

Regolith Printer V1 Software

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Overview

This document covers the software configuration from off the shelf to installed and printing. Regolith printer V1 uses a Bigtreetech Octopus V1.1 main board running Marlin firmware.

Hardware

BIGTREETECH Octopus V1.1 – chosen because of stepper driver versatility, high performance 32-bit MCU, and deep expandability/configurability.

24V Blower fan – used to cool the stepper motor drivers

NEMA 23 and ball screw/linear rail combo –

- X: 1 motor
- Y: 2 motors in sync
- Z: 4 motors in sync

TMC5160T Pro V1.0 – stepper motor drivers. Chosen because of high current limit to run NEMA 23 motors, as well as various configuration options for future feature expansion.

Hardware Configuration

BIGTREETECH Octopus V1.1 –

- The TMC5160T motor drivers run in SPI mode for additional software configuration availability. To enable this mode, ensure all jumpers are jumping the top 2 rows as seen in Figure 1.



Figure 1: Stepper motor headers shown in the SPI configuration. The jumpers are circled in blue in their correct location.

- Adjust the jumpers on the bottom row of fan headers to configure 24V output as shown in Figure 2.

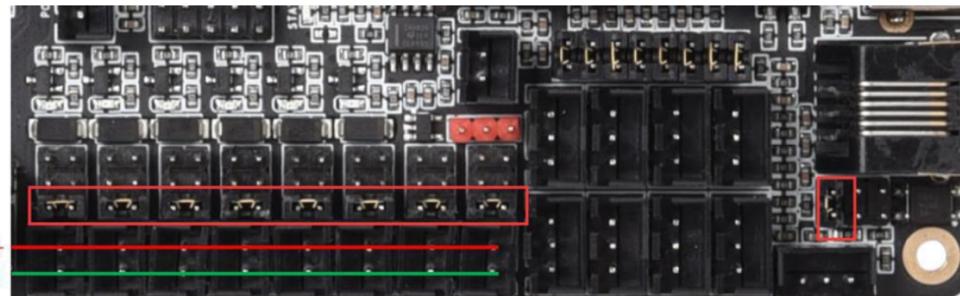


Figure 2: Jumpers near fan headers. Configured to deliver 24V to fan headers

- Adjust the jumpers near the RJ45 port to enable the stallguard endstop feature on the TMC5160T. These jumpers short the diagnostic output of the stepper drivers to the inputs of the endstops, allowing the stepper driver's back EMF sensing to replace the role of a traditional limit switch. Configured in Figure 3.

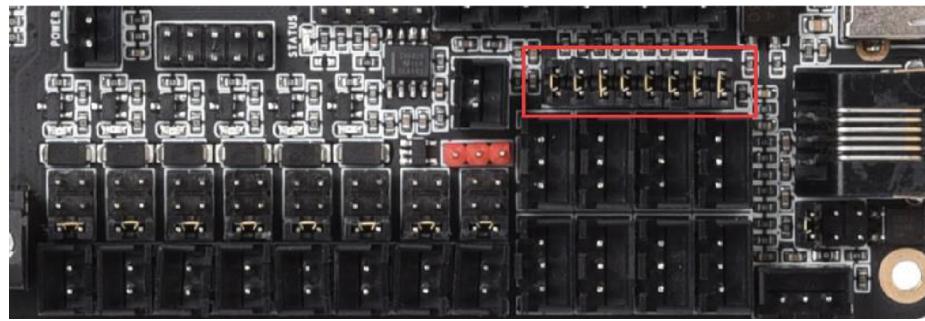


Figure 3: Jumpers enabling 'stallguard' feature of motor drivers to be used in place of traditional limit switches.

- Ensure a jumper is connected as shown in Figure 4. This enables the Octopus board to be powered via USB-C as opposed to exclusively through the screw terminals. This makes uploading firmware more convenient.

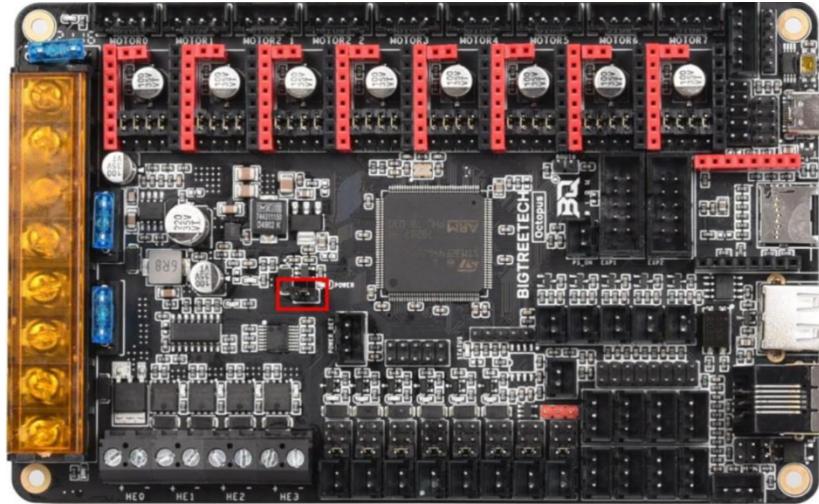


Figure 4: USB-C power enable jumper boxed in red.

Firmware

Overview

This printer runs Marlin (currently 2.0.9.3.x). If you just want to load the preconfigured file, download the ‘firmware.bin’ file from [Github](#) and follow the steps in ‘flash firmware’ in this document.

Flash Firmware

Once the Marlin build has been configured and compiled, you should have access to the ‘firmware.bin’ file. This file acts as a backup that contains all configurations and settings. To flash to the board:

1. Format a microSD card to FAT32
2. Copy the ‘firmware.bin’ file into the newly formatted microSD card
3. Insert the microSD card into a powered BIGTREETECH Octopus mainboard (the ‘STATUS’ light should blink consistently, several times a second)
4. Press the ‘RESET’ button next to the board’s USB-C connector
5. Wait for the ‘STATUS’ light to return to its previous state (from step 3). This should take about 3 minutes.
6. To confirm successful flashing, insert the microSD card back into a computer and check that the ‘firmware.bin.’ file was renamed to ‘firmware.CUR’.
7. Done!

Custom Configuration

Modifications to the stock Marlin build can be reviewed by either:

1. Access change history on the [Github](#).
2. Compare ‘configuration.h’, ‘configuration_adv.h’, and ‘platformio.ini’ files between base Marlin repository and this configuration available on [Github](#).

Notes

- In the future, we can add additional circuitry to have the Octopus control the heating of the furnace, similar to controlling a heated bed in a traditional printer.
- RGB LED headers on the board means we can get creative with lighting, i.e. have it glow red if the furnace is heating, change colors when heating is complete, etc.