

RC HLS

Height limited switch



Manual version: 1.1

RC Electronics

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Introduction

The RC HLS #1 module was designed and developed to provide a lightweight, compact and low cost device for use in 200 m altitude limited competitions. It incorporates everything we have learnt in recent years during development of the RC Altimeter #2 and #3 series.

Module is a “plug and play” unit simply connected between the ESC (Electronics Speed Controller) and receiver. It will automatically cut off the motor at the reselected altitude or after selected time of motor run (which 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 with soldering the jumpers, see figure 2. After landing, you can check the cut off altitude via flashing LED. For contest use it also stores the first 40 s of the 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 even the smallest 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 (800 us) for 10 seconds, which stops electric motor. After 10 seconds, throttle control is back in pilot’s hands.

Key features

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

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 | 3.5 – 8 volts DC |
| Input Current | 36 milliamps |
| Memory capacity | Last 6 flights each 35sec. |

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 HLS #1 module.



Figure 1: The RC HLS #1 module.

Motor cut-off setting jumpers

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



Figure 2: Soldering jumpers.

Using the RC HLS #1 module

Powering the module

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

Mounting the module

Install the RC HLS #1 module between ESC and receiver. The module can be mounted in one of this 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.

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 HLS #1 module installed, to verify that there is no system interference.

Operation

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.

The RC HLS #1 is measuring servo pulse coming from the 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 record additional markers in flight.

When model reaches preset cut off altitude or preset cut off time runs out, RC HLS #1 generates 800 us pulse to the ESC, so the motor is stopped and launch is saved in non-volatile memory. This pulse is generated for 10 s and receiver pulse is passed through again after that.

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 external battery is not required. USB drivers can be downloaded from our web page www.rc-electronics.org under Downloads -> Software. After installation, a virtual COM port will be created. Please make sure that this virtual COM port number is 1...10.

This interface is not a part of the package and must be bought extra. Downloading data from the 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 3: Downloading USB interface.

RC HLS Downloader software

Installation

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

Startup

In order to communicate with the RC HLS, you need a USB interface which is not included with the RC HLS #1. Connect the RC HLS #1 to this USB interface. After you run software, you will get a window similar as the one on figure 4. Firstly select the correct virtual COM port, which was installed with the USB driver installation. After that you can read out firmware version of the RC HLS #1, download flights or erase them all. After downloading flights you will be automatically asked where to save the *.flt file. After saving you must open this file with the PC RC Altimeter Logger (refer to the RC Altimeter #2 BASIC manual for operation with data).

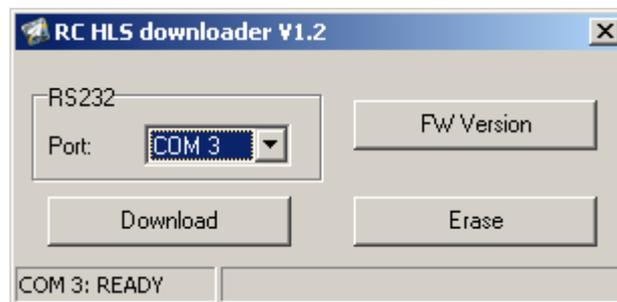


Figure 4: RC HLS downloader.

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 our web page www.rc-electronics.org. After downloading run the Firmware Upgrade.exe file. Select the correct COM port and specify the new firmware file (RC_HLS_v1.xx.hex). After you have selected the firmware file click the “Upload” button. Connect the HLS’s male JR connector to female JR interface connector (one wire) and join other two. Upload of the new firmware will start. You should only use a firmware update file specially provided for the RC HLS #1 module. Using an incorrect update file will render the RC HLS #1 module inoperable.

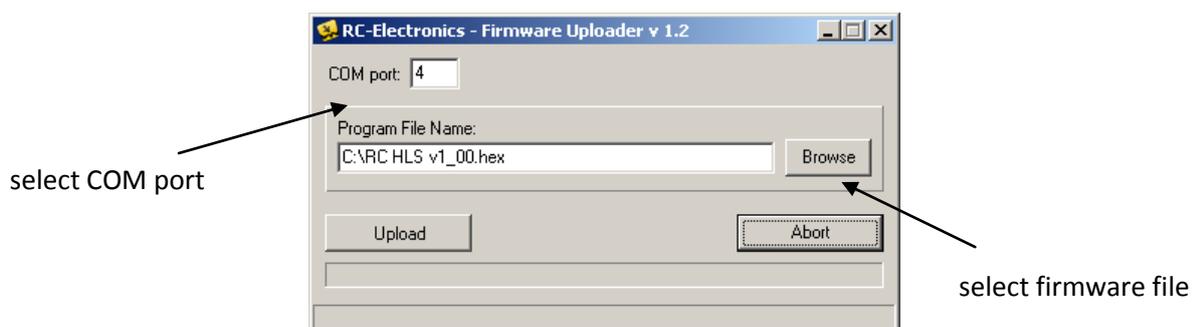


Figure 5: Firmware Uploader.