

RC HLS

Height Limited Switch



Manual version: 1.0

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Introduction

The RC HLS #1 (Height Limited Switch) was designed and developed to provide a lightweight, compact and low cost device for use in 200m altitude limited competitions. It incorporates everything we have learnt in recent years during development of the RC Altimeter #2 and #3 series. The device is a “plug and play” unit, simply connected between the ESC (Electronics Speed Controller) and receiver. It will automatically cut the motor at the reselected altitude or after selected time of motor run, (whichever comes first), and release full control back to the pilot 10 seconds later. Cut off parameters of 200m/30s, 150m/25s and 100m/20s are selectable by soldering jumpers on the PCB (Printed Circuit Board). After landing, you can check the cut off altitude via a flashing LED and for contest use, it also stores the first 40s of flight for 6 flights to enable launch height checking.

How it works

The RC HLS #1 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. After selected cut-off altitude or time is reached it generates low servo pulse (800us) for 10 seconds which stops electric motor. After 10 seconds throttle control is back in pilots hand.

Key features

- Lightweight at only **5 grams with JR cable**
- Small • 20 mm x 12 mm x 6 mm + JR cable
- Onboard LED to flash out cut off altitude
- Records 6 launches for later review on competitions (downloading interface not included)

Hardware

Figure 1 shows the RC HLS #1 hardware module.



Figure 1. The RC HLS #1

Motor cut-off settings

To change motor cut-off settings solder together jumpers with required setting.



Specification

Board Dimensions	0.8" x 0.5" x 0.23" 20 mm x 12 mm x 6 mm
Weight	5 grams
Temperature Range ¹	-10°C...+60°C
Input Voltage Range	3.3 – 4.2 volts DC
Input Current	36 milliamps
Memory capacity	Last 6 flights each 35sec.

Using the RC HLS #1 module

Powering the module

To power the RC HLS #1 module plug the male JR cable into a throttle channel of the R/C aircraft receiver. Plug the ESC cable into female JR connector of RC HLS #1.

Mounting the module

The RC HLS #1 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. For many aircraft, 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 right angles 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.

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.

Don't 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 HLS #1 module installed to verify that there is no system interference.

Operation

Install RC HLS #1 between ESC and receiver. When power is applied to the system the module will set zero altitude and after 1 second it is ready for use. In this time make sure that the module is stationary. RC HLS #1 is measuring servo pulse coming from receiver and generates the same pulse on other side to control ESC. With measuring pulse it can detect when throttle has been applied so it can records additional markers in flight. After launch when model reaches preset cut off altitude or preset cut off time runs out RC HLS #1 generates 800us pulse to ESC so motor is stopped and launch is saved in non-volatile memory. This pulse is generated for 10s and after that receiver pulse is passed thru again.

Downloading USB Interface

The downloading USB interface connects to the RC HLS #1 module's JR connectors. The RC HLS #1 gets power from the 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.

This interface is not part of package and must be bought extra. Downloading data from RC HLS #1 may be required only on competitions to check out model start (cut off altitude/time) and CD (contest director) should provide this interface.



Figure 2. Downloading USB interface

RC HLS Downloader software

Installation

No installation is required for the RC HLS Downloader software. You can download the software from www.rc-electronics.org. After downloading run the RC_HLS Downloader.exe file.

Startup

In order to communicate with RC HLS you need downloading USB interface which is not included with RC HLS #1. Connect RC HLS #1 to downloading USB interface. After you run software you will get window on Figure 3. First select correct COM port which was installed with downloading USB interface installation. After that you can read out firmware version of RC HLS #1, download flights or erase them all. After downloading flights you will be automatically asked where to save *.flt file. After save you must open this file with PC RC Altimeter Logger (refer to RC Altimeter #2 BASIC manual for operation with data)

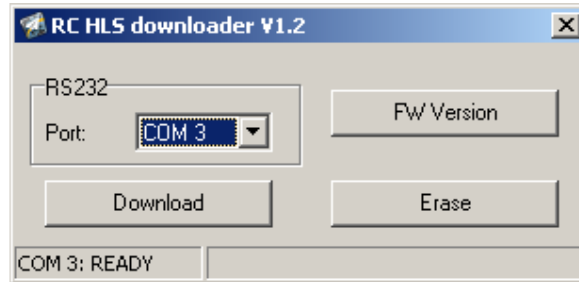


Figure 3. RC HLS downloader

Firmware upgrade

You will need USB downloading interface for firmware upgrade! The RC HLS #1 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_HLS_v1.xx.hex). After you have selected the firmware file click the "Upload" button. After pressing the "Upload" button, connect HLS's male JR connector to female JR interface connector (one wire) and then join other two and the upload of the new firmware will start. You should only use a firmware update file specifically provided for the RC HLS #1 module. Using an incorrect update file will render the RC HLS #1 module inoperable.

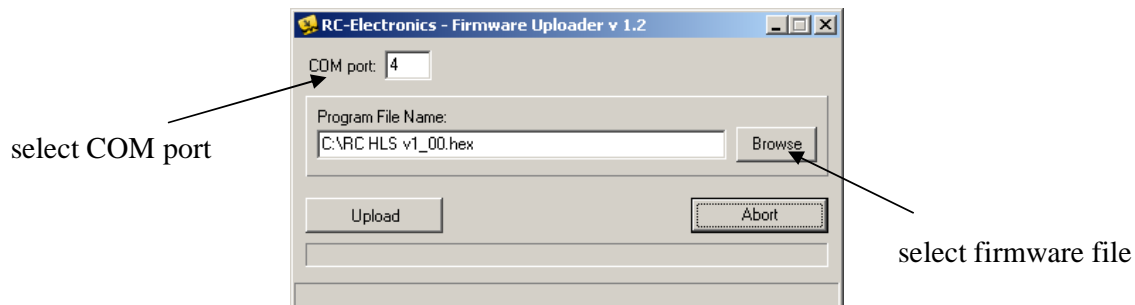


Figure 6. Firmware uploader