Flashing the bootloader and the firmware

Bootloader

The keyboard uses an ATmega328p-AU and you must flash the bootloader before you can flash the firmware. There are many tutorials on how to do that.

If you have an Arduino UNO and the Arduino IDE, you can try to flash the bootloader directly on the keyboard.

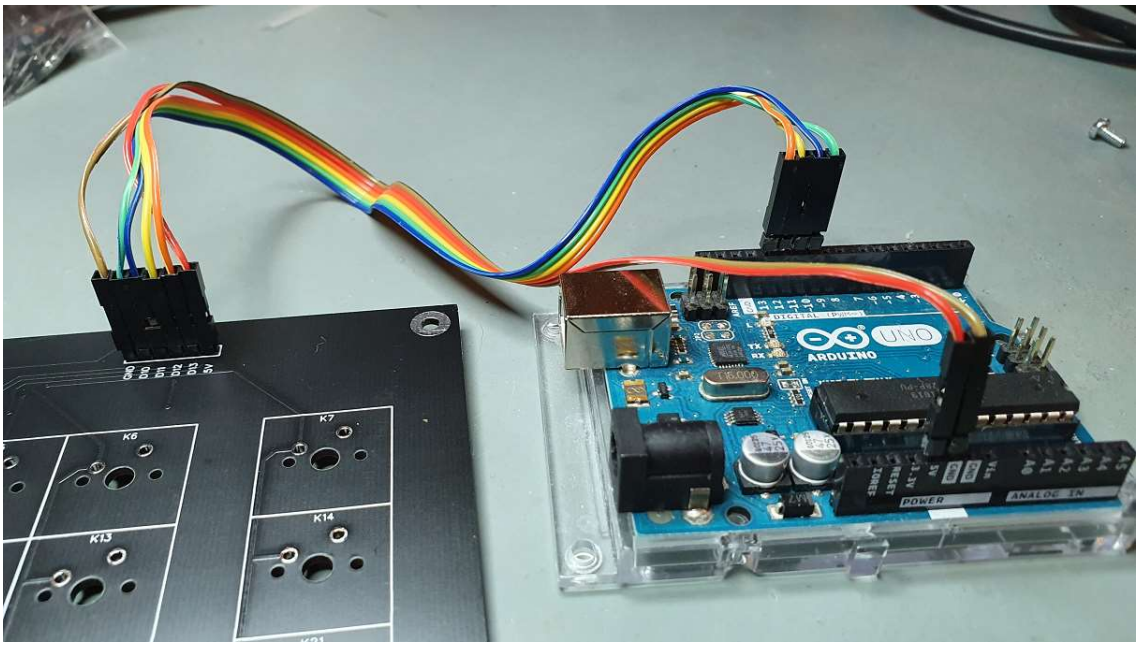
Firmware

I use Visual Studio Code with the PlatformIO extension to edit, compile and flash the firmware.

To flash the firmware, you need a **3.3V** FTDI adapter with the standard pin-out.

Flashing the bootloader for the keyboard controller

Connect the BOOTLOADER header pins to the Arduino UNO (see Silkscreen)



Connect the Arduino UNO to your PC and start the Arduino IDE.

Select the Arduino UNO board:

Tools->Board

Select the com port:

Tools->Port->(your com port)

Open the ArduinoISP example:

File->Examples->11ArduinoISP->ArduinoISP

Upload the sketch to the Arduino UNO

Sketch->Upload

Select the programmer:

Tools->Programmer->Arduino as ISP

Flash the bootloader:

Tools->Burn Bootloader

If everything worked fine, you will see “Done burning bootloader”

Flashing the keyboard firmware

Project folder: Software/Firmware/Keyboard

Power off the calculator and connect the FTDI adapter to the keyboard. Make sure you connect your adapter the correct way around by checking the ground pin (GND).

To compile and flash the keyboard firmware just press the → symbol. The flash process should start automatically.

Flashing the controller firmware

Project folder: Software/Firmware/Controller

Before compiling you must select the display type in the HardwareInfo.h file:

```
// HardwareInfo.h

// Provides information about the hardware

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// Licensed under the MIT License

#pragma once

enum class display_type
{
  undefined,
  in12,
  in16,
  in17,
  b5870
};

//=========================================
// set here your display type
#define DISPLAY_TYPE display_type::undefined
//=========================================

// generates compile time error if display type not set
static_assert(DISPLAY_TYPE == display_type::in12 ||
                  DISPLAY_TYPE == display_type::in16 ||
                  DISPLAY_TYPE == display_type::in17 ||
                  DISPLAY_TYPE == display_type::b5870,
              "Invalid display type!");
```
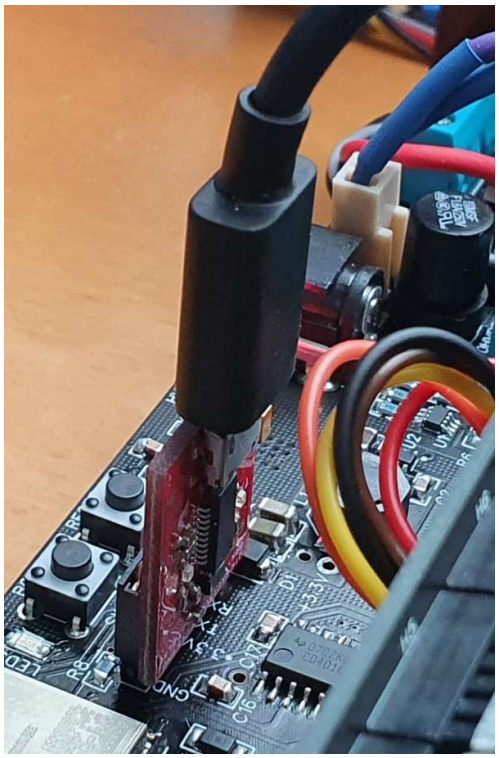
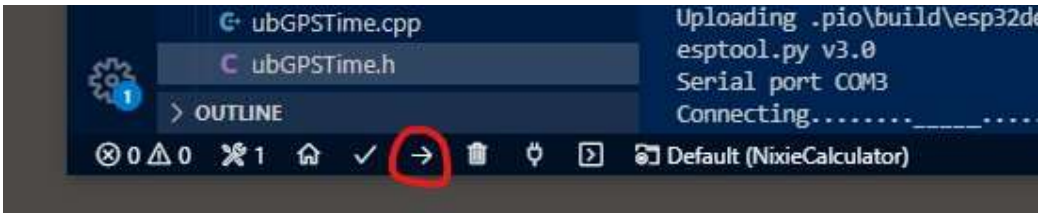

Power off the calculator and connect the FTDI adapter to the controller board. Make sure you connect your adapter the correct way around by checking the ground pin (GND).



To compile and flash the controller firmware, press the → symbol. Once you get the “Connecting…” message, press and hold the “boot” button on the controller board, then press and release the “reset” button and finally release the “boot” button. This should start the flash process.



Check firmware versions

After flashing the controller and the keyboard firmware, **remove the FTDI adapter** and power on the calculator. During start-up, the calculator briefly shows the controller firmware version on the left and the keyboard firmware version on the right.