Printrbot Firmware Guide

What is firmware?

Firmware is the software that runs directly on the printrboard which interprets the GCODE and converts it into signals to the various motors on your printrbot. The printrbot ships with Marlin 1.0 RC2 installed and that is the version that the printrbot team currently recommends.

Updating new firmware is recommended only for intermediate to advanced users. While the procedure is well tested there is a small possibility that you could irreparably damage your printrboard. Please follow all steps in this guide carefully and, above all, try to understand what they do so that you are comfortable with backing out of any errors.

Obtaining a firmware file

The default firmware as shipped is archived at
https://raw.github.com/PxT/Marlin/master/MarlinProductionBolts.cpp.hex

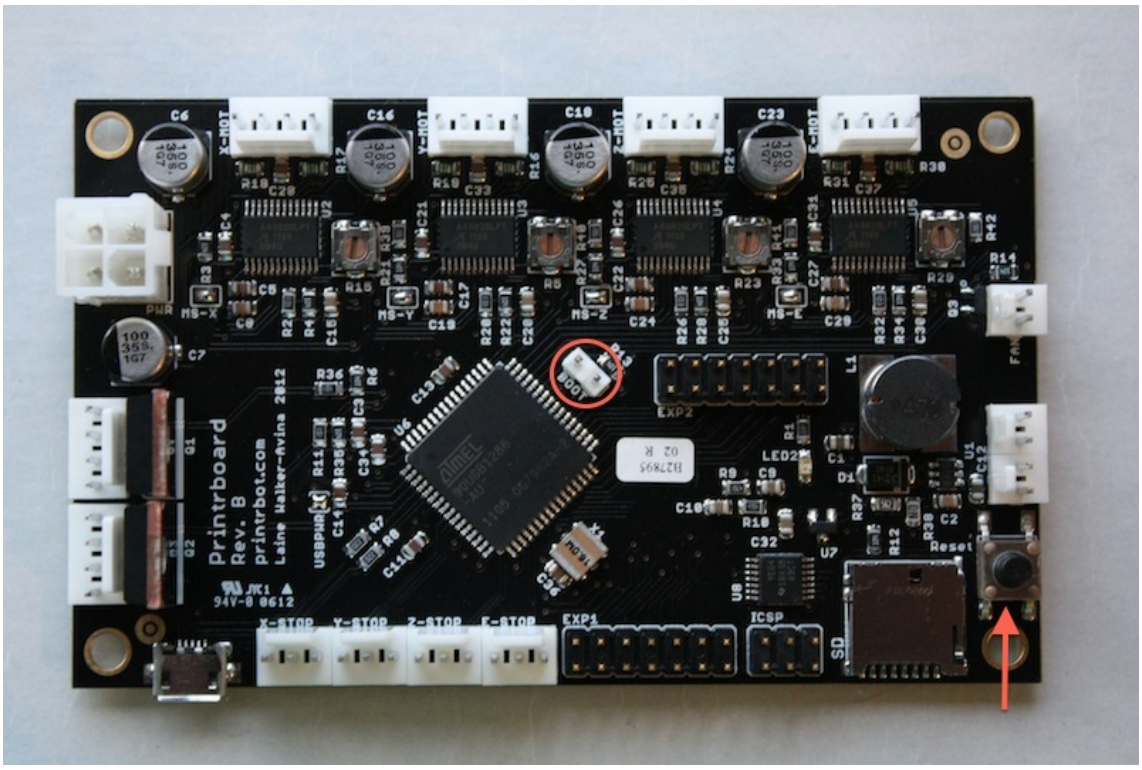
You can use that file to restore to a factory-default state. Advanced users may wish to compile their own firmware either to adjust some configuration parameters or to experiment with new features. The source code used to build the factory-default firmware is available at
https://github.com/PxT/Marlin

See the section below entitled **Building Firmware** for more detailed instructions.

Loading new firmware

NOTE: The instructions below refer to printrboard Revisions A-C. If you have a Revision D or later board then the state of the BOOT jumper is reversed and you should install the jumper when this document says to remove it & vice-versa.

By default the printrboard boots directly into the firmware and starts running when you turn on the power. If you want to update the firmware you have to tell the board to instead boot into a special boot loader mode that is used for installing a new firmware file. This is accomplished by removing the jumper on the **BOOT** pin and then pushing the reset button (with the board powered on). The **BOOT** pin is shown here circled in red with no jumper installed (bootloader mode). The reset button is marked with an arrow.



Once the board is reset you can replace the **BOOT** jumper and proceed with the following steps.

To install the new firmware you must use a special utility that can communicate with the bootloader. On Mac OS X and Linux this program is a command-line utility called dfu-programmer. On Windows there is a GUI provided by Atmel called Flip. Download links can be found in the **More Information** section below.

Loading firmware with dfu-programmer:

```
dfu-programmer at90usb1286 erase
dfu-programmer at90usb1286 flash <firmware_hex_file>
```

Loading firmware with Atmel Flip:

- The first time you boot into the bootloader it will appear as a new USB device. Allow Windows to install the appropriate driver.
  Note: Windows 7 users may need to install a driver manually from
  http://www.avrfreaks.net/index.php?module=Freaks%20Academy&func=viewItem&item_id=2196&item_type=project
- Select the target device: AT90USB1286. Select Communication medium as USB. Click Open.
- Open the compiled HEX file within the FLIP software.
- Make sure the Erase, Blank Check, Program, and Verify checkboxes are checked.

- Click the Run button

Writing firmware to the board should only take a couple of seconds. Once complete make sure the **BOOT** jumper pin is in place and then push the reset button again to boot the board normally. You should now be able to connect using Pronterface.

Compiling Marlin firmware

Windows users:

- Download a pre-configured Arduino build environment that contains the compilers for the AT90USB1286 chip from http://www.reprap-usa.com/download/arduino0022.zip.

Macintosh users:

- Download and install the Arduino software from http://arduino.cc/hu/Main/Software
- Download and run the Teensyduino installer from http://pjrc.com/teensy/td_download.html Do not install any of the optional libraries
- Download the copy of Arduino 0022 from reprap-usa.com as noted in the Windows section above and unzip it in a temporary location.
- Find the Arduino app in your Applications folder, control-click on it and choose "Show Package Contents" , navigate to Contents -> Resources -> Java -> hardware -> teensy -> cores
- In the temporary location where you unzipped the reprap-usa copy of Arduino, locate the hardware -> at90usb1286 -> cores -> at90usb1286 directory and copy it to the cores directory found in the previous step.
- Download http://blog.lincomatic.com/wp-content/uploads/2012/03/at90usb1286txt.zip and unzip it to a temporary location. Copy the three files contained within to the Contents -> Resources -> Java -> hardware -> teensy directory you found in step 4. Overwrite any existing boards.txt file.
- Close any Finder windows and optionally delete the temporary copy of Arduino0022

Launch your installed version of Arduino and choose Teensylu/Printrboard from the Tools -> Board menu. You are now ready to build the firmware.

- Open the Marlin.pde file in Arduino.
- At a minimum we recommend changing the STRING_VERSION_CONFIG_H and STRING_CONFIG_H_AUTHOR definitions in Configuration.h. That way when you load your new firmware you will see the updated version string in Pronterface and can easily confirm that your new firmware is working.

- Any other changes to the firmware are outside the scope of this document. Refer to the printrbottalk message boards or other reprap forums for more information.
- To compile, click the Verify button:  or choose Sketch -> Verify/Compile from the menus.
- You may see a number of warning messages during compilation, those can be ignored. If the compile is successful you will see a status message similar to this:
  `Binary sketch size: 68012 bytes (of a 130048 byte maximum)`
- Immediately before the final status message you should see a path indicating where the compiled Marlin.cpp.hex file is stored. Since that may be a temporary directory you should copy the file to a directory of your choice.
- Follow the steps in the **Loading New Firmware** section to upload the firmware to your board.

More Information

- dfu-programmer for Linux: http://dfu-programmer.sourceforge.net/
- dfu-programmer for Mac OS X: http://www.uriahbaalke.com/?p=106
- Atmel Flip for Windows: http://www.atmel.com/tools/FLIP.aspx/
- Arduino Software: http://arduino.cc/hu/Main/Software
- Printrbottalk Firmware forum: http://www.printrbottalk.com/forum/viewforum.php?f=22

Feedback

While we have attempted to make this document as accurate as possible, some errors or omissions may have inadvertently made it past our crack team of copy-editors. Due to the overwhelming volume of mail the Printrbot team has been receiving, please first check that you have the latest version of this document available from http://printrbot.com/faq/getting-started/

If you have already updated to the latest version of this document and you have found an error, typo, omission, or if you just want to tell us how great this guide is, please send it to paul@printrbot.com

Credit

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