Open Panzer TCB - Bootloader & Firmware Instructions

Product Profile

The Open Panzer Tank Control Board (TCB) is a micro-controller board based on the ATmega2560 processor. It is used to control RC models, specifically RC tanks. Although it is Arduino-compatible we use a custom bootloader to provide additional functionality.

General test procedure

1) Flash custom bootloader, verify success by observing onboard LED.
2) Flash firmware, verify functionality by observing onboard LEDs.

3. Tools

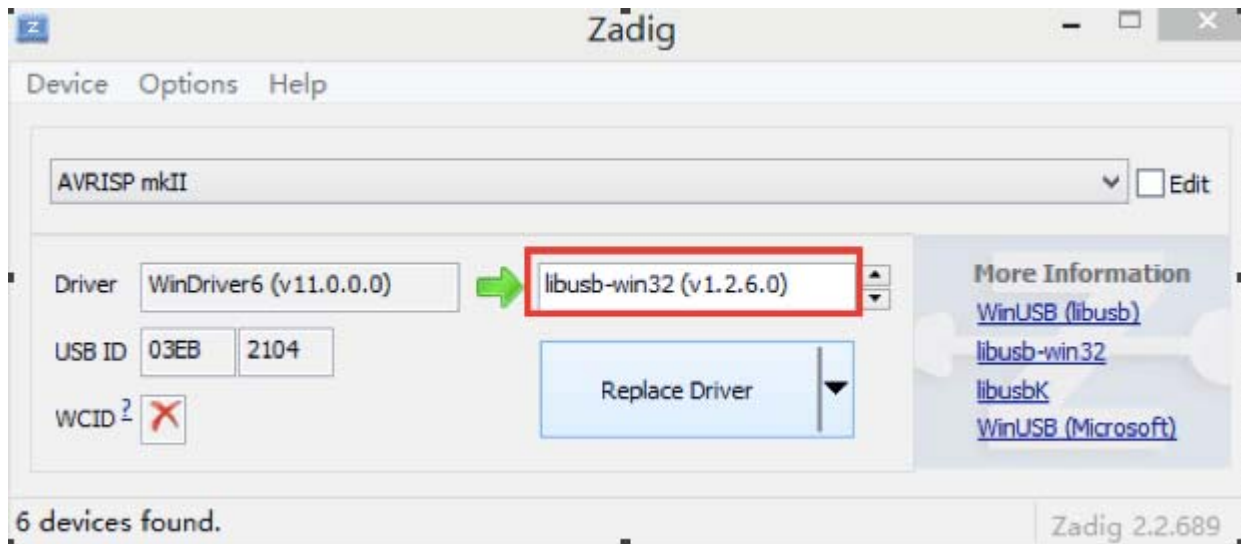| Items	Device and tools	Qty	Comment
1	Computer	1	Running Windows system
2	USB Micro-B Cable, **OR** 6-16 volt battery/power supply with 2-pin JST-XH plug	1	You can either use USB or a battery/power supply to turn on the TCB (not to exceed 16 volts). USB is via Micro-B cable. Battery/DC power supply requires a 2-pin JST-XH plug.
3	AVIRSP mkII **OR** USBasp	1	Flash bootloader
4	ISP Pogo adapter	1	For example the SparkFun ISP Pogo Adapter or similar, used to flash bootloader
5	5 volt FTDI Adapter	1	Optional, can make flashing firmware faster than through ISP. For example, Adafruit FTDI Friend, SparkFun FTDI Basic Breakout 5V, or similar
6	USB Mini B cable	1	If using the optional FTDI adapter, this cable will be required.

Items	Software tools	Description
1	[Zadig](#)	Install generic USB drivers
2	[OP Config](#)	Uploading firmware HEX file

Program files Included
1) avrdude.exe   (flash bootloader)
2) avrdude.conf   (flash bootloader)
3) optcb2560_boot.hex   (bootloader hex)
3) bootloader_batch_script.bat   (batch file to automate bootloader flash)

Flash Bootloader Procedure

1) Connect Flash Programmer (AVRISP mkII *or* USBasp) to PC
2) Run Zadig, select your Flash Programmer (AVRISP mkII or USBasp)
3) Install or Replace driver to libusb-win32
4) **NOTE –** if you encounter problems with flashing, you can also try libusbK driver

5) Open `"bootloader_batch_script.bat"` file with a text editor such as Notepad. There are four settings you need to confirm – the location of avrdude.exe, avrdude.conf, and optcb2560_boot.hex, and also the type of programmer you are using (AVRISP mkII or USBasp). These sections are clearly marked in the file. Make any adjustments necessary for your environment then save and close the batch file.
6) Power the TCB either with a Micro-B USB cable or with a battery/DC power supply using a 2-pin JST-XH plugged into the BATT terminal of the TCB.
7) Connect the TCB to the Flash Programmer (AVRISP mkII or USBasp) using the 6-pin ISP Pogo Adapter.
8) Run `"bootloader_batch_script.bat"` file. This screenshot on the next page should be the result.
9) You can also confirm successful bootloader install by observing the board. The **red** LED will be flashing very slowly (once per second).

Successful Bootloader flash


```
 Administrator: Flash Bootloader                                      _ □ ✕

                Programmer Type : usbasp
                Description     : USBasp, http://www.fischl.de/usbasp/

avrdude.exe: auto set sck period (because given equals null)
avrdude.exe: warning: cannot set sck period. please check for usbasp firmware up
date.
avrdude.exe: AVR device initialized and ready to accept instructions

Reading | ################################################## | 100% 0.02s

avrdude.exe: Device signature = 0x1e9801
avrdude.exe: safemode: lfuse reads as F7
avrdude.exe: safemode: hfuse reads as DA
avrdude.exe: safemode: efuse reads as FD
avrdude.exe: NOTE: "flash" memory has been specified, an erase cycle will be per
formed
             To disable this feature, specify the -D option.
avrdude.exe: erasing chip
avrdude.exe: auto set sck period (because given equals null)
avrdude.exe: warning: cannot set sck period. please check for usbasp firmware up
date.
avrdude.exe: reading input file "C:\openpanzer_boot\optcb2560_boot.hex"
avrdude.exe: writing flash (260346 bytes):

Writing | ################################################## | 100% 0.06s

avrdude.exe: 260346 bytes of flash written
avrdude.exe: verifying flash memory against C:\openpanzer_boot\optcb2560_boot.he
x:
avrdude.exe: load data flash data from input file C:\openpanzer_boot\optcb2560_b
oot.hex:
avrdude.exe: input file C:\openpanzer_boot\optcb2560_boot.hex contains 260346 by
tes
avrdude.exe: reading on-chip flash data:

Reading | ################################################## | 100% 0.05s

avrdude.exe: verifying ...
avrdude.exe: 260346 bytes of flash verified
avrdude.exe: reading input file "0x0F"
avrdude.exe: writing lock (1 bytes):

Writing | ################################################## | 100% 0.01s

avrdude.exe: 1 bytes of lock written
avrdude.exe: verifying lock memory against 0x0F:
avrdude.exe: load data lock data from input file 0x0F:
avrdude.exe: input file 0x0F contains 1 bytes
avrdude.exe: reading on-chip lock data:

Reading | ################################################## | 100% 0.01s

avrdude.exe: verifying ...
avrdude.exe: 1 bytes of lock verified

avrdude.exe: safemode: lfuse reads as F7
avrdude.exe: safemode: hfuse reads as DA
avrdude.exe: safemode: efuse reads as FD
avrdude.exe: safemode: Fuses OK (H:FD, E:DA, L:F7)

avrdude.exe done.  Thank you.


C:\openpanzer_boot>_
```
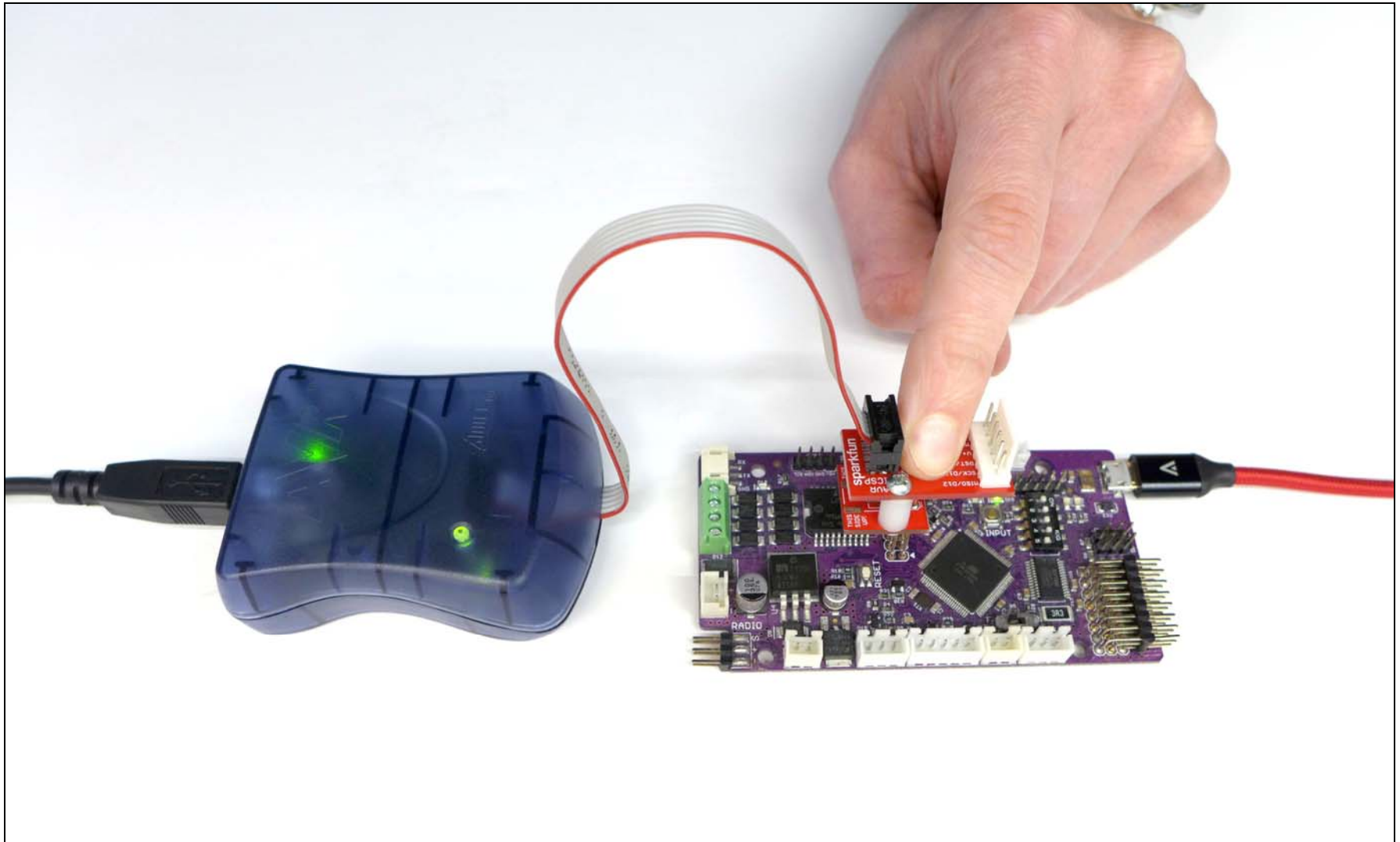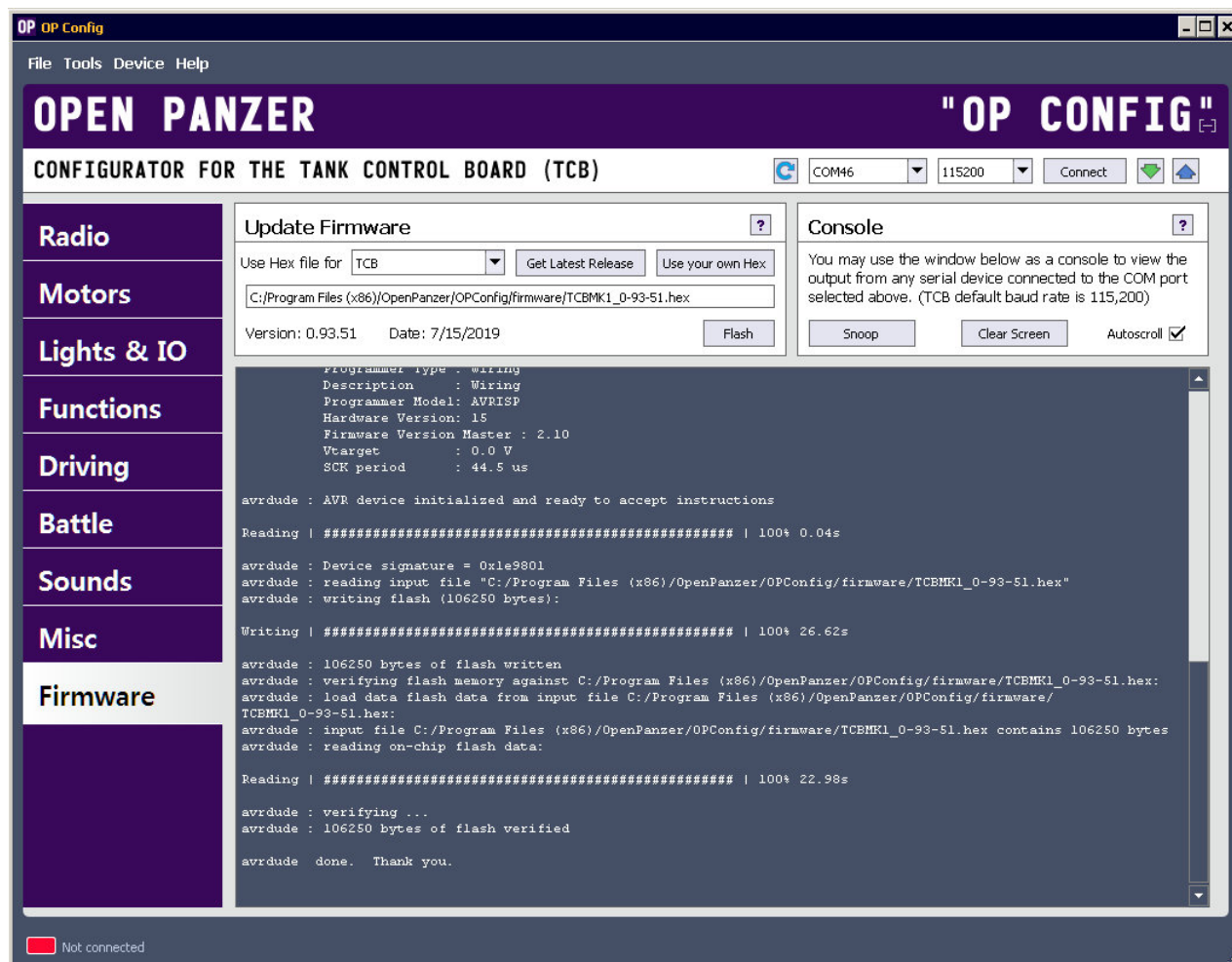
Flashing bootloader with AVRISP mkII and SparkFun ISP Pogo Adapter

Flash Firmware Procedure

1) Next flash the latest TCB firmware. Load the OP Config program and go to Firmware tab. The "Use Hex file for:" list should already be set to "TCB" (*not* "TCB – DIY Version"!)
2) Click the "Get Latest Release" button and latest firmware will be downloaded. Now you can click the "Flash" button to load the firmware on to the board.
3) There are two ways to load the firmware – first, you can connect the board directly to your computer with the Micro-B USB cable (make sure dipswitch #5 on the TCB is in the "ON" position). However this will create hundreds of COM Ports if you are updating hundreds of boards, and Windows will install a driver for each one which will take a long time.
4) The faster alternative method is to use the FTDI Friend adapter. This require you to create only a single COM port once. On the TCB, make sure dipswitch #5 is in the "OFF" position (meaning it will accept serial commands from the alternate input). Now plug the FTDI Friend into the "SER. 1" connector on the TCB. Make sure to match "black" and "green" on FTDI and TCB connectors so polarity is correct. The FTDI Friend will both provide power to the board and permit flashing. Now you can Flash firmware from OP Config as described above.

5) If firmware flash is successful you will see the results shown above. You can also confirm by looking at the board. The **red** and **green** LEDs will be flashing in alternating pattern very quickly. The **blue** LED will be flashing at medium rate.

Using the FTDI Friend to flash firmware

TCB Board Layout

USB/Power - Use to provide power during bootloader flash
ISP   - Use pogo adapter to flash bootloader
Red LED   - Will flash slowly (once per second) after bootloader flash

SERIAL 1   - Use FTDI Friend to flash firmware
Dipswitch - Position #5 must be in "OFF" position to be able to flash with SERIAL 1
Red/Green - Will flash alternating very fast after firmware flash
Blue LED   - Will flash medium after firmware flash