Dephy Bootloader User Guide

KEY FEATURES

- Allows user to upgrade ExoBoot or ActPack via a USB-C connection.
- Only works on machines running Windows 10.
- Requires the use of command-line scripts.

SAFETY

- **Before using your EB60 ExoBoot or ActPack, make sure to read and understand the safety information in this guide and at dephy.com/safety!**

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What is the Dephy Bootloader?

The Dephy Bootloader is designed to update firmware on Dephy's ExoBoot and ActPack via USB-C. This is different from using a dedicated programmer to connect and flash each microcontroller.

The Dephy ExoBoot and ActPack platforms have several onboard microcontrollers that run our mechatronic systems. We use microcontrollers with different integrated circuits that require special tools to flash firmware upgrades. Typically, these upgrades require removing the cover of the device you are using, possibly ruining a protective seal, to gain access to the main Rigid board. However, by using the bootloader, a user is able to upgrade all onboard microcontrollers from an externally accessible USB-C port.

What can I flash with the Bootloader?

ExoBoot:

- Manage (Mn)
- Regulate (Re)
- Execute (Ex)
- BT121
- XBee
- Habsolute (Habs)

ActPack:

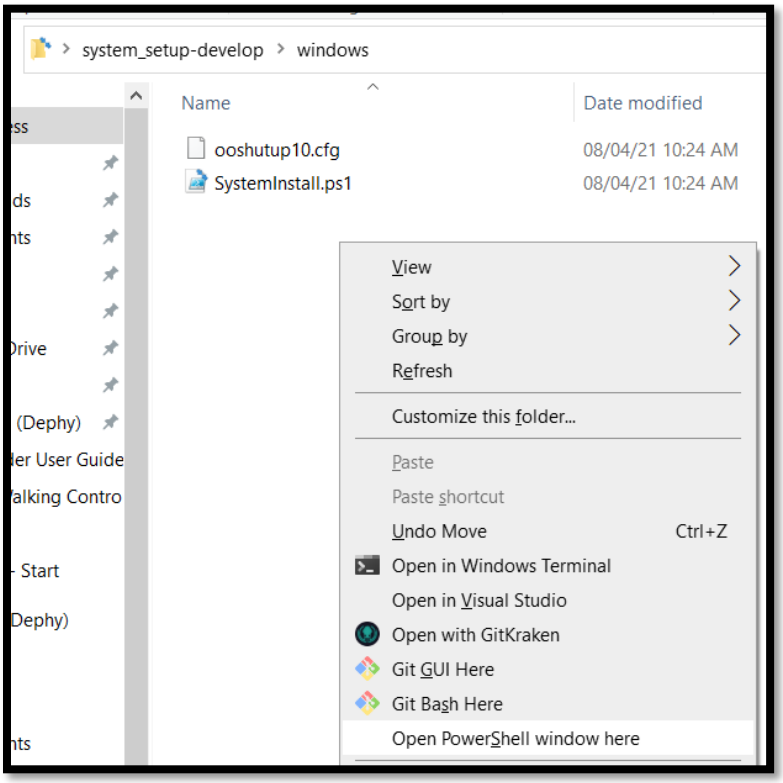
- Manage (Mn)
- Regulate (Re)
- Execute (Ex)
- BT121

When upgrading between major releases (e.g., 7.x.x -> 8.x.x), Manage, Regulate, and Execute (include Habsolute if using an ExoBoot) must be updated to the newest firmware for your hardware version for proper functionality. BT121 and XBee updates are less frequent, though we recommend upgrading these microprocessors when upgrading the others.

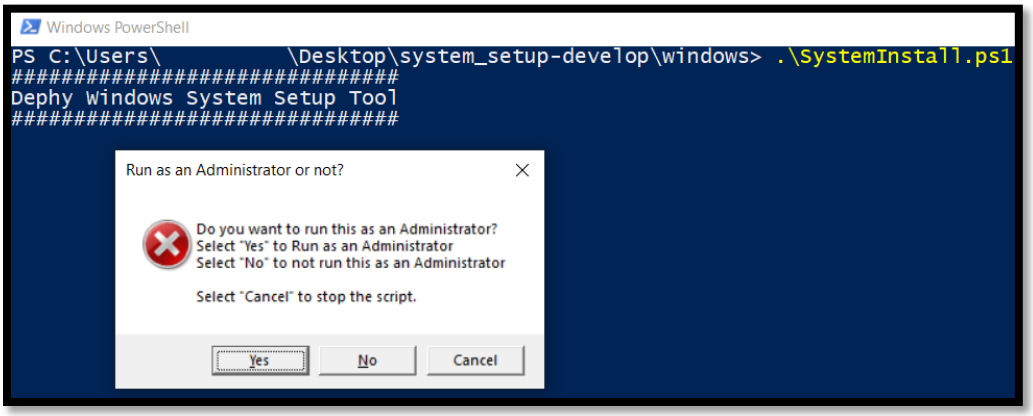
Installation

For your convenience, all tools required for Bootloader installation are compiled into an executable to be provided by Dephy. If your Dephy package includes the Bootloader, please reach out for these files.

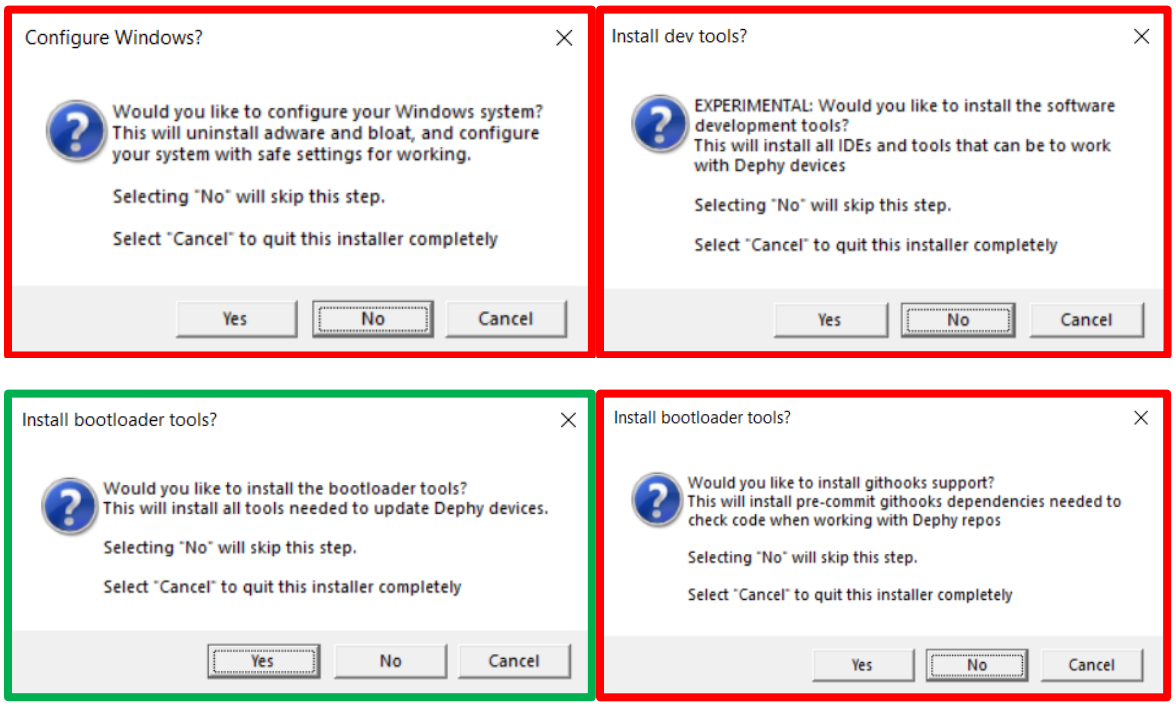
1. Extract all files provided by Dephy.
2. Under system_setup-develop/windows run SystemInstall.ps1 as an administrator.
    a. Shift + Right Click in the folder to “Open PowerShell window here”



    b. When the option comes up to “Run as an Administrator or no?” click “Yes”



    c. In the following input prompts, only click “Yes” to “Install bootloader tools” (option #3) and click “No’ for all other options (#1, #2, #4).



d. Reboot your computer. The bootloader will not work until you restart.

Bootloader Use

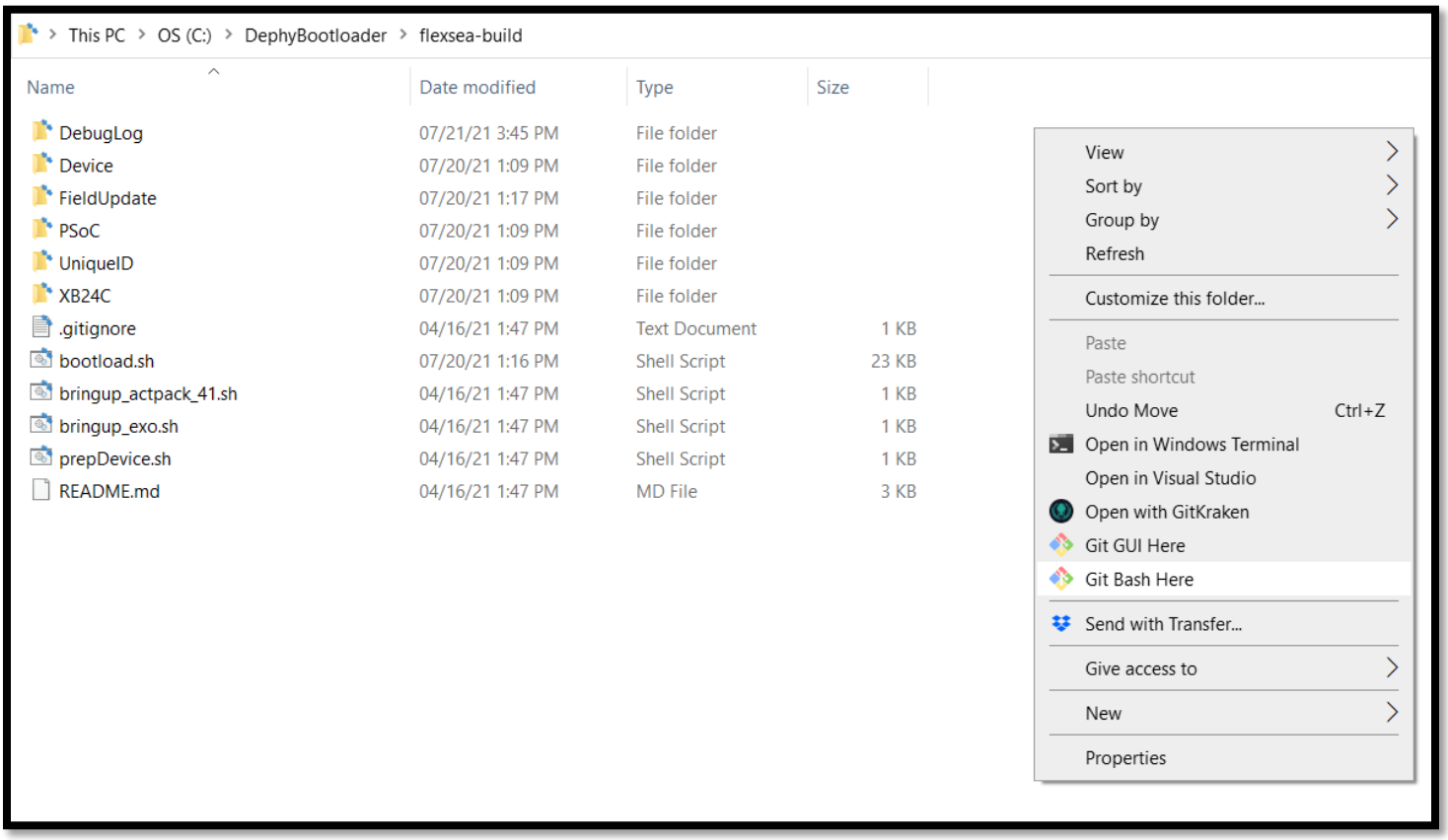
Following installation in this guide, a folder called "DephyBootloader" should exist in your C Drive.

1. Make sure your device is plugged in via USB and **ONLY POWERED VIA USB**. External power supplies or batteries plugged in during bootloading may damage onboard microcontrollers.

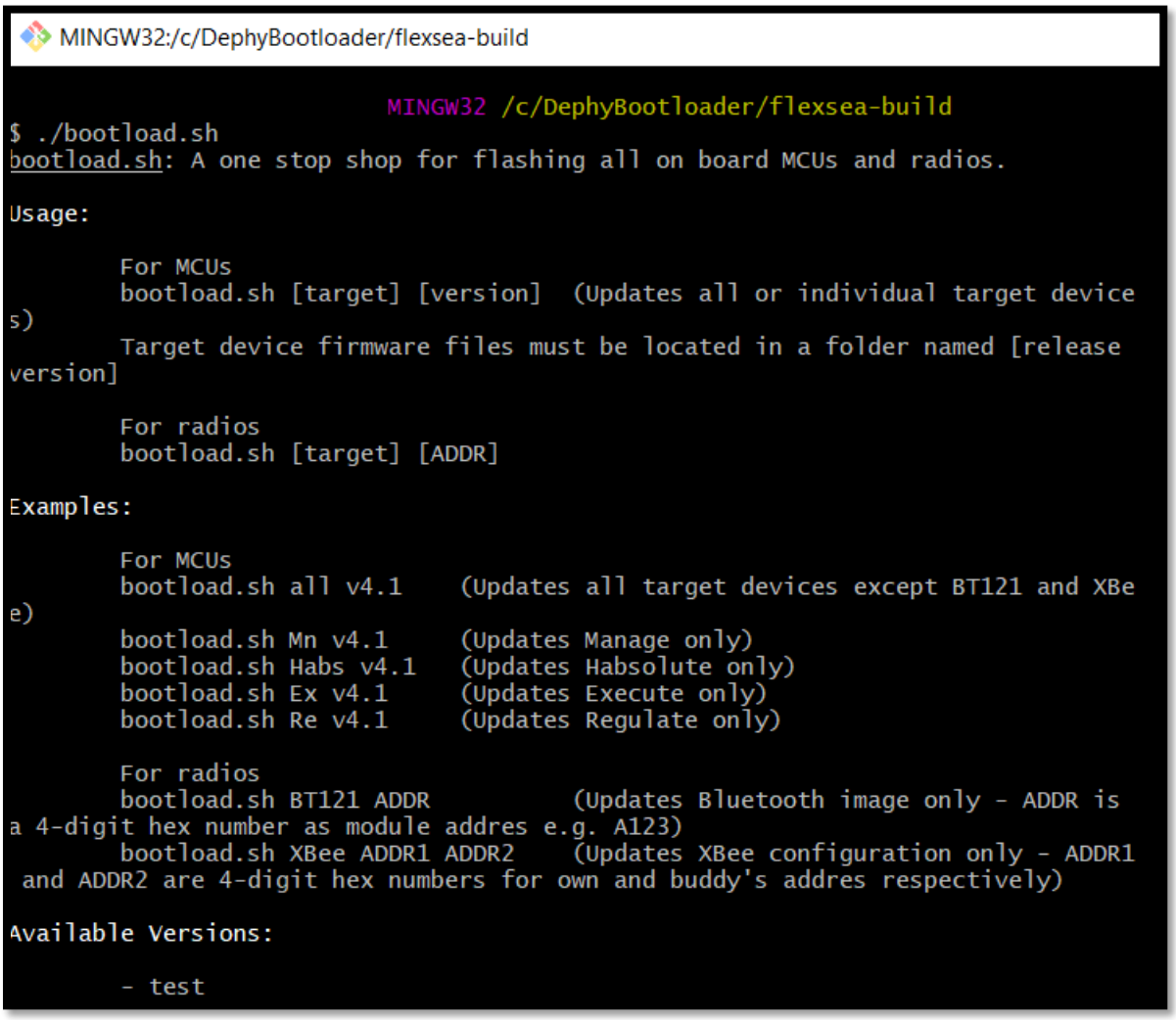
2. A folder under "C:\DephyBootloader\flexsea-build\FieldUpdate\Releases" will contain all firmware files for your versions. If you get new firmware from Dephy in the future, make a new folder here and label it according to the device and version. For example, v7.0.1-EB604-L indicated version 7.0.1 for a left EB604.

3. To run the Bootloader, go to "C:\DephyBootloader\flexsea-build" and find a named "bootload.sh"

4. Right click in the flexsea-build folder to select "Git Bash Here" option



5. Typing the command "./bootload.sh" will give you all options for the Bootloader script. All firmware versions in your "Releases" folder will be seen under the Available Versions section.



6. If flashing all boards, we recommend using the "all" keyword. If flashing manually, follow this order: Habsolute >Execute > Regulate > Manage > BT121. If flashing an Actpack, flash Execute first as there is no Habsolute microcontroller.
    a. Flashing Habsolute should take less than 3 minutes.
    b. Flashing Execute should take less than 5 minutes.
    c. Flashing Regulate should take less the 3 minutes.
    d. Flashing Manage should take less than 1 minute.

FAQ

- How do I use the bootloader?
  - Run the command without arguments for usage (i.e., type ./bootload.sh into GitBash). The script will provide user prompts and examples.

- The bootloader hangs when trying to upgrade an ExoBoot.
  - Make sure the battery is not inserted in the ExoBoot. If it was, unplug the battery, power cycle, and try again only powered via USB.

- Bootloading fails while trying to flash Habsolute.
  - Disconnect the USB cable, wait for 15s and try again

- I disconnected my USB-C in the middle of flashing a microcontroller.
  - **DO NOT DISCONNECT WHILE RUNNING THE BOOTLOADER.** The device that got interrupted is now bricked. You will need to reflash Ex, Re, and Mn using a programming adapter, such as STM32 or PSoC (except for BT121 and Habs).

- The bootloader hangs when flashing Mn.
  - Check that the DFuse driver is correctly installed.

- I flashed Mn and now I cannot flash any other board.
  - Revert Mn and flash the other boards first.

- The bootloader crashed, why?
  - You probably have a mismatch of version: Make sure Actuator Package is at its latest version and run "python -m pip install --upgrade flexsea"

Reference Documents

- Safety Guide: **dephy.com/safety**
- Software Guide: **dephy.com/start**
- ActPack Data Sheet: **C_0003_DS_0001_V03_ACTDATA**

Date	September 21, 2021
Revision	C_0004_UG_0001_V01_BOOTLOADGUIDE
Created by	Jonathan Kaplan
Reviewed by	Carlos Asmat
Approved by	Matt Mooney MJM
Purpose	User guide for the bootloader that has been reviewed and approved for release