RC ALTIMETER #3 PRO

Altitude data recording and monitoring system with telemetry and microSD card

Manual version: 1.0

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Introduction

The RC Altimeter #3 PRO was designed to provide a lightweight compact device for measuring and recording altitude over time. It was designed especially for use onboard a radio controlled (R/C) aircraft, but would be useful in other applications too.

The RC Altimeter #3 PRO transmits current altitude, maximum altitude achieved in flight, vario, battery voltage, temperature and number of interferences detected at the field via an RF link to the ground unit (RC T2000). It also records all this data to microSD card for later review.

If RC GPS module is connected to the module it will also transmit latitude, longitude, ground speed, trip distance and distance from the R/C pilot and will save all GPS data for 3D flight review with Google Earth and SeeYou software.

How it works

The RC Altimeter #3 PRO module uses a high-resolution barometric pressure sensor system to detect small changes in air pressure that occur due to changes in altitude. It is sensitive enough to detect altitude changes of less than one meter. This also makes it sensitive to changes in local weather and air pressure variations. The intended use of this device is for measuring short-term altitude changes in R/C aircraft. Long-term altitude readings will vary considerably due to varying atmospheric conditions. It is best used to measure relative changes in altitude. The module uses a 433MHz two way link to transfer data from your R/C aircraft to the RC T2000 ground module. Data transfer is digital, so there won't be any noise or incorrect data received. All parameters are recorded to microSD card for later review or flight.

Key features

- Lightweight at only **12 grams with telemetry and JR cable.**

- Small – 33 mm x 20 mm x 9 mm.

- With the **RC T2000** module it will work as a variometer with audio tone.

- Records data to **microSD** card for later review.

- Integrated **FXJ switch** function.

- PC **USB** interface for firmware updates.

- Export data to JPG image, KML (Google Earth) file and IGC (SeeYou) files.

- Wide range of input power: 4 – 20 volts DC. Power it from your aircraft receiver battery.

- Every unit is tested in pressure chamber.

- Transmits measured parameters in real time.

- With the RC GPS module it will transmit additional information such as ground speed, trip distance and distance from the R/C pilot and will record all GPS data required, so you could later review your flight in 3D with Google Earth or with SeeYou.

System requirements

- PC with one of the following operating systems: Win98, Windows ME, Windows NT, Windows 2000, Windows XP, Windows Vista.

- Available USB port.

- SD card reader.

- 2 megabytes Hard Drive space.

Specifications

Board Dimensions	1.29" x 0.78" x 0.35"
	33 mm x 20 mm x 9 mm
Weight	12 grams (0.42 oz.)
Temperature Range[1]	-10°C ~ +60°C
Input Voltage Range	4.0 – 20.0 volts DC
Input Current	36 milliamps
Measured Voltage	4.0 – 18.7 volts DC
Memory Capacity	64MB SD card included (up to 2GB SD card can be used)
Displayed Altitude Resolution	1 meter, 1yard or 1 foot
Output Power	10mW (10dBm) at 433MHz
Range[1]	More than 1 km (depends on antenna installation)

[1] Specifications are taken from component ratings and system limits and may not have been tested to the full extent of the specified ranges.

Physical overview

Figure 1 shows the RC Altimeter #3 PRO module.

The module includes a 433MHz transceiver for transmitting data to the ground with a 17cm long antenna.

The JR cable is used to connect it to a radio-controlled aircraft's onboard receiver, which powers the RC Altimeter #3 PRO module.

The 3-pin connector serves as a servo pass-through or as output for FXJ switch function.

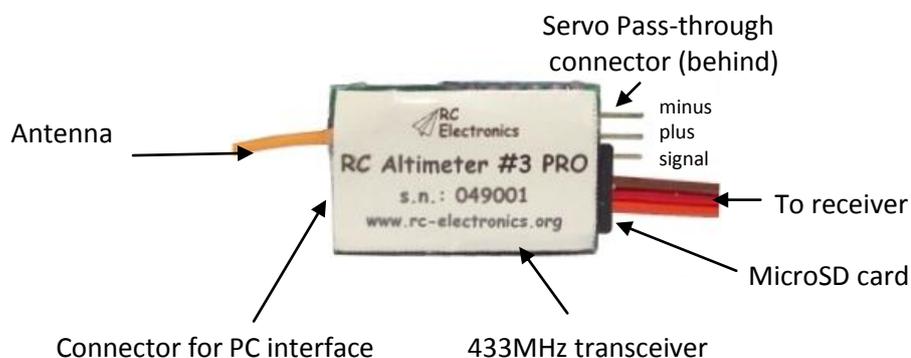A modular connector is used for firmware updates with PC and for connection to RC GPS module.

Figure 1: The RC Altimeter #3 PRO module.

Using the RC Altimeter #3 PRO module

Powering the module

To power the RC Altimeter #3 PRO module, plug the 3 pin connector on JR cable into a spare receiver channel on the R/C aircraft receiver. If you do not have an open receiver channel, you can plug the RC Altimeter #3 PRO into the receiver and plug that channel's servo into the RC Altimeter #3 PRO servo pass-through connector. Be sure to observe proper polarity when plugging the connector into the receiver. For non-R/C use, attach a battery to the servo pass-through connector. A JST style connector can plug directly into the 3 pin pass-through connector. Again, be sure to observe proper polarity, or damage may result. Orientation of the 3 pin pass-through connector is shown on figure 1.

Mounting the module

The RC Altimeter #3 PRO module can be mounted in one of two ways:

- **Inside the fuselage of the aircraft.** In this case there should be an opening of at least 0.5 sq. cm to allow air pressure inside the fuselage to equalize with the atmospheric pressure outside the aircraft. In many aircrafts, the fuselage is not airtight and is sufficiently vented to the outside air.

- **On the outside of the aircraft.** In this case the pressure sensor should be at the right angle to the airflow for maximum accuracy. This means the air stream is flowing across the hole in the pressure sensor, not directly into or away from it. If possible, mount it away from the prop wash, because the measured altitude can increase by over 60 meters due to airflow from the prop.

The module can be mounted using double-sided tape, cable ties, or Velcro. Velcro is recommended so that the module can be removed and interfaced with the PC for downloading altitude data.

Be sure that the module is not touching any metal surfaces. Shorting the metal contacts on the module will result in a radio system failure.

Do not mount the module on top of power batteries when using electric planes because they get hot and this can affect the altitude readings by up to 30m.

Also be sure to keep the module away from water, fuel and other liquids.

Always range check the aircraft's radio system before flying with the RC Altimeter #3 PRO module installed, to verify that there is no system interference.

For maximum range a full length of antenna should hang free from the fuselage.

Operation

Each time you turn on the module it will set zero altitude and create a new flight. When the module is setting zero altitude, you must make sure that the module is stationery. In order to view data, you must use the RC T2000 module. Via the RC T2000 module you are able to change any logger settings and set zero/create new flight.

PC USB Interface

The PC USB interface connects to the RC Altimeter #3 PRO module's 4 pin connector. The RC Altimeter #3 PRO gets power from the USB interface, so no external battery is required. USB drivers can be downloaded from www.rc-electronics.org (under Downloads -> Software). After installation a virtual COM port will be created. Please be sure that this virtual COM port is number 1...10.

Figure 2: USB interface.

Firmware upgrade

The RC Altimeter #3 PRO module provides the ability to upload new firmware to the module. No installation is required for the Firmware Upgrade software. You can download it from www.rc-electronics.org.

After downloading, run the Firmware Upgrade.exe file. Select the correct COM port and then specify the new firmware file (RC_Altimeter_v2.xx.hex). After you have selected the firmware file, connect the module to the USB interface so it will run and LED will flash. Wait for about 4 s and click the "Upload" button. If something goes wrong during update, disconnect the module from the USB interface and restart Firmware uploader. Again, select correct COM port and update file and click Upload button.

After pressing the "Upload" button, **quickly connect the USB interface to the RC Altimeter #3 PRO** and the upload of the new firmware will start.

You should only use a firmware update file specifically provided for the RC Altimeter #3 PRO module. Using an incorrect update file will render the RC Altimeter #3 PRO module inoperable.
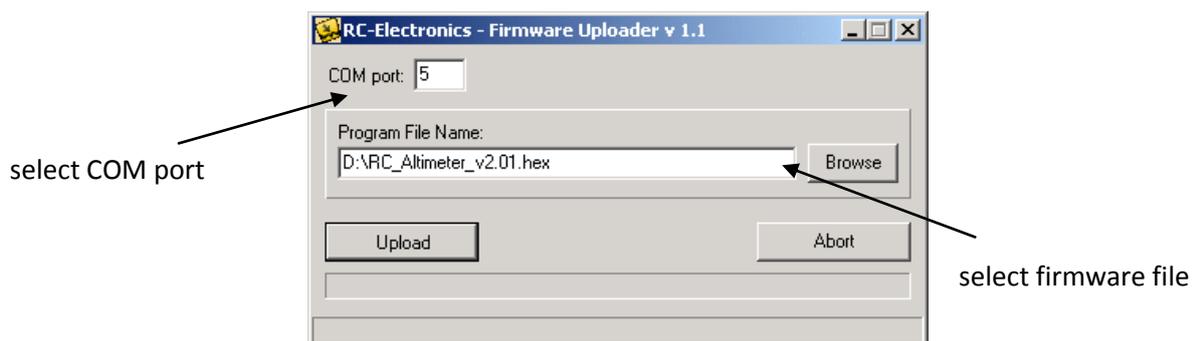
select COM port

select firmware file

Figure 6: Firmware uploader.