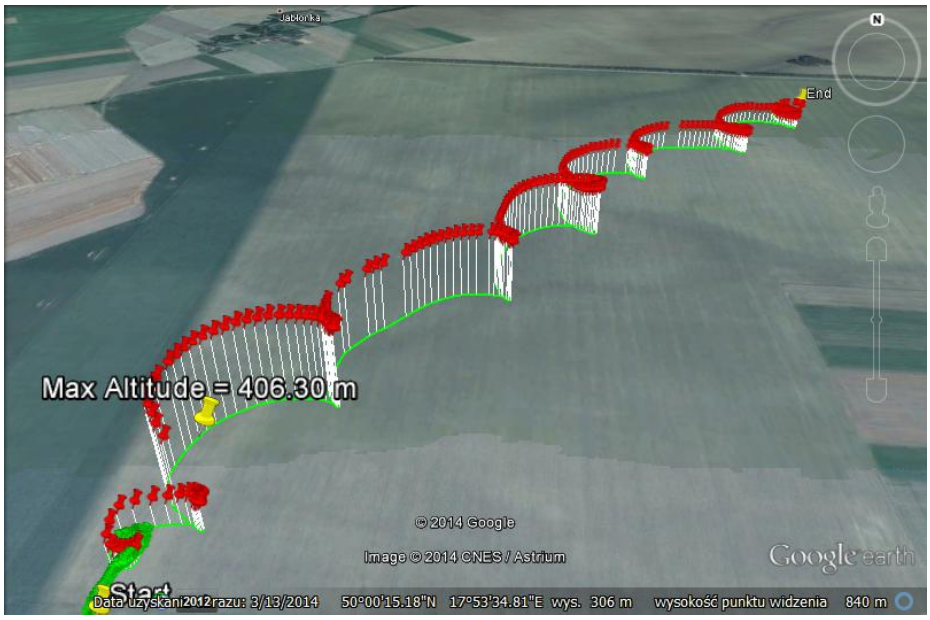
- **Save path** - writes to a memory card or to other memory location file "rocket_path" including log of the coordinates obtained from the model since its incorporation and positioning (catching FIX GPS) to save data. Please note that after writing, turn off the application and change the name of file for example “test 1”, because if you do a next flight a new records will overwrite them and you will lost data. The best method of proper operation: flight, finding the model, save path, turn off application and change the name of file. Of course he wants to keep the data for analysis or as a souvenir from the competition/training.
- **Restart blu gps** - restore connection BT.
- **Random pos** - the test item, other than GPS.
- **Reset altitude** - GPS indicates the height AMSL to indicate height above the ground / AGL/ before the flight should reset it. GPS points during the flight altitude of a big mistake, usually underestimates the value, this is due to limitations manufacturer for civil applications.
- **Load Last Pos** - last received GPS position.
- **Settings** - select Bluetooth device, log to file enable/disable
- **Logs screen** - data in the form of text, scroll, clear

Before the installation of the transmitter in the model is proposed to train using this set in the area to configure tablet/smartphone functions:

- screensaver
- screen timeout
- power saving
- turn off unnecessary applications

You can create and save your own settings profile to work with application.
After work - turn off application, GPS and Bluetooth to minimize power consumption.

Stored in the memory flight data “rocket_path” can be converted to a file type * .kml and visualize in Google Earth on the map and used to analyse the flight. Using the "KML Generator" software.



Fly-off in Kietrz Cup 2014

Typical problems and solutions:

1. LED RX in receiver does not flash - check channel setting, check LED TX flashing in transmitter, check receiver and transmitter power supply.
2. Transmitter and receiver are turned on and application is run but LED LINK flashes quickly Bluetooth (BT) in your device is off or BT module is not in pair with your device Go to BT settings, open BT communication, scan devices and choose your receiver e.g. GPS_LOC_433B and enter your PIN number /1234/. Check menu "Settings" which Bluetooth was chosen to run with the application. "Actual Device" should be in compliance with the name of your receiver.
3. During the work in case of lost Bluetooth communication because of being out of the range you can restore connection by using the application function in menu "Restart blue gps"
4. LEDs RX + TX lights continuously – data transmission error – turn off and on the receiver after few seconds.
5. LED FIX in transmitter flash once per second for a long time (more than 2 minutes) does not signal "FIX" - at first you turn on in a new localization it can take longer time but if you repeat and time is still more than 35-45sek, you should find a better localization in the model to place the module. GPS antenna should be always placed far from the other metal or carbon containing elements.
6. Unexpected interrupt transmission on tablet / smartphone - change in the tone of acoustic signals, LED STATUS does not flash and LED LINK flashes – the problem can be caused by other applications running in the background type gadgets or screen saver, battery saving, etc. Switch of unnecessary applications.

General note:
after installation of transmitter in the model, many technical attempts should be performed with the working system to identify and remember characteristic, behaviour, the range of work in various positions model after landing, for example :

- model lying on the transmit antenna directed vertically,
- model based tail / lobe of the bush, tall grass, hung on a bush,
- model on the back.

Please note that the GPS system is based on the transmission of radio signals from satellites and in some regions, especially in areas near the very strong transmitters military and civilian can be hindered its reception.

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