



# Instructions for building an ACL

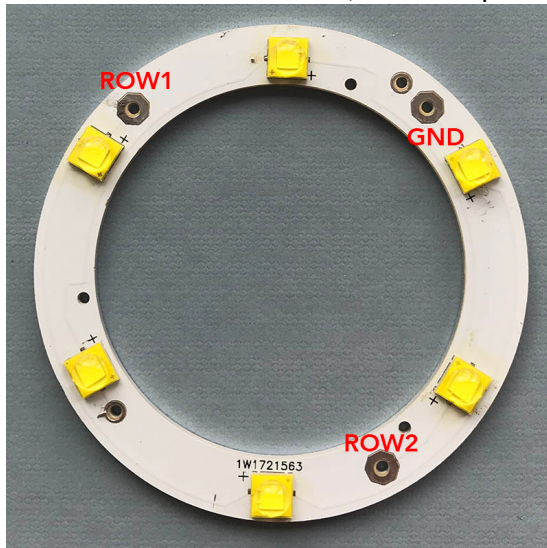
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## I. General

The ring LED has two small Phillips screws. These have the function of connecting the aluminum circuit board to GND. Please do not use this to attach the circuit board. The three small holes offset by 120 ° are provided for this purpose. These can of course be enlarged a little if necessary.

The ring LED should be labeled on the back. Unfortunately this was neglected during production. But this also has the advantage that the heat can be better dissipated from the board. Therefore, here is a photo of which contact has which function.



Three LEDs are always connected in a row. Together they have a luminosity of approx. 5000lm, are supplied with 10.7 V and require 5A. With the standard flash program, the power consumption of one row of LEDs corresponds to a continuous load of approx. 2.7W. In tests, the circuit boards were heated to approx. 65 ° C. Provides good ventilation and prevents heat build-up. If you're not sure, do careful tests. It is essential to avoid heat on our aircraft!

## II. Prepare the PCBs

1. There are two options for connecting the LEDs:
  - If you want to be able to decide at any time whether one or both rows of LEDs should flash, then solder 3 cables with a cross-section of 1mm<sup>2</sup> to the circuit boards
  - Basically all LEDs should flash, then only solder 2 cables with a cross section of 1mm<sup>2</sup> to GND and ROW1 and solder a bridge between ROW1 and ROW2
2. To do this, feed the cables into the holes from behind
3. Make sure that the cable insulation almost reaches the top. Otherwise there is a risk that the cable will come into contact with the aluminum circuit board. This leads to a short circuit.
4. Checks with a multimeter whether there is no solder connection other than GND connected to the aluminum circuit board

### III. Installation

1. Lay the cables in your aircraft to the point where the control board is to be installed.
2. Make sure that the cables cannot be frayed
3. There are different ways to let the LEDs flash:
  - a) All LEDs
  - b) Only one row, i.e. 3 LEDs
  - c) One row, the second can be switched on if necessary. For example, you fly by default with 5000lm flashlight in all directions in order to save some electricity. In some situations, e.g. close to airports, you double the output to 10000lm in order to be seen better.
4. With variant a) you connect the two cables of a board to a contact pair of the 8-pin connector on the control board. There must be a bridge between ROW1 and ROW2 on the LED board.
5. With variant b) you connect GND and a row of LEDs on the board to a contact pair of the 8-pin connector on the control board.
6. In variant c), cables are soldered to GND, ROW1 and ROW2 on the LED circuit board. A cable must lead the set voltage from the constant current source to a toggle switch in the instrument panel. The voltage is fed back from the toggle switch to the point where the control board of the ACL is installed. From each flasher, the wires soldered to ROW2 are connected to the one coming from the toggle switch.

### IV. Programming the ATTiny2313

1. Connect the programmer to the ACL with the cable
2. Connect the Arduino Nano to the PC using the mini USB cable
3. Install the following board library: <https://github.com/SpenceKonde/ATTinyCore>
4. Set the following under tools:
  - Board: ATTiny 2313/4313
  - Chip: ATTiny2313
  - Clock: 8 MHz (internal)
  - B.O.D. Level: B.O.D. Enabled (4,3V)
  - Save EEPROM: EEPROM retained
  - Initialize Secondary timer : no
  - LTO (1.6.11 + only): Enabled
  - tinyNeoPixel Port: Port A (pins 2,3,17)
  - millis()/micros(): Enabled
  - Port: den auswählen, der neu hinzu kam
  - Programmer: Arduino as ISP (ATTinyCore)
5. Burn the bootloader first
6. Open the sketch program ACL.ino and upload it

## **V. Arduino Nano V3 under Windows**

The Arduino Nano V3 is most likely not recognized by Windows and is then available as a port in the Arduino IDE. You have to install the driver afterwards.

1. Download the driver here and then unzip it:  
<https://www.youtube.com/watch?v=SPdSKT6KdF8>
2. Start the device manager and connect the Arduino to the USB port
3. under "Other devices" a new device appears that is not correctly recognized (probably something with USB UART)
4. Right click on the device and select "Properties"
5. click on "Driver" and then on "Update Driver"
6. Click on "Search for a driver on my computer" and then click on "Select from a list"
7. Then select "Show all devices", "Next", then on "Disk" and finally click on "Browse"
8. Go to the unzipped folder and select the file "ftdibus.inf", click "Open" and "OK"
9. Select "USB Serial Converter", click "Next", "Yes", "Close", "Close"
10. A USB serial port is now displayed under "Other devices"
11. Right click again, "Properties"
12. Click on "Driver" and then on "Update Driver"
13. Click on "Search my computer for a driver" and then click on "Select from a list"
14. Then select "Show all devices", "Next", then click on "Disk" and finally click on "Browse"
15. Go to the unzipped folder and select the file "ftdiport.inf", click "Open" and "OK"
16. Select "USB Serial Port", click "Next", "Yes", "Close", "Close"
17. A new serial port is now displayed in the device manager. Make a note of the interface, e.g. COM9. You can now find it under the in the Arduino IDE

## **VI. Adjusting the flashing frequency**

1. Open the sketch Programm-ACL.ino with Arduino DIE and edit it as follows:
2. Adjust the values in lines 13-15
3. In line 13 you set which connections you want to use for the LEDs and at the same time determine how many of the LED channels you want to use. A maximum of 4 channels are supported.
4. The lighting time of the LED is set in line 14. Default is 25ms
5. The pauses are set in line 15. Default are 800, 500 and 200ms

## **VII. Pin assignment of the 8-pin screw connector**

- 1: 12V
- 2: GND ACL 1
- 3: 12V
- 4: GND ACL 2
- 5: 12V
- 6: GND ACL 3

7: 12V

8: GND ACL 4

### **VIII. Disclaimer**

The ACL is not EASA or FAA certified.

If you want to know whether you can legally use this ACL in your glider, contact your examiner. Discuss with your examiner before installation. Clarify with him the subject of the temperature of the LED circuit board in use and choose a good installation location together!

This ACL is a craft project and not an aviation-approved device. I expressly point out that use is at your own risk, excluding any warranty!