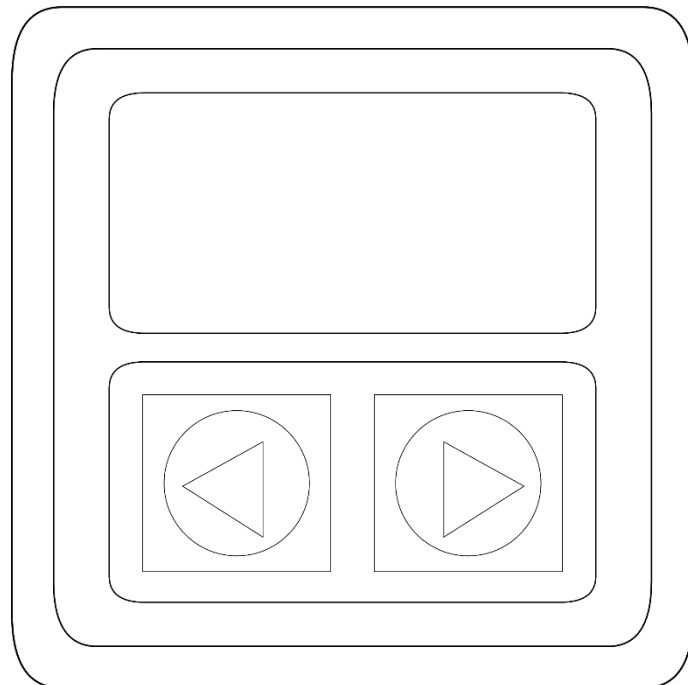


USER MANUAL

SMART BALLOON DEVICE



Version 2.1

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PREFACE

This device designed by Mariano Messaggi, paraglider pilot, lover of airports, who recently had support by Rubic Balões in his trajectory, a company which is in the process of certification of its hot air balloon type of aircraft within ANAC and Instituto do Aerodesporto Brasileiro, ADB Brasil, aiming to promote the productive chain of the products used in airports.

Smartvario, Rubic Balões, ADB Brasil, all involved and committed to promoting national potentials for research and development of new options for the use in national and international ballooning.

This first experimental official version was baptized as SMART BALLOON DEVICE which, coincidentally in its two initial letters reminds of “SB”, as in aviation the first letter always designate the ICAO region (S for South America) and its second letter informing the country (B/D/I/J/N/S/W are all reserved for Brazil).

The letter D of “Device” means a thing made or adapted for a particular purpose, especially a piece of mechanical or electronical equipment. Traduzido: algo feito ou adaptado para um propósito específico, especialmente uma peça de equipamento mecânico ou eletrônico.

A product used for the free flight, adapted to the use in ballooning, with the inclusion of a wireless thermometer and step-by-step adjustments for the functions required for the balloon flight. This device will be improved with each version to meet every need of a balloon pilot and its aircraft in leisure, entertainment, record-beating or competition flights.

Thermometer, variometer and altimeter are mandatory instruments for balloon flights, should the aircraft be experimental or certified.

This product is experimental and the interested party may have the equipment calibrated by a certified entity to do so. The calibration is annual.

We are creating an access platform that contains the technical information for the improvement of SBD version 1.

Wait for news!

PARTS

- RECEPTOR – MAIN UNIT
- TRANSMITTER – REMOTE UNIT
- USB C CHARGING CABLE

OVERVIEW

Consisted of two parts:

1. Receptor – Main Unit
2. Transmitter – Remote Unit

RECEPTOR – MAIN UNIT

Consisted of a screen, an ON-OFF button, a USB C charging port and two buttons being the right yellow and the left red. It is charged via a USB C connector plugged to any USB port or mobile device.

TRANSMITTER – REMOTE UNIT

Digital Thermometer and an ON-OFF button. Uses a 9V battery.

SETUP

TRANSMITTER – REMOTE UNIT

1. With the tip of a ballpoint pen or any similar instrument that doesn't damage the cover, open the compartment on the backside, below the thermometer wire;
2. Connect the negative and positive poles to the 9V battery poles;
3. Plug in the wires and the battery in the compartment;
4. Fit the cover over the protrusions and close it;
5. The ON-OFF button is on the right side, same side of the transmitting antenna and with the thermometer wire facing backwards;
6. The button facing downwards means it is OFF;
7. The button facing upwards means ON and you will see a red flashing LED inside.
8. The unit stores the temperature (datalogger) of 4 hours, deleting it every time it is turned on.

RECEPTOR – MAIN UNIT

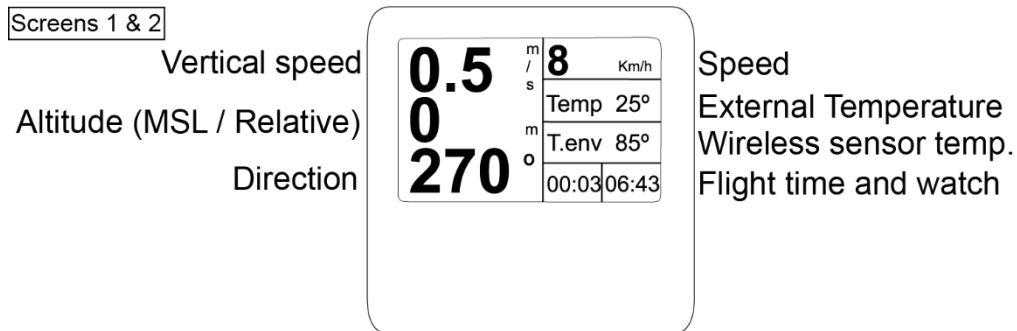
1. Recharge the variometer with the USB C connector in a computer or portable device;
2. The red LED means it is charging;
3. The blue LED means that the receptor is fully charged;
4. The USB C port is on the upper right side, close to the ON-OFF button;
5. The ON-OFF button is also located on the upper part, close to the USB C port;
6. The button located on the left means it is OFF; The button located on the right means it is ON;
7. At the time it is ON, previously configured adjustment values will be shown.

SCREEN SWITCHING

At the time it is ON, previously configured adjustment values will be shown during 1 second.

The screens can be switched using the 2 front buttons between 4 pages.

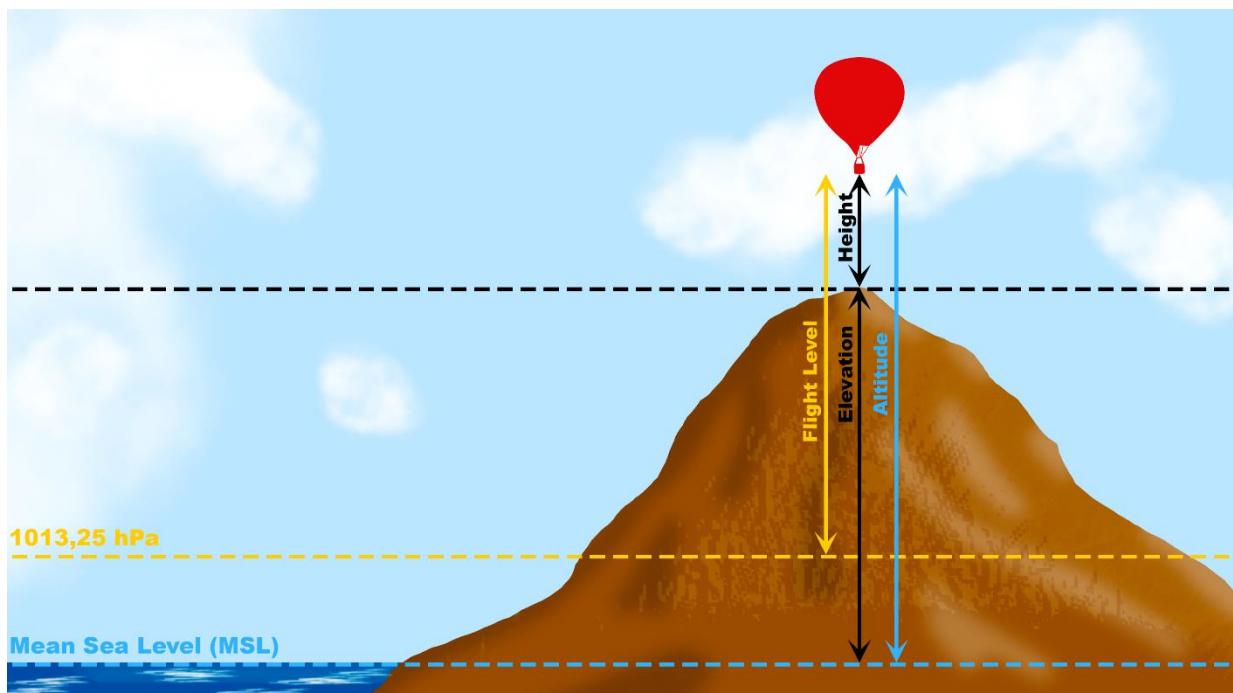
SCREENS 1 AND 2



Barometric Sensor information will be shown:

- A. Altitude variation (m/s) or vertical speed: when it is climbing, the value is positive (climb rate). When it is descending, the value is negative (descent rate).
- B. Altitude in QNE, standard pressure altitude (1013.25 hPa), which would be the Flight Level or FL.

The QNE altitude is adjusted according to the initial altitude obtained from the GPS.



The altitude related to the takeoff is in meters. It will always be zero at the time it is turned ON. It will be positive if it is above the takeoff and negative if it is at a level below the takeoff.

- C. The flight stopwatch starts the counting at the moment it is turned ON and it is reset at the takeoff;
- D. The external temperature in °C;
- E. The wireless sensor temperature is shown only when it receives the data from the sensor.

While the GPS is not set, it shows the number of satellites it is receiving the signal from.

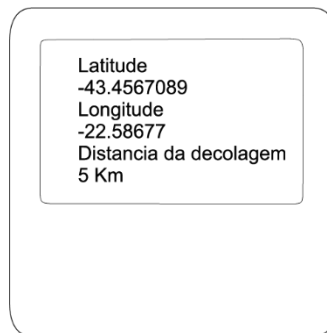
The receptor has a GPS that needs an open external area, free from obstacles to be connected. It depends on a sight line pointing to the sky. It might take some minutes to set it after being turned ON.

After the GPS is set, it will show:

- A. The ground speed (Km/h);
- B. The direction in degrees (it can be defined as geographic or magnetic); and
- C. The watch.

SCREEN 3

Screen 3

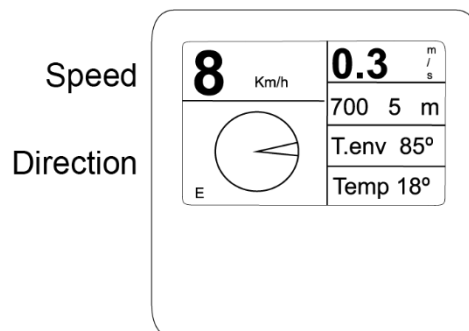


Latitude Coordinates
Longitude Coordinates
Takeoff distance

Shows the geographical coordinates (latitude and longitude) in UTC and the distance from the takeoff point (m).

SCREEN 4

Screen 4



vertical speed
Altitude (MSL / Relative)
wireless sensor temp.
external temperature

Shows the same data as screen 1 reorganized with the directions in cardinal points.

The battery status is indicated by a thick bar in the middle of the screen.

SETUP

1. To enter the setup, turn the SBD RECEPTOR ON with the red button pressed;
2. The setup screen will be shown, then you can release the red button after a high pitch beep, followed by a low pitch beep;
3. The wireless sensor temperature alarm setup will be shown first;
4. Let the system follow the options and press the red button when the desired envelope temperature is selected. The interval is in every 5°C from 80°C to 150°C;
5. Choose the limit for the internal envelope temperature as 110°C, 120°C or 125°C as indicated in the Operation Manual of your balloon; The alarm changes according to the temperature variation.

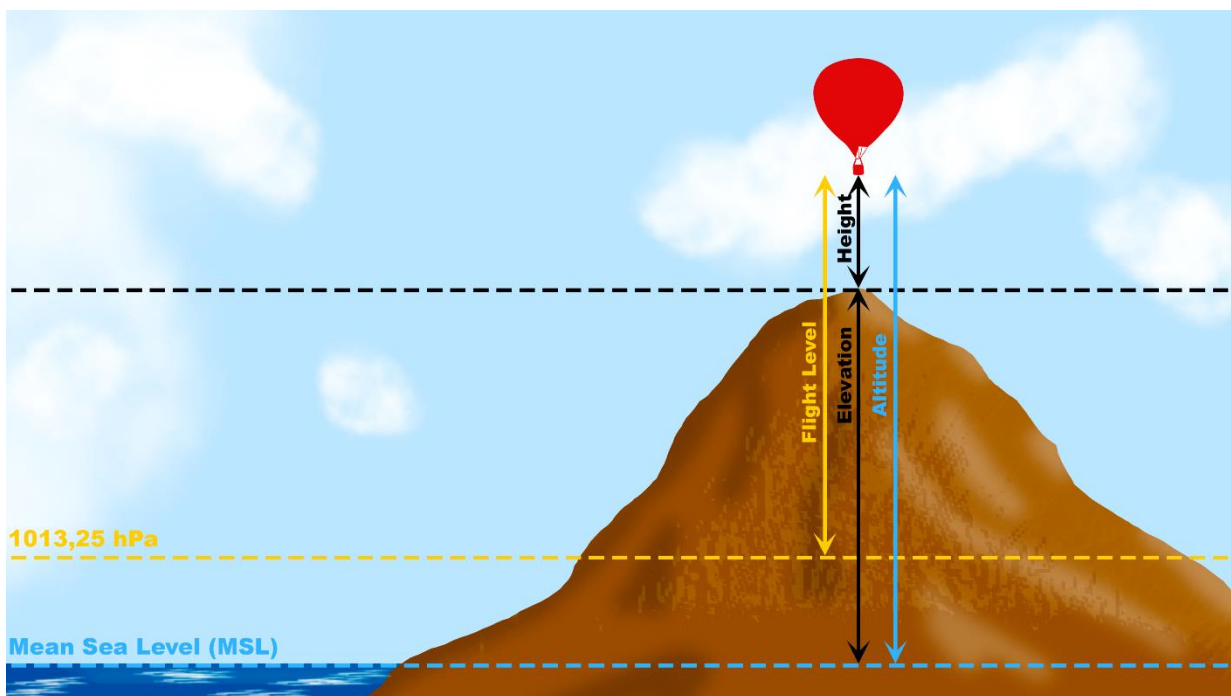
6. To proceed to the next configuration, the descending alarm, turn the device OFF and ON again according to item 2 and wait for it to reach this setup screen; The interval is in every 0.5 m/s and goes from 0.5 to 8 m/s. Press the red left button when the desired descent rate is selected to warn you through the alarm;
7. To proceed to the next configuration, the climbing alarm; The interval is in every 0.5 m/s and goes from 0.5 to 8 m/s. Press the red left button when the desired climb rate is selected to warn you through the alarm;
8. The fourth adjustment is the magnetic variation: 0 to calculate the magnetic variation and 1 to use the geographic direction.
9. The following 2 configurations are related to the wireless sensor. Adjust the BitRate (The interval is in every 50, which represents 50 bits/s and goes from 800 to 1700 bits/s) according to the internal part of the transmitter and then the adjustment of the serial number of the transmitter.

PANEL LIGHTING

1. The screen lighting is ON by default;
2. To turn OFF or ON, both buttons, red and yellow must be pressed at the same time.

SCREEN SWITCHING

1. You have 4 screens available to switch from pressing the right button (yellow).
2. While turning the receptor ON, you will first see the setup of SCREEN 1 to check if everything is according to the setup;
3. Following, the SCREEN 2 contains the following information from left to bottom and the right from top to bottom:
 - a. Vertical speed in m/s:
 - i. When it is climbing it will show the number,
 - ii. When it is descending it will have the negative (-) sign before it.
 - b. Altitude in QNE, standard pressure altitude (1013.25 hPa), which would be the Flight Level or FL.



- c. Flight direction in which it is flying in cardinal degrees:

- i. The direction is calculated by the track;
 - ii. The direction can be either geographic or with magnetic variation, whichever is desired.
 - d. Speed in km/h
 - e. External Temperature in °C
 - f. Envelope Temperature in °C
 - g. Flight time in hs:min, and the stopwatch is reset automatically when the takeoff is detected
 - h. Watch in hs:min, which is shown as soon as the GPS connects itself to the satellites.
4. Pressing the yellow right button, you will hear a beep and the the SCREEN 3 will appear, containing the following information from left to bottom and the right from top to bottom:
 - a. Speed in km/h
 - b. Direction in graphic;
 - c. Vertical speed in m/s:
 - i. When it is climbing it will show the number,
 - ii. When it is descending it will have the negative (-) sign before it.
 - d. Altitude in meters relative to the mean sea level and on the other side the positive or negative variation of this altitude
 - e. Envelope Temperature in °C
 - f. External Temperature in °C
5. Next, the SCREEN 4 contains the following information from top to bottom:
 - a. Latitude in decimal degrees;
 - b. Longitude in decimal degrees;
 - c. Distance in km

TEMPERATURE

1. Turn the transmitter on.
2. Place the transmitter on the top of the balloon, in the area indicated by the operation manual of your balloon manufacturer;
3. Insert the wireless thermometer in the balloon's hole and fasten it in order to prevent it from being loose or swinging;
4. This fastening structure must be provided for in the manufacture of the balloon envelope by the manufacturer;
5. Fasten the receptor to the column of your basket or other desired place, but with a sight line pointing to the sky;
6. Turn the receptor on.
7. You will see that both of the fields below the speed the information will be shown:
 - a. External temperature; and
 - b. Envelope Temperature
8. If you reach the alarm temperature, it will be activated with a characteristic sound which varies according to the temperature variation.

VERTICAL SPEED

1. Fasten the receptor to the column of your basket or other desired place, but with a sight line pointing to the sky;
2. Turn the receptor on.
3. You will see on SCREEN 2 or SCREEN 3 the information about:
 - a. Vertical speed

4. Set it according to your assessment within the viable parameters of the Operation Manual from the manufacturer of your balloon.
5. If you reach the alarm climb or descent speed rate, it will be activated with a characteristic sound.

PRECAUTIONS

- Do not subject the unit to an excessive force, shocks, dust, temperature or humidity.
- Do not submerge the unit. If water splashes on it, dry it immediately with a soft cloth without lints.
- Do not clean the unit with abrasive or corrosive products.
- Do not try to fix internal components. That voids the warranty.
- Use only new batteries.
- Images shown in this manual may differ from the real unit.
- When you discard the unit, be sure that it will be collected separately for special treatment.
- The allocation of the product in different places than indicated in this manual voids its warranty and exempts it from any liability.
- The content of this manual can not be reproduced without the manufacturer's approval.
- Do not discard the batteries in the normal bin. Collect them separately for special treatment.

NOTE: The technical specifications for this product and its content provided in the user manual are subjected to modification without previous notification.

NOTE: Features and accessories may not be available in every country. For further information, contact a regional representative.

TECHNICAL SPECIFICATIONS

TYPE	DESCRIPTION
MAIN UNIT - RECEPTOR	
L X W X H	65 x 27 x 67 mm without the antenna
Weight	145g
Temperature Unit	°C
Temperature Resolution	1°C
Envelope Temperature variation exhibition	80 °C - 150 °C
Signal Frequency 1. Frequency: cycles per second 2. Memory bandwidth: bytes or bits 3. Total bandwidth: bytes per second or bits per second (item 1 multiplied by item 2)	433 MHz
Power	USB C rechargeable battery
REMOTE UNIT - TRANSMITTER	
L X W X H	65 x 27 x 67 mm without the antenna
Weight (without batteries)	55g
9V battery weight	60 g
Transmission area	100m (300ft) without obstacles
Power	Batteries: 1 x 9 V

ABOUT THE DOCUMENT

We do not have a Declaration of Conformity.

This instrument is being used experimentally and tested as a temperature indicator, variometer and altimeter for hot air balloons.

WARRANTY

1. The legal warranty is established by the CDC (Código de Defesa do Consumidor).
2. You have 90 days to complain about issues with the durable product.
3. The period starts counting from the receipt of the product.