

Bootloader Basics

Introduction

OpenTX v2.x has one very significant improvement over previous versions. It's now possible to flash new firmware to your Taranis from the transmitter itself **after** you've gotten v2.x on it for the first time. That gives you two ways to flash firmware.

OpenTX v2.x uses a bootloader to allow us to do this. In fact, the bootloader (contributed by Mike Blandford, I believe) is one of the coolest things about v2.x. You use bootloader mode to flash the firmware and update the bootloader itself from the TX without using OpenTX Companion. However, we can't use it until we get the OpenTX bootloader flashed to the STM chip.

A bootloader is already installed in the chip when you get it. Companion can use that bootloader if it can see it, but Windows doesn't come with a driver that can mount it and make it useable. You might remember that being able to talk to the chip is the reason we have to run Zadig. We need to install the correct driver for the STM BOOTLOADER. We have to use Companion 9X or OpenTX Companion to flash the firmware the first time. That's how we get the OpenTX bootloader on the STM chip. That gives us two bootloaders on the chip. Once we do that, another way of flashing firmware opens up for us.

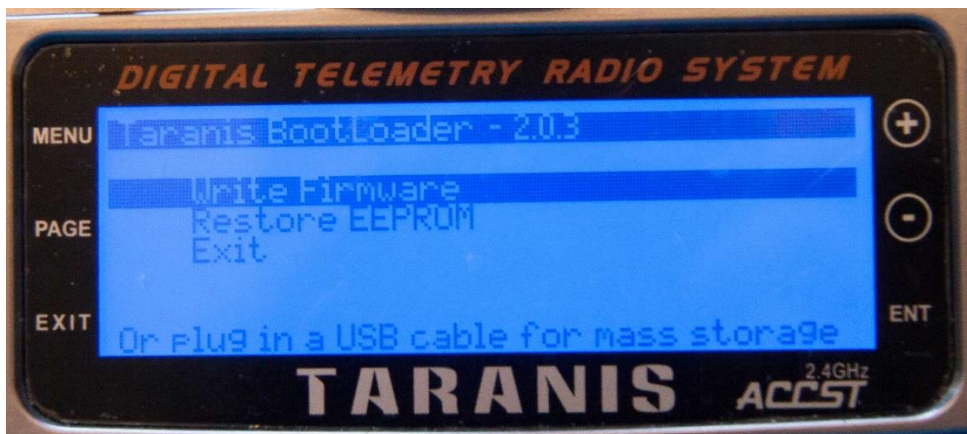
Why do we need a second bootloader if one comes already installed on the chip? The original bootloader works fine as long as you're using OpenTX Companion or one of its ancestors. However, by having the second bootloader, you can bypass some of the functions of OpenTX Companion.

Once we have v2.x on the transmitter, we can view and work with the mass storage areas of the Taranis. There are two of them. One is a drive called Taranis-Don't Mess With It!-and another additional external drive. In my particular case, it's Drive H, but your results will vary depending upon what you've got stuffed into your computer. Once the drive is visible in Windows Explorer, you can treat it like any other external drive.

We access all of these features by turning the transmitter on in bootloader mode.

To Enter Bootloader Mode:

1. Hold both the horizontal trim tabs (Rudder and Aileron) toward the switch (inside) while turning on the radio.
2. You will boot into the following screen:



3. If you're going to be working with the EEPROM in OpenTX Companion, the SD card in Windows File Explorer, copying new firmware files to the card, etc., once you're in bootloader mode, plug a USB cord from the TX to the computer.

4. From the bootloader screen itself, you can use the arrow keys to move up and down, then use the “ENT” key to:
 - a. Write firmware: Use this option when you want to flash new firmware that you’ve copied to the SD card FIRMWARES folder.
 - b. Restore an EEPROM: Use this to restore an EEPROM you’ve backed up to the SD card.
 - c. Exit bootloader mode.

Flashing Firmware After the First Time

There are **two** ways to flash firmware after you’ve flashed it for the first time:

- A. Method #1: Just as we did for this lesson. That is, through OpenTX Companion with the TX **OFF** and connected to the computer through a USB cable. This method also rewrites the bootloader if there have been any changes since the last firmware upgrade. Most consider it to be the easiest, safest, most reliable method of updating the firmware.

NOTE: In the following text, “firmware.bin” is used to identify the new firmware file that OpenTX wants to download and install. In reality the name will be something different. As of this writing (06/2014), the current firmware download file name for my computer is: opentx-taranis-noheli-en-2.0.3.bin. The filename of the first firmware you download will probably be similar, but without the “noheli” segment. OpenTX Companion allows you to configure a custom tailored version of the firmware for your transmitter. Since I don’t fly heli’s, I’ve elected to not include helicopters in my world. The downloaded firmware filename reflects that.

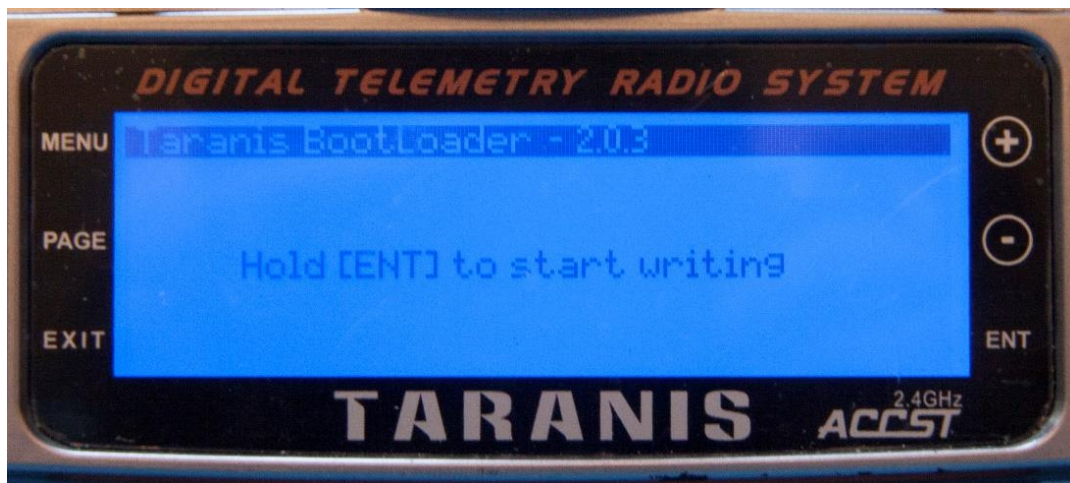
- B. Method #2: With the radio **ON** in bootloader mode. This method does not update the bootloader, so if there have been any changes to the bootloader, you must jump through a couple of extra hoops to get them. To update the firmware using bootloader mode:
 - a. We must first copy the new firmware.bin file to the SD card:
 - i. Download and save the new firmware to your computer.
 - ii. Either connect the TX to the computer *in bootloader mode*. Remember, you already have v2.x on the transmitter, so the OpenTX bootloader is available to us.
 - iii. After you’re in bootloader mode, connect the transmitter to the computer with a USB cable. Give the computer a few seconds to recognize the transmitter. When it does, the SD card is visible in Windows Explorer.
 - iv. If you choose to remove the SD Micro card from your TX, place it in an appropriate card reader, and access the card in Windows Explorer.
 - v. Copy the new firmware.bin file to the FIRMWARES folder.
 - b. Replace the card if you removed it, and turn the TX on in bootloader mode as described above.
 - c. Highlight “WRITE FIRMWARE” to select it, and press “ENT”



- d. Highlight the firmware package you wish to flash

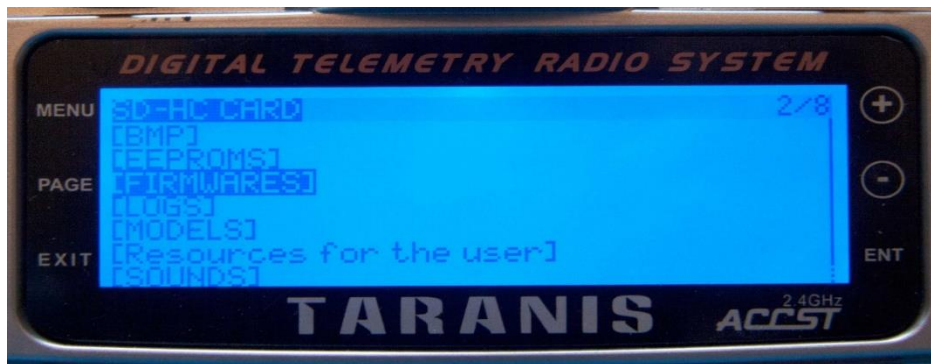


- e. Press "ENT" to move to the flash screen
f. Press and Hold "ENT" to write the firmware.



- g. Press "Exit" as needed to return to the main bootloader screen
h. Note that this method, once again, **does not** update the bootloader, only the firmware.

- C. To update the bootloader using the TX:
a. Turn the TX on and clear any warning screens.
b. Long Press the MENU key (hold the key down approx. 1 sec.) to access Radio Setup
c. Short Press (tap) the PAGE key to move to the SD-HC card screen
d. Highlight the FIRMWARES folder and press "ENT" to open it.



- e. Select the file that contains the bootloader you wish to use. Why would you want to use a bootloader that was different from the version of OpenTX that you're running?
 - i. Using the TX to upgrade the firmware doesn't automatically apply any changes that the new bootloader may contain.
 - ii. Perhaps there's a bug in the new bootloader, but the firmware itself works fine. By replacing the new, broken bootloader with an older reliable one, you're still flying!
 - iii. Another reason is to retain features you liked in an older version of the bootloader that have been changed in the newer version. Another perfect example of how OpenTX allows you to configure your radio the way YOU want to!



- f. Press "ENT" to get to a "Flash Bootloader" screen, similar to the one you saw when flashing the firmware through the TX.
- g. Select "Flash Bootloader" and press "ENT" to replace the existing bootloader with the one you've selected.



- h. When completed, use "EXIT" to return to the main TX screen.

Well, now you know all there is to know about flashing...firmware, that is. Well, perhaps not everything, but you should have a much better understanding of the process than you had before. Believe it or not, after just a few times through this, it becomes as routine as locking the door of your residence when you leave, or waving at the neighbor on the way out. Good luck with the next lesson, *Check It Out!*