

# MIRNY CPLD UPDATE MANUAL

## 1. Prerequisites

### 1.1. Hardware

To update Mirny's CPLD firmware one needs to get access to JTAG connector placed on Mirny board which requires partial disassembly of the crate. Mirny+Almazny board is in. Steps how to do it are described later in this document. For now, let's list the hardware needed to perform the update:

- PC with Linux operating system
- Torx T20 screw drive
- a tool to lever enclosure (i.e. slot screw drive)
- USB cable (type A to micro B)
- JTAG HS-3 programmer (included in the package)

### 1.2. Software

Assuming you are working on a Linux machine:

- install [xc3sprog](<https://xc3sprog.sourceforge.net/>)
- it might be needed to load udev rules for the device to be working

## 2. Disassembly

### IMPORTANT

> Before taking any action make sure that the crate is turned off and **NOT** connected to the mains line (or any other power supply).

> Find a place where you can comfortably put the crate and operate on it.

> Note that after disassembling the crate (and **BEST** assembling it back) you'll have to power it up to actually download firmware to CPLD. Bear that in mind while looking for a place to work on the device.

1. Locate small pockets on crate's side panels (as indicated in the Figure 1 with red circles). Gently place slot screw drive in the pocket and lever panel up. You need to repeat this action on crate's both sides.



Figure 1: Side view of assembled crate with pockets indicated

2. Having removed both side panels from the crate, one needs to remove the top. Gently pull apart the sides of the top panel (place your hands around the encircled area shown in the Figure 2) and then pull it upwards. It should easily come off. If it didn't come off easily it's probably due to panel locking on front and back ends of the crate (green circles). If so try to lever panel up there as well.

Putting the panel aside might be restricted by the crate grounding cables. If that's the case just disconnect them (you don't have to unscrew anything here).

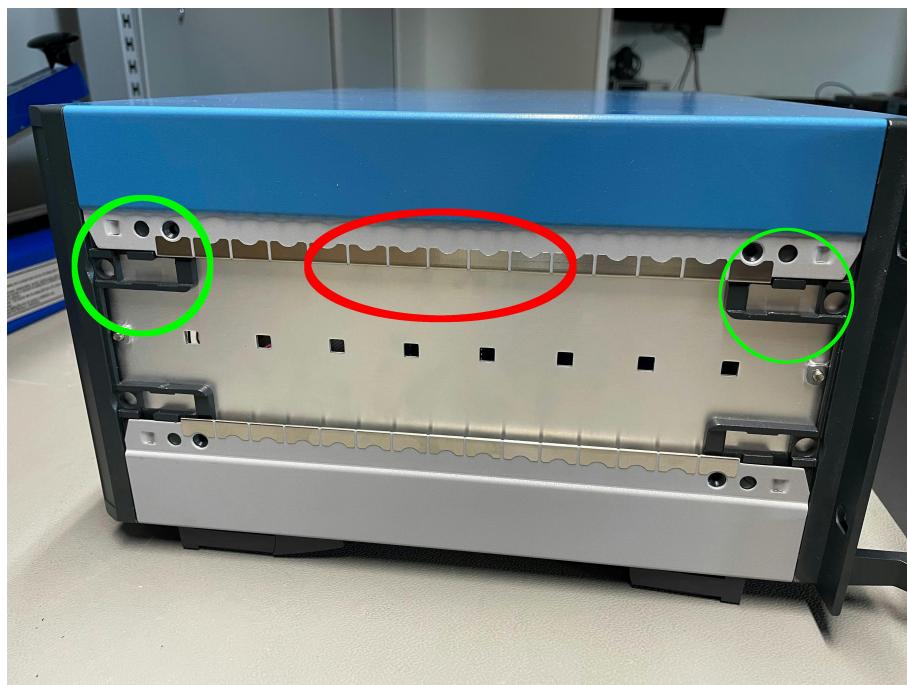


Figure 2: Side view of the crate without side panels

3. Next you have to remove the fan unit. To do so you need to unscrew four screws (2 on each side; shown in the Figure 3). It is going to be sufficient when you just put the unit somewhere on the top of the crate. Please note that there are cables connected to the fan unit so take extra caution when moving it around (and remember that you'll have to power on the crate in the next steps so make sure the cables don't get into the fans). Figure 4 shows the crate with the fan unit mounted and Figure 5 shows the crate with the fan unit moved back (notice that moving it just 5-10 cm back should be enough for you to access the JTAG connector).

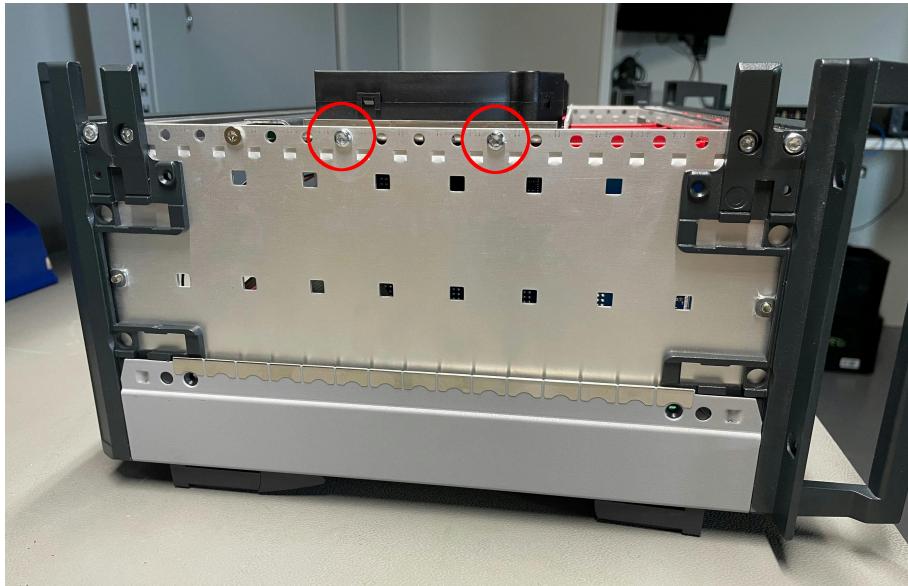


Figure 3: Top view of the crate with fan unit

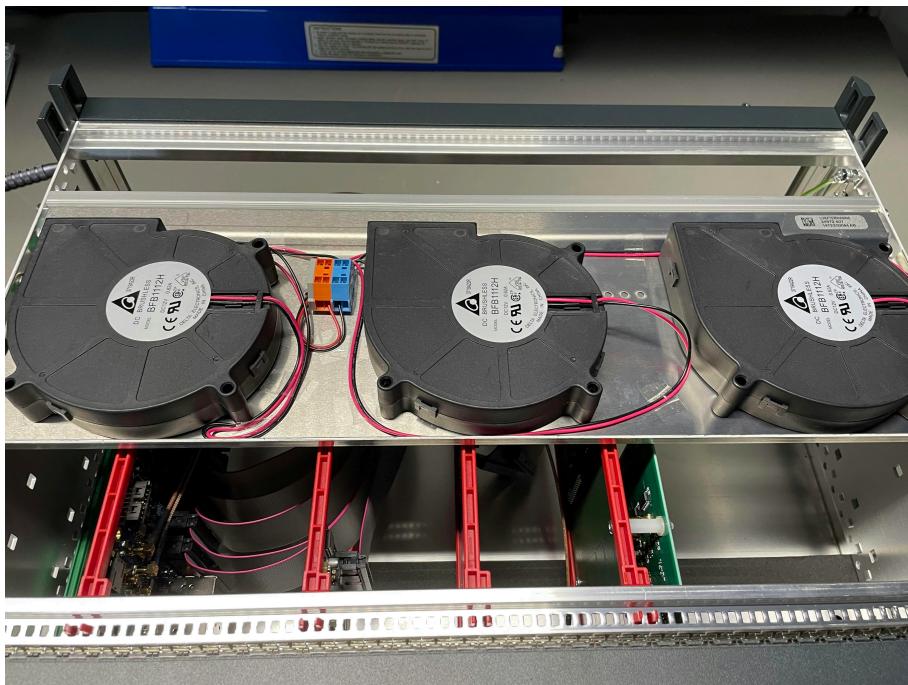


Figure 4: Top view of the crate with fan unit



Figure 5: Top view of the crate without fan unit; Note that the fan unit is placed on the top of the crate.

4. Locate the Mirny+Almazny board and its JTAG connector (indicated with red circle in the Figure 6)

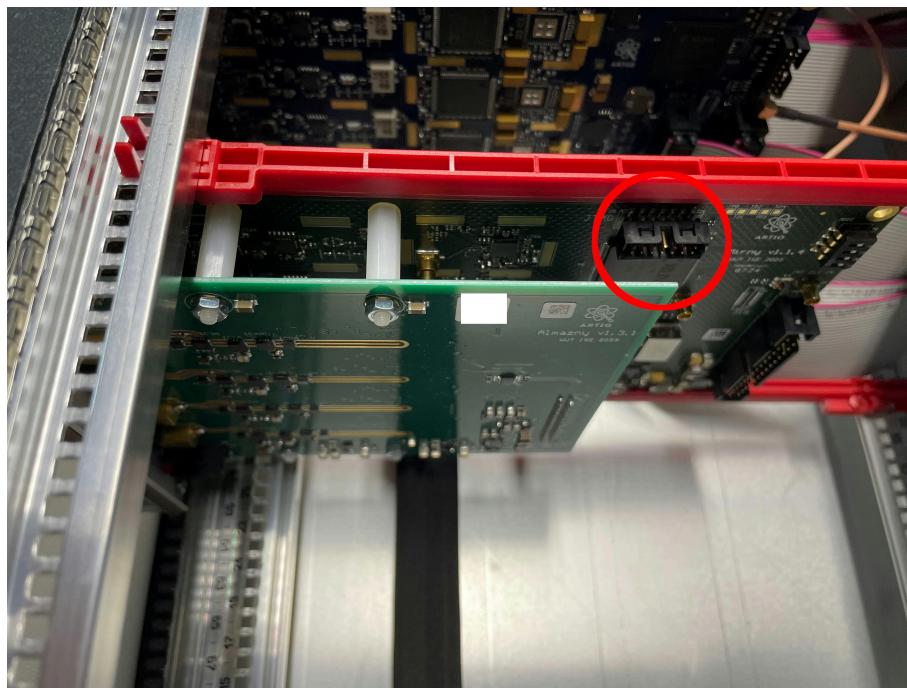


Figure 6: Top view of the crate with Mirny+Almazny board

5. Place JTAG HS-3 cable in the board's connector. Please make sure that the programmer is disconnected from the PC USB.

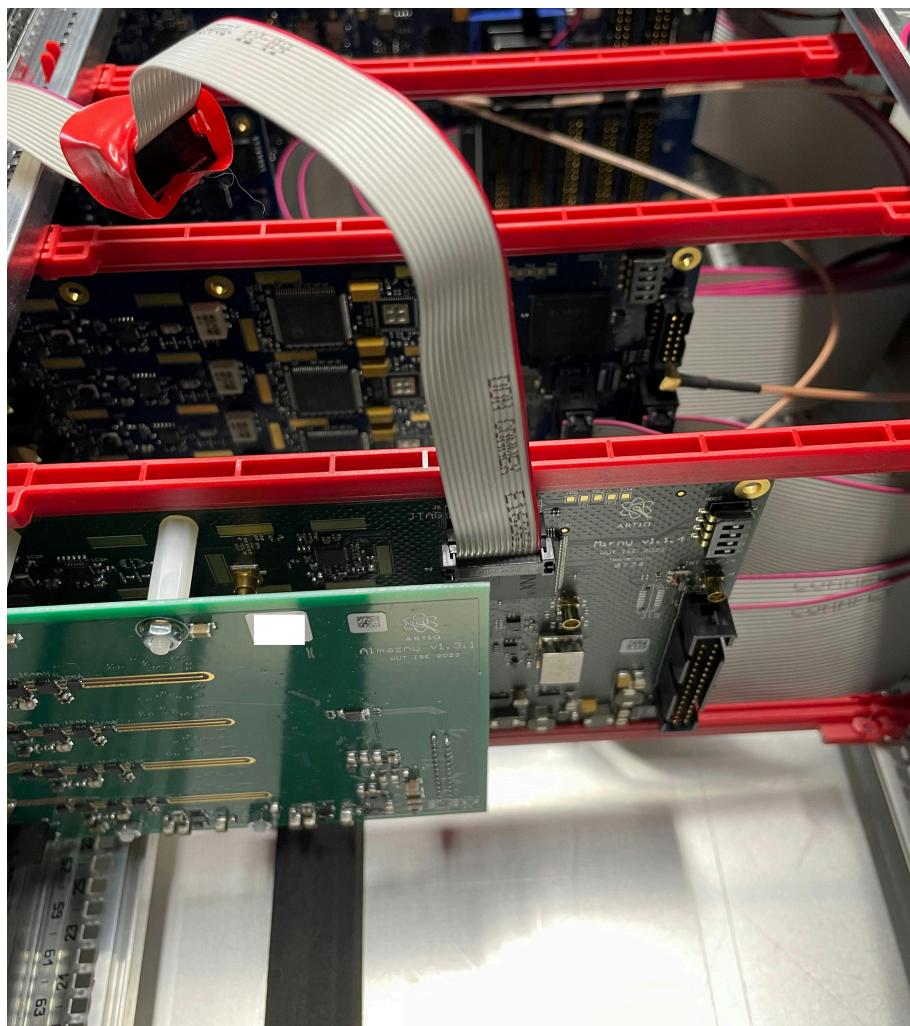


Figure 7: Top view of the crate with Mirny+Almazny board and JTAG HS-3 cable connected

### 3. Firmware update

Having successfully dismantled the crate and connected the JTAG programmer one can proceed to updating the firmware.

1. Connect JTAG programmer with the PC via USB cable.
2. Power on the crate.
3. Test if the programming cable is detectable (even if you are using HS-3 programmer launch xc3sprog with `jtaghs2` parameter):

```
$ xc3sprog -c jtaghs2
```

You should be able to observe in the terminal window something like this:

```
Using Libftdi,  
JTAG loc.: 0 IDCODE: 0x16d8c093 Desc:  
length: 8  
XC2C128_TQ144 Rev: A IR
```

If PC is unable to find device using Libftdi, it is most likely that you have to update your 'udev' rules and/or update user group membership.

a) To add user to chosen group:

```
$ sudo usermod -a -G <group_name> $USER  
# and to gain new group access without the need to relogin:  
$ su - $USER
```

Substitute with chosen group (we suggest to use `plugdev` but can be `dialout` or other).

b) To update udev rules, create a file `/etc/udev/rules.d/99-ftdi.rules` and populate it with the following:

```
ATTRS{idVendor}=="0403", ATTRS{idProduct}=="6014", MODE=="0660",  
GROUP="<group_name>"
```

c) Reload and retrigger rules:

```
$ sudo udevadm control --reload-rules && sudo udevadm trigger
```

Now you should be able to discover programmer using `$ xc3sprog -c jtaghs2`.

4. Launch flashing script (from the top of this directory):

```
$ ./flash.sh
```

and look for `Verify: Success`.

Congratulations! You just updated Mirny's CPLD firmware to current version (v0.3.1). All you have to do now is power off the crate, and reassemble it.

### **3.1. Reassembly**

1. Disconnect the programming cable (NOTE: make sure to disconnect USB from the programming cable before disconnecting it from the board).
2. Mount the fan unit (4 screws - 2 for each side).
3. Connect the grounding cables (IMPORTANT)
4. Put the top panel back on.
5. Mount the side panels.