



Instructions for building an ACL

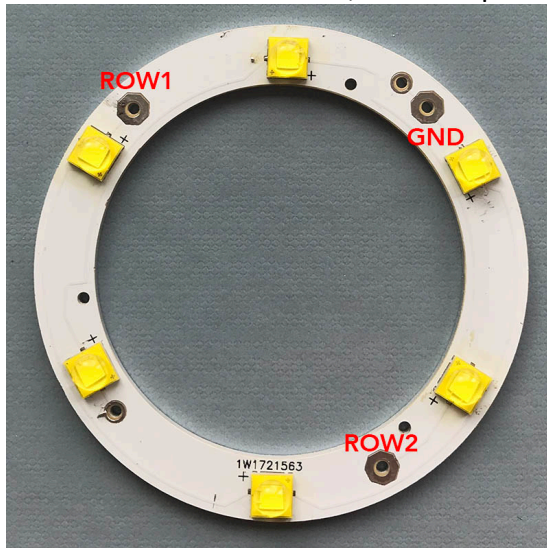
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I. General

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 1mm² to the circuit boards
 - Basically all LEDs should flash, then only solder 2 cables with a cross section of 1mm² 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. With variant c) you have to connect the cables from ROW1 and ROW2 to a cable via a soldered connector or a clamp connector, which is then connected to a contact pair of the 8-pin connector on the control board. The cable of the switchable LED row is pinched and led over a contact pair of a relay. Make sure that the relay is designed for at least 5A! The coil of the relay is connected to 12V via a switch. If the coil is not supplied with 12V, the contact pair is open and the LED row does not flash. So you only flash with 3 LEDs. If you close the switch, the relay picks up and the second row of LEDs also flashes. Use a separate relay for each LED board, which are all supplied with 12V from the same switch, or alternatively use a relay that has several contact pairs.

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 program ACL.ino and edit it as follows:
2. Adjust the values in lines 16-20
3. in line 16 you can set how many of the LED channels you want to use
4. In line 17 the lighting times of the LED are set. The standard is 25ms
5. The pauses are set in lines 18, 19 and 20. The standard 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!