RSTrimmer

3-Axis Trimmer for Ultralight Aircrafts
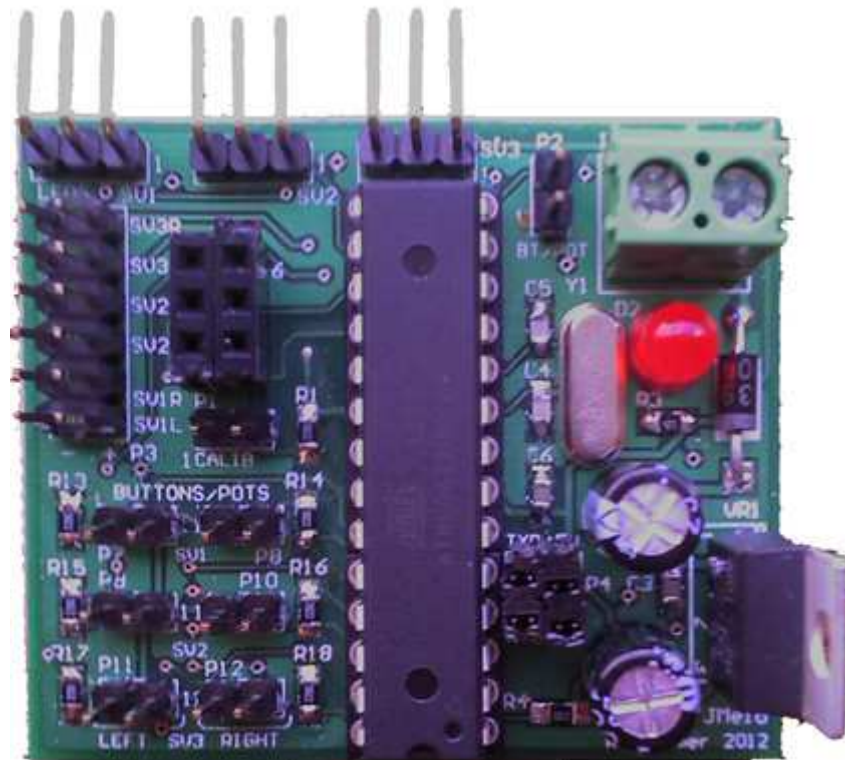
User Manual

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Índex

Introduction

RSTrimmer was designed to fit in any ultralight airplane and act has a 3-axis trimmer.

This way from your cockpit you can trim you rudder, elevator and aileron independently.

This control can be accomplished by the use of six buttons, two for each servo left or right, or by the use of three knobs (potentiometers).

It presents also six LEDs for state indication, two for each servo.

The device has a calibration mode, where you can calibrate the led's with a custom servo center position.

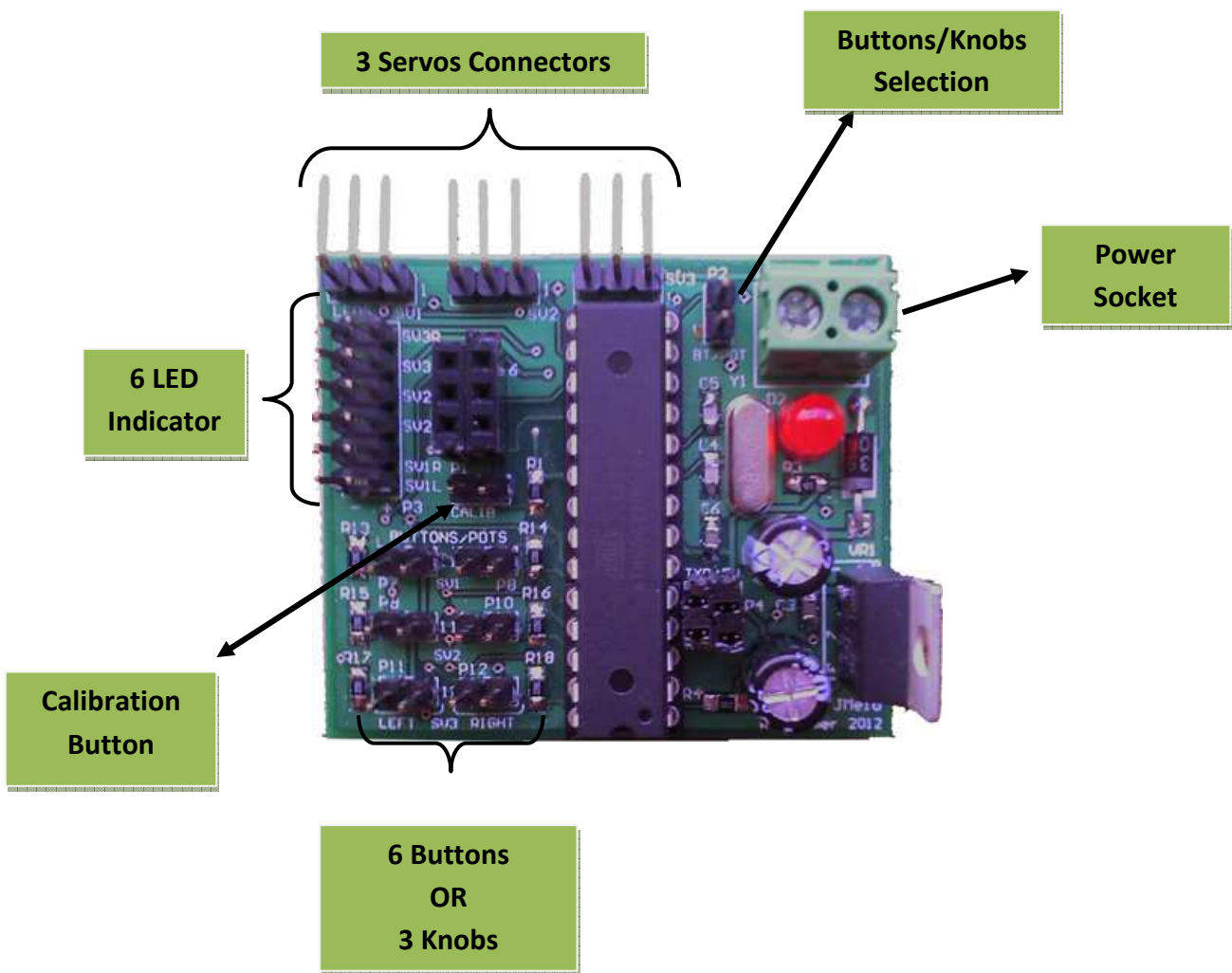You can also save a predefined position for the servos at power up.

It has really low consumption, in the order of 40mA in idle state.

Overview

Package Contents:

2xRed LEDs
3xPressure Buttons
1x Knob
1xRSTrimmer Board

RSTrimmer Board

Connectors

Except for the power socket, all connection to RSTrimmer are made via female headers with 2.54mm pitch, 3-Way Female Headers for the servos, and 2-Way Female Headers for knobs and buttons.

Definitions

For this guide purpose and as an example we are assuming that we are using all the 3 Servos and they are positioned in the aircraft as…
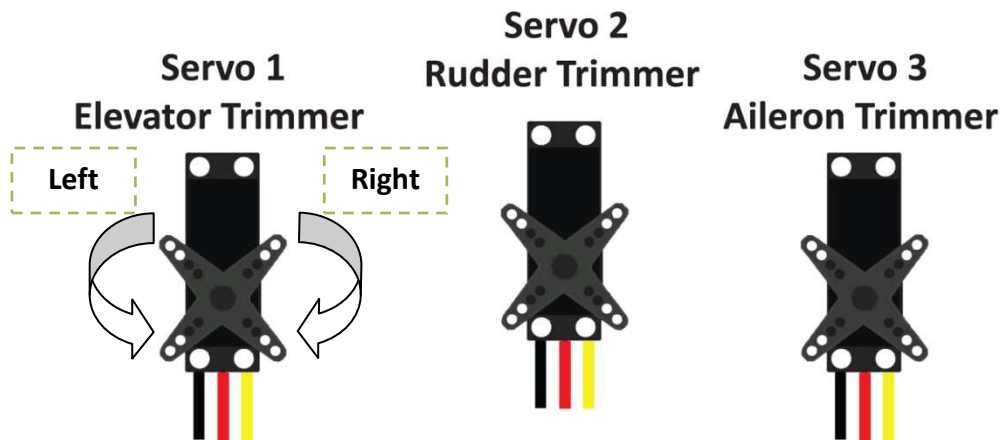
We are also assuming that when left and right button are pushed, the movements happen as the ones described in picture.

With this information, and with previous knowledge of how the servo is going to be positioned, we can match a button, to a servo movement, to a trimmer movement and also to a LED indicator.

Notice that Servo 1 is placed on the elevator, and the movements are described as left and right, it doesn't make sense, they should be up or down. This is way it's up to you to do the match depending on how you are going to install the servo.

Later, when installing RSTrimmer remember to define a left and right, it's better to use the buttons for reference, and change the servo orientation, this way you know how the servo will react to each one of the buttons, and witch of the LEDs represent left or right, possibly meaning to you up or down. This way you will know how to better position your buttons, and also how to position your LED indicators.

An example of 3-Axis full control using RSTrimmer with 3 buttons or 3 knobs is described in the next chapter.
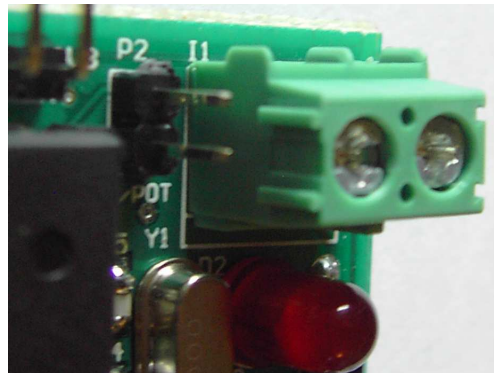
Installation

Operation Modes

To start installing RSTrimmer you need to define first what kind of control you want to use, this is done by opening or closing a header P2.
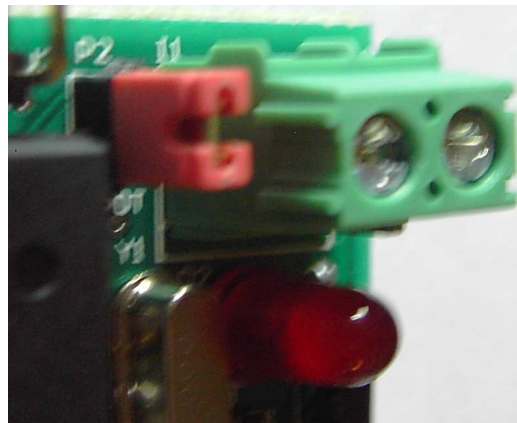
You can find it right beside the power socket and use a commonly called jumper if you need to close the circuit.

By leaving the header open, RSTrimmer starts in Button Mode.

This means you have to use buttons connected as described in "Buttons Configuration" chapter.

By placing a jumper on P2, RSTrimmer starts in Knob Mode.

This means you have to use knobs connected as described in "Knobs Configuration" chapter.

It's not mandatory to use all the 6 buttons/3 knobs and 3 servos configuration! Use from 1 to 3 servos in what order you need, as long as you associate the correct buttons/knobs to the correct servos.

If you are not using a servo output and a pair of buttons, just leave the headers disconnected.

If you decided for knobs skip "Buttons Configuration" and read "Knobs Configuration".
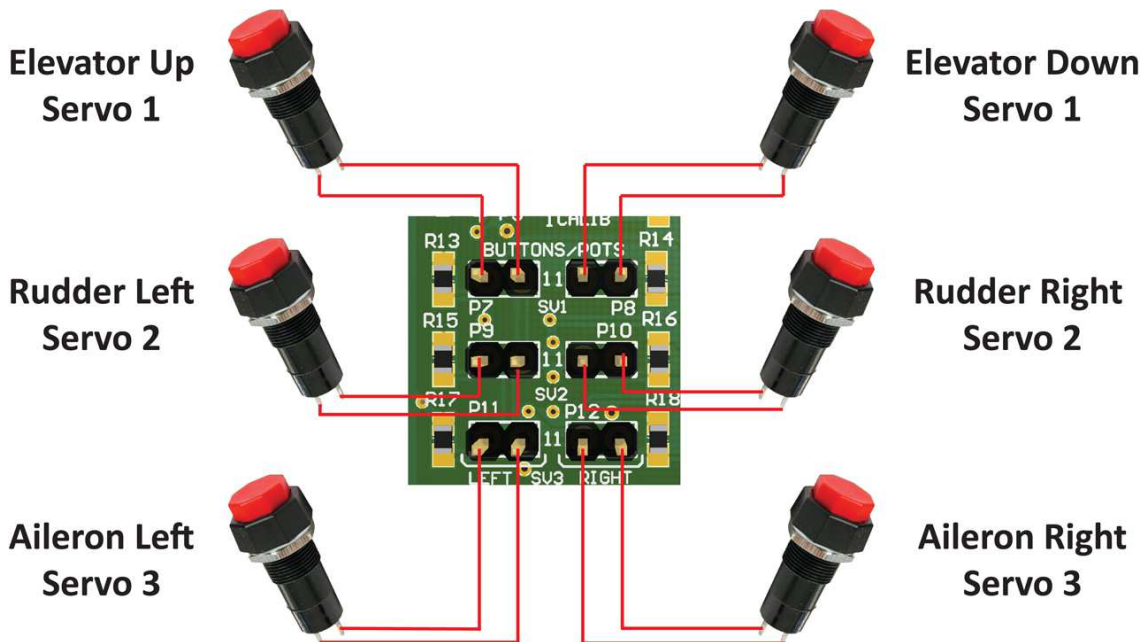
Buttons Configuration

If you are using the Button Mode you will have to connect two buttons to control each servo. This is done in the header's P7 to P12.
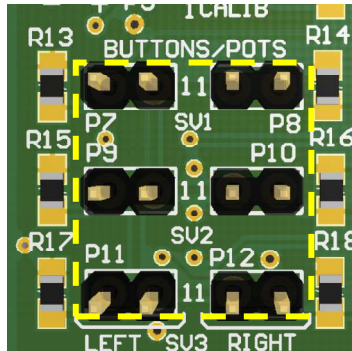
|		
Servo 1 Buttons	P7-Left	P8-Right
Servo 2 Buttons	P9-Left	P10-Right
Servo 3 Buttons	P11-Left	P12-Right

You can use almost any pushbutton, as long as it has has a normally open contact, and it's SPST (Single pole, single throw).

3-Axis Trimmer Button Mode Control

Knobs Configuration

If you are using the Knob Mode you will have to connect one knob to control each servo. This is done in the header's P7, P9 and P11.
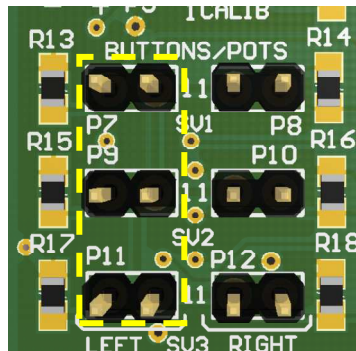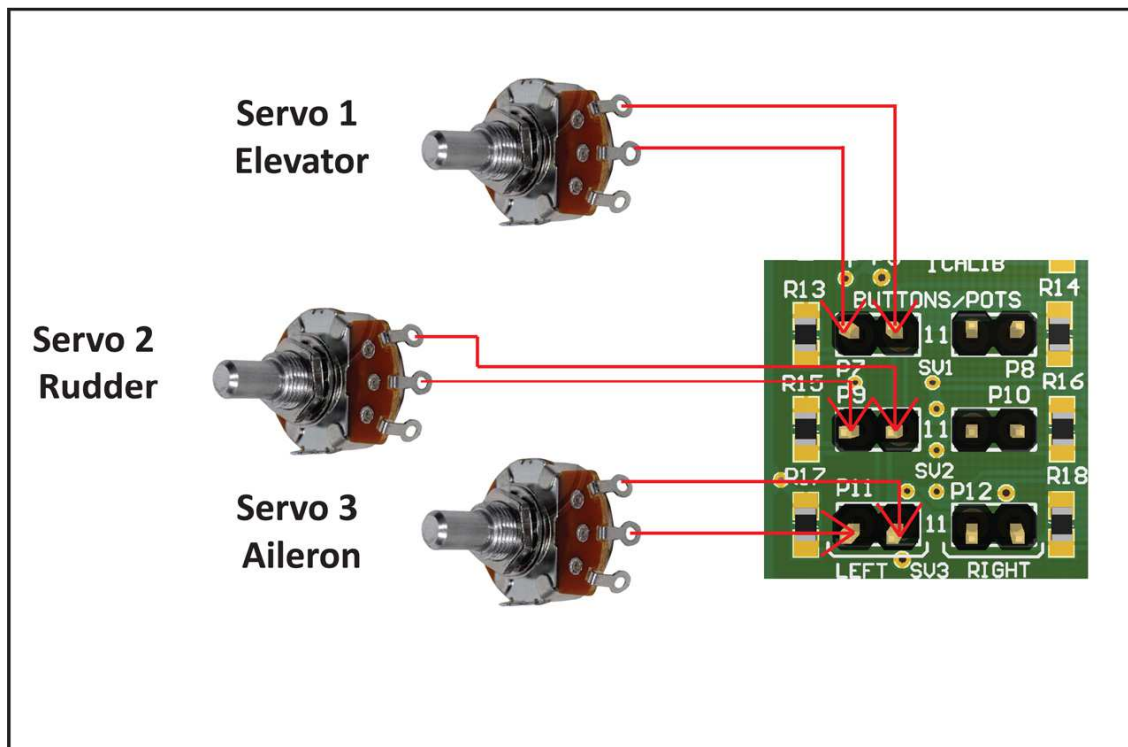

P7 for Servo 1 Knob

P9 for Servo 2 Knob

P11 for Servo 3 Knob

The knob to use must be a potentiometer with 47KΩ value.

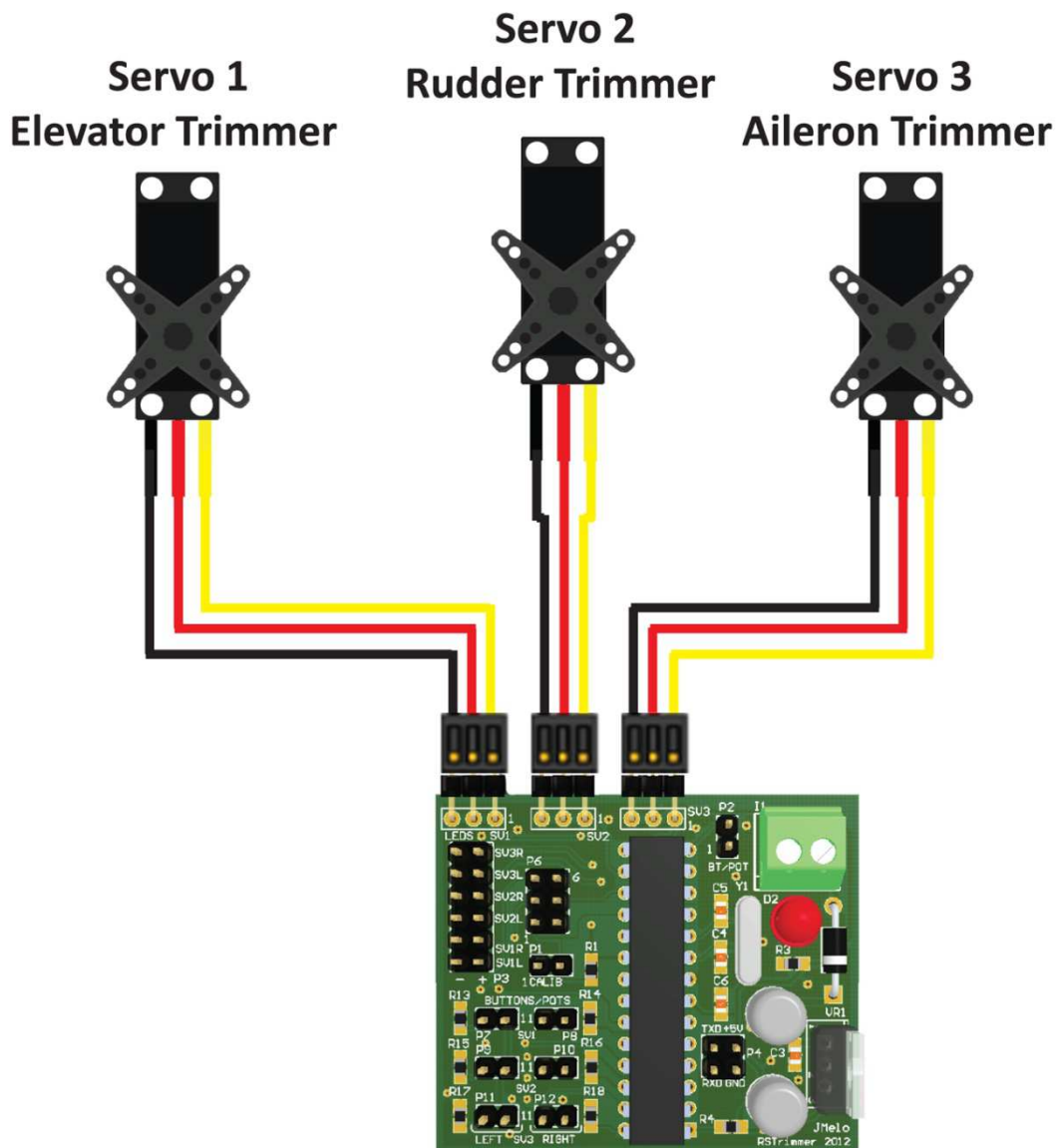*3-Axis Trimmer Knob Mode Control*

Servo Connections

Your Servos should have 3-colored wires, two of them for power, red and black, and a third one usually yellow or white for signal.

Connect them as described below.

Servo 1- Connects to Header **SV1** on board

Servo 2- Connects to Header **SV2** on board

Servo 3- Connects to Header **SV3** on board

LED Indicators

The LEDs need to be connected to header P3.

The left pins of the header are all ground, and must be connected to the negative pin, '**-**', of the LEDs.

On the right pins are the signals to each LED and they are labeled as SV1R, SV1L, SV2R, SV2L, SV3R and SV3L. So on the right side pins replace SVXX for number of servo and movement direction, and you can find witch LED belongs to witch servo.

On the picture below, only the servo 1 indicators are connected, this is so you can understand how to connect the LEDs, but you must wire as many pair of LEDs as servos you are using, in this case, all of them.
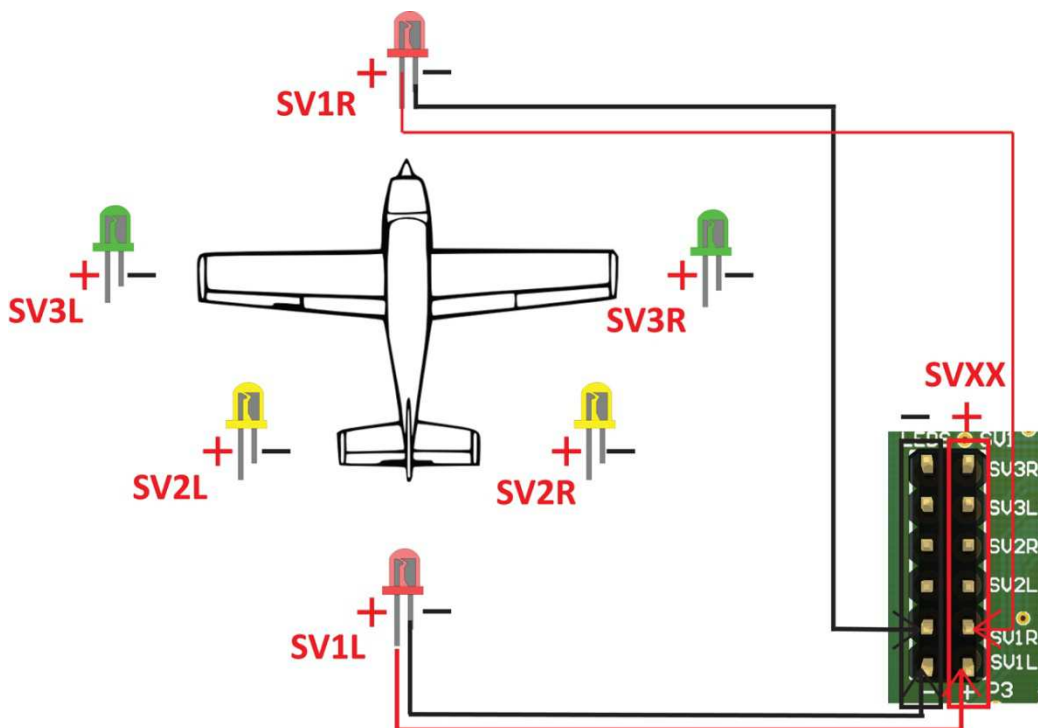
RSTrimmer starts with default center position for each servo. If you move the Servo 1 to the left, and you cross beyond the center position, the LED SV1L will light up, and SV1R will go off. This also works the other way around, if you cross the center to the right, the LED SV1R will light up, and SV1L will go off. If you hit the center both of the LEDs will light up.

Since we don't know exactly how we are going to install the servos, using the calibration button you can change this default center in order for your LEDs to really represent the physical center of your trimmer.
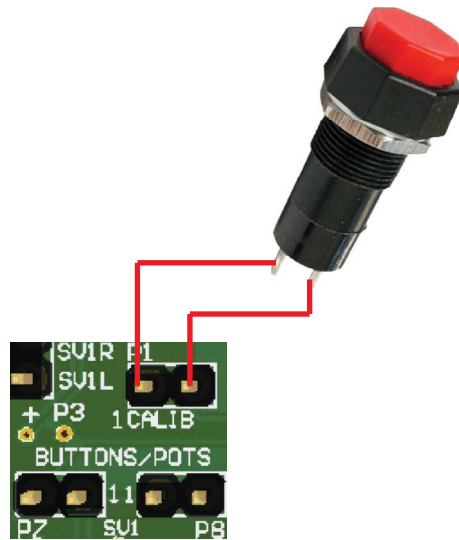
Calibration Button

Also, when you are in flight you may need to trim the plane to your needs and then put all indicators in center.

Another useful resource is the ability to save an initial state position, this way at startup the servos will, independently of what position they are in, return to your own predefined state.

For this an extra button is required, this button in combination with the servo control buttons or knobs make these features possible.
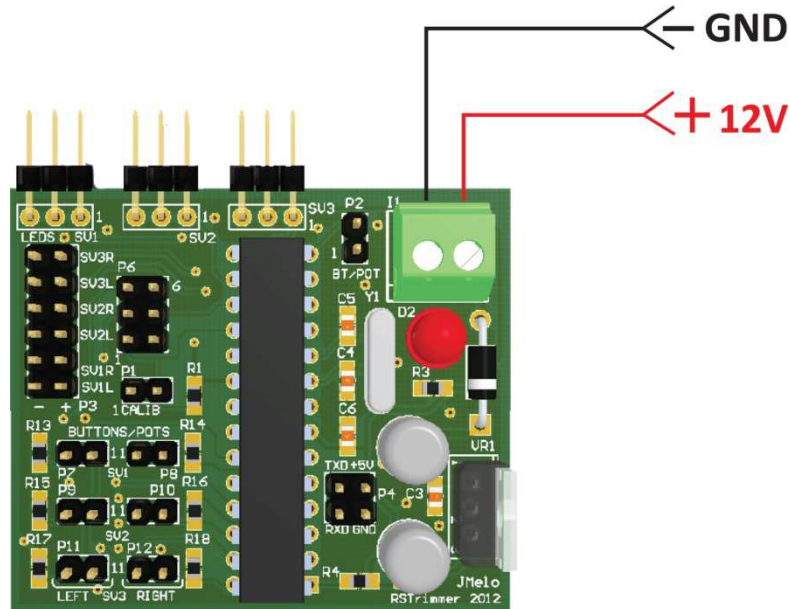
The connection is also done by a pushbutton, like the ones specified in "Buttons Configurations", but it's made on header P1, just on top of the Control Buttons.

Center Calibration	Save Initial Position(Button Mode)
1- Press the calibration button for 8 seconds, 2- After 8 seconds the LEDs blink 2 times, 3- When they stop blinking release the calibration button, 4- All LEDs light up, 5- Adjust servos to new center, 6- Press calibration button at least for 2 seconds, 7- LED Animation Starts, 8- Release calibration button, 9- New centers defined.	1- Move servos to new initial position, 2- Press and hold the calibration button 3- Immediately after, press and hold any other control Button 4- LED Animation Starts, 5- Release both buttons, 6- New initial position defined. **Save Initial Position(Knobs Mode)** 1- Move servos to new initial position, 2- Press and hold the calibration button 3- Immediately after, rotate any knob at full Left or Right and 4- LED Animation Starts, 5- Release button a center the knob, 6- New initial position defined.

Power

To power your RSTrimmer board you will need a DC power source.

Input Voltage: 7-16Vdc

Recommended Input Voltage: 12Vdc

Minimum consumption: ~40mA

Absolute Maximum consumption: 900mA

Servo Voltage: 4.8Vdc~5Vdc

If you install it on your airplane, connect the power lines after your kill switch, this way the system is turned on/off with the airplane.

If you want to test your RSTrimmer board, use any AC-DC converter available that can output at 7 to 12Vdc.

Remember to follow the order of installation provided by this manual and leave the power connection to the end.
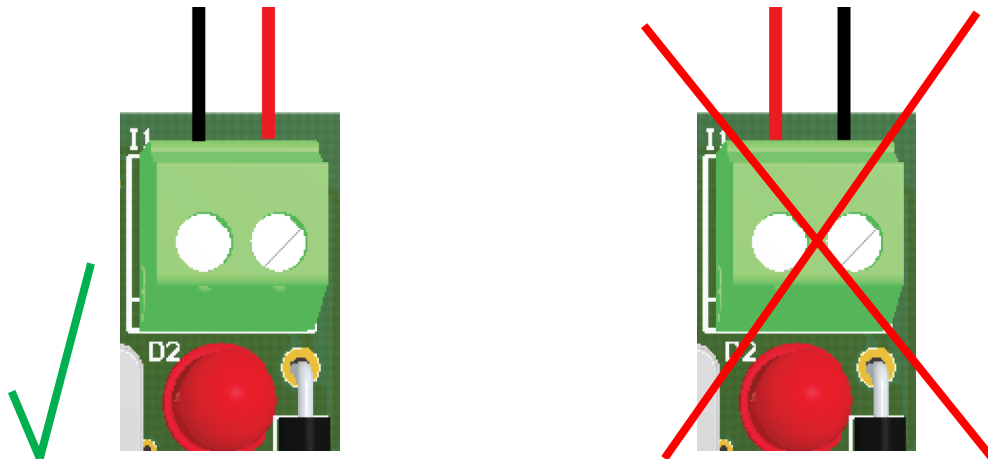
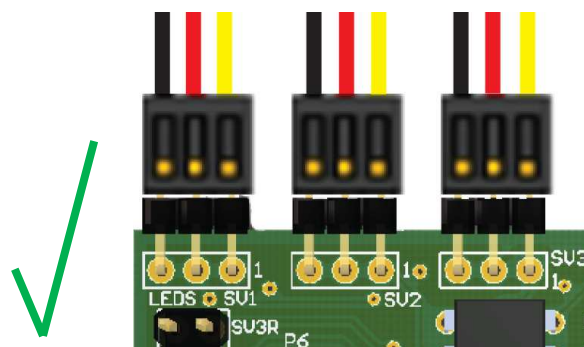If the power connection is correct, the red LED on the board should light up.

Cautions

Do not cover the power integrated circuit on the edge of the board, if possible place a heat sink on it.

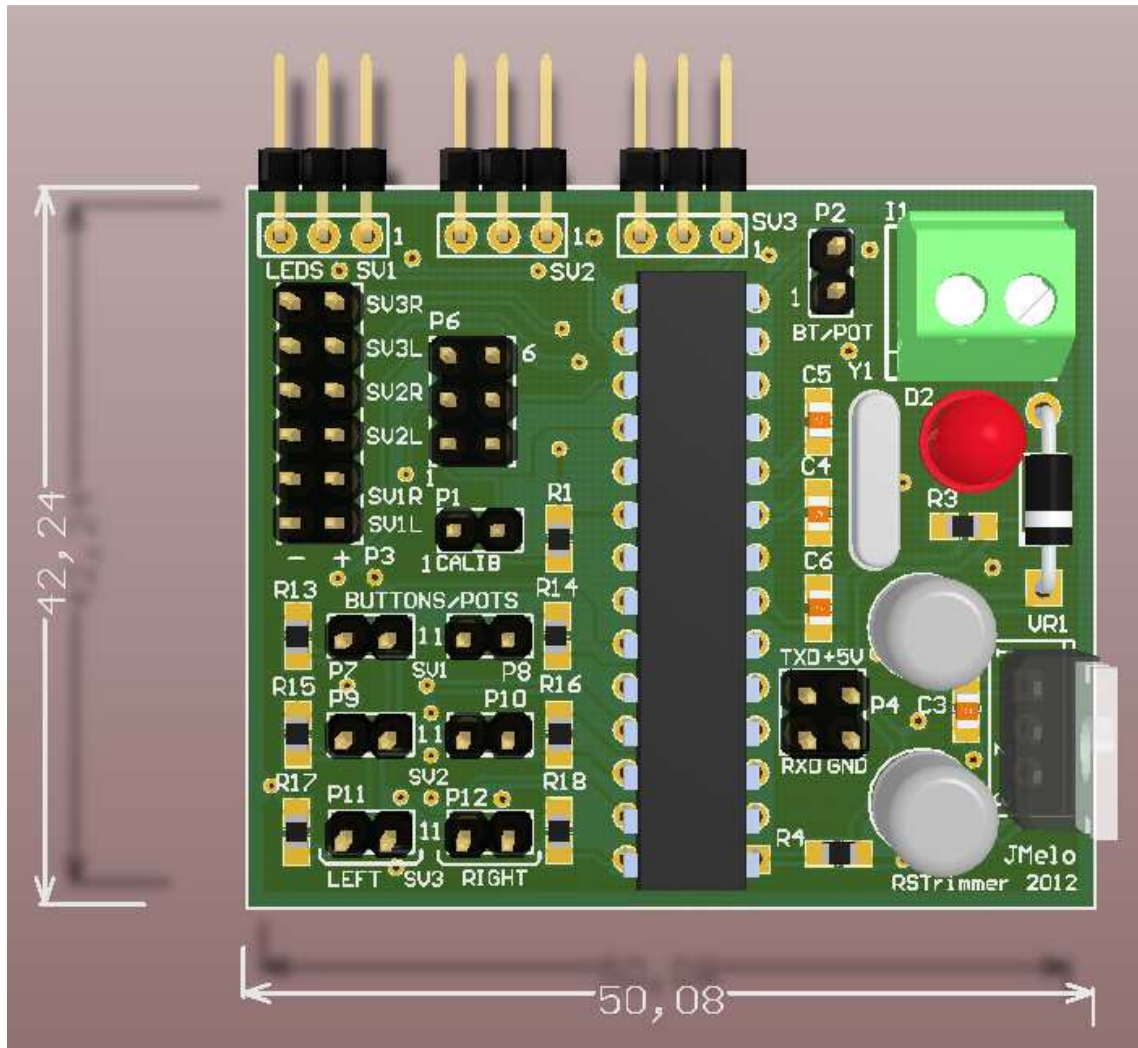Don't ever switch polarities in the power socket, this can send your RSTrimmer directly to the recycle bin!

Don't ever switch polarities on the servos!

Mechanicals

Dimensions: 50x42mm

Weight: ~20g

Installation Appendix

3-Axis Control Button Mode

Servo Connections

Servo 1
Elevator Trimmer

Servo 2
Rudder Trimmer

Servo 3
Aileron Trimmer

GND

12V

P2 Open

Position Indicator Connections

SV1R

SV3L

SV3R

SV2L

SV2R

SV1L

SVXX

Button Mode Connections

Elevator Up
Servo 1

Elevator Down
Servo 1

Rudder Left
Servo 2

Rudder Right
Servo 2

Aileron Left
Servo 3

Aileron Right
Servo 3

R13

R14

R15

R16

R17

R18

P7

P8

P9

P10

P11

P12

BUTTONS/POTS

SV1

SV2

SV3

LEFT   RIGHT

Calibration
Button

3-Axis Control Knob Mode

Position Indicator Connections

SV1R
SV3L
SV3R
SV2L
SV2R
SV1L
SVXX

Servo Connections

Servo 1
Elevator Trimmer

Servo 2
Rudder Trimmer

Servo 3
Aileron Trimmer

GND
12V
P2 Closed

Calibration Button

Knob Mode Connections

Servo 1
Elevator

Servo 2
Rudder

Servo 3
Aileron