FrSky Horus X10S/X10 System

FrOS Firmware Updating and OpenTX Flashing Using Windows

Smart Port Flashing with X10S/X10

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Document Credits

This document was created by Mike Dailey and Jan Urbanek with support from the OpenTX team members Bertrand Songis and Andre Bernet.

About This Document

This document is in draft form and is for use with FrOS and OpenTX 2.2.1 or later   **If you are just looking for the information on how to do a normal FrSky FrOS OS firmware update with firmware bin files go to page 17.**

Overview

The FrSky Horus X10S/X10 has the ability to operate with the factory installed FrSky FrOS OS firmware or OpenTX 2.2.1. The FrOS OS is FrSky's in-house developed powerful menu driven OS and OpenTX is a highly flexible and powerful open source OS developed by the OpenTX Development Team for the X10S/X10.

This document, explains how to switch the X10S/X10 system to the OpenTX OS and how to remove OpenTX from the system and return to FrOS OS. The instructions assume the user is already an experienced user of OpenTX Companion.   If you have not used OpenTX Companion before read the "Downloading and flashing the firmware" section at the bottom of this page https://opentx.gitbooks.io/opentx-taranis-manual/content/companion-introduction.html

Two separate SD cards will be used to make the process easier and keep the FrOS and OpenTX files separate to avoid conflicts. One card will be used for FrOS and the other card will be configured for OpenTX.

It is recommended that the user read through the instructions first and then start at the beginning and follow them step-by-step. It is easier to get the process done correctly the first time rather than needing to troubleshoot a problem later.

These instructions are written for users of Windows computers.

General Warnings

These instructions are for use with **ONLY** the **FrSky X10S/X10 system**. When running FrOS OS the X10S/X10 it is flash memory centric and only uses the SD card for, Logs, extra sounds, extra model images, screen prints and firmware updates.

The FrSky X10S/X10 systems were provided with factory installed FrOS firmware. There is no FrSky support planned for users that flash their X10S/X10 with OpenTX and have problems with OpenTX or have problems flashing the system back to FrOS.   Considering the risk if there are problems you may not want to flash your system with OpenTX.   If you do change the OS system you do so at your own risk.

If you do not consider yourself an experienced user of OpenTX Companion and have not used Companion before you may not want to flash your X10S/X10 with OpenTX and stay with FrOS OS.

Even though OpenTX 2.2.X is in ongoing development, there is little chance that models built in one release might not be compatible with a future build. After building a model the programming needs to be checked very carefully with the aircraft to make sure it works as expected.

The current version of OpenTX Companion only supports an USB connection to the X10S/X10 for flashing of firmware (power off) and the massstorage option to access the SD card via the USB connection (power on) is no longer needed. The massstorage or Joystick option is now selected when the system is connected to the PC.

If you are not an experienced user of OpenTX Companion you might have problems returning to your X10S/X10 to FrOS.

Warning

These instructions assume the user has knowledge and experience with copying files with their Windows computer. Significate caution must be used with connecting and disconnecting the X10S and X10 from the windows computer and the file copy process.

Accidently copying the wrong file or deleting system files from the internal X10S and X10 USB Flash Memory drive can cause the system to be inoperable. Recovering an inoperable system can be difficult because the system must be operable to access the USB Flash Memory drive.
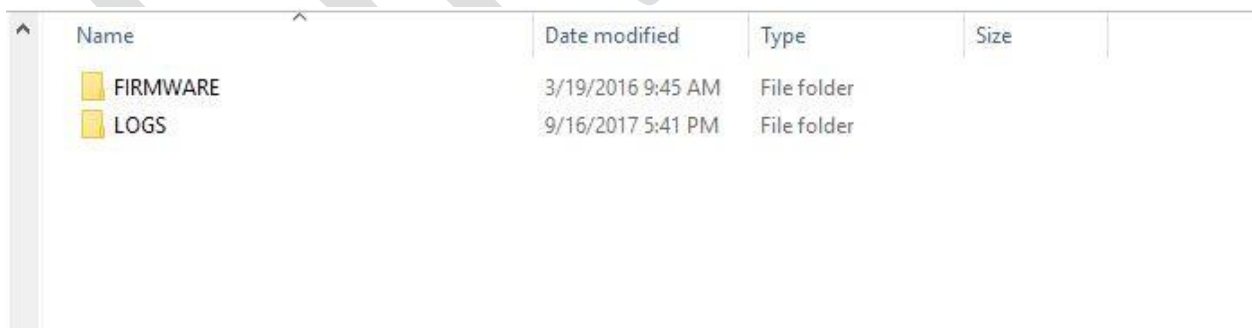
X10S and X10 Storage

The X10S and X10 have two user accessible storage mediums, a 16 meg internal USB Flash Memory drive and an external micro SD drive.

The Flash Memory drive stores the system configuration files, system sound files, model files, model images, model sounds, and user defined custom sounds. The SD card stores the FrOS firmware when doing system firmware updates, data logs, screen prints, extra model images and extra user defined custom sounds.

Using The SD Card

The X10S and X10 have a SD slot in the bottom of the case. The SD card is used for FrOS firmware updates, data logs, screen prints and extra storage space for extra model images and sound files. SD card is not supplied with the system. A 16 gig card is more than adequate and I prefer to use a class 10 card. The micro SD card must be no larger than 32 gig.

Prepare the card by formatting it as fat 32. Then create the following directories.

Name	Date modified	Type	Size
FIRMWARE	3/19/2016 9:45 AM	File folder	
LOGS	9/16/2017 5:41 PM	File folder	

The SD card is inserted into the slot in the bottom of the system with the card contacts facing up. Use caution because the SD card mechanism is spring loaded and can launch the card a significant distance. When the card latches it will be below the surface of the case.

If more than a few custom sounds are planned rather than using up space on the internal USB Flash Memory drive the least used sound files can be stored on the SD card. The files need to be in a path on the SD card that is the same path that is used on the Flash Memory drive. The path on the SD would be SOUNDS\en\Track. When programming a sound in Special Functions the system looks for the sound on the Flash Memory drive first and then the SD card.   The same applies to model images on the SD card IMAGES/modelimages. See the FrOS Sound and Image Files section for file specifications.

Backing Up - USB Flash Memory Drive

Before copying files to the Flash Memory drive it is best practice to make a backup.

With the system powered on plug a USB mini data cable into the USB connector on the back of the system. The connector is under the rubber cover. Plug the other end of the USB data cable into the USB connector on a Windows computer. The Windows computer will automatically detect the Horus and two File Explore screens will appear.

Name	Date modified	Type	Size
CONFIG	5/13/2016 3:10 PM	File folder	
IMAGES	4/15/2016 10:39 AM	File folder	
SOUNDS	4/15/2016 10:39 AM	File folder	
SYSTEM	8/31/2017 5:09 PM	File folder	

One for the Flash Memory drive.

Name	Date modified	Type	Size
FIRMWARE	3/19/2016 9:45 AM	File folder	
LOGS	9/16/2017 5:41 PM	File folder	

And one for the SD card.

Copy the Flash Memory folders to a folder on your Windows computer. After models are built, sound files and model images are added it is best practice to make more backups to protect your data. Be careful not to delete the Flash Memory files, just copy them.

Caution. Always use the "Safely Remove USB Hardwar" eject feature on your computer to close each of the USB ports.

Flashing Firmware

Flashing OpenTX Firmware

1. A micro SD card of about 4 gigabytes or more is required and formatted as Fat32. The maxim SD card size is 32 gig.

2. Down load the Horus OpenTX SD card files from the 2.2.1 link on this page here http://www.open-tx.org/downloads.html and included sounds. As of this date

OpenTX 2.2.1 will be listed as a RCX build until the production release. The link takes you to a second page where there is a link to the SD card files. Download the newest files from the link X12 or X10.

3. Un-zip the download and copy the files to the SD card.

4. The folders on the SD card will look like the image below. The Models and Radio and folders must be manually created and will be empty until the system is flashed. The LUA folder is something special I'm doing. Be sure to copy the Version file. IMAGES is used for 192X114 JPG and PNG color model images with a file name length limit of 6 characters. Sound files have a file name length limit of 6 characters. Logs will hold log files when the data "logging" feature is used. Make sure the VERSION file is on the SD that matches the OpenTX build.
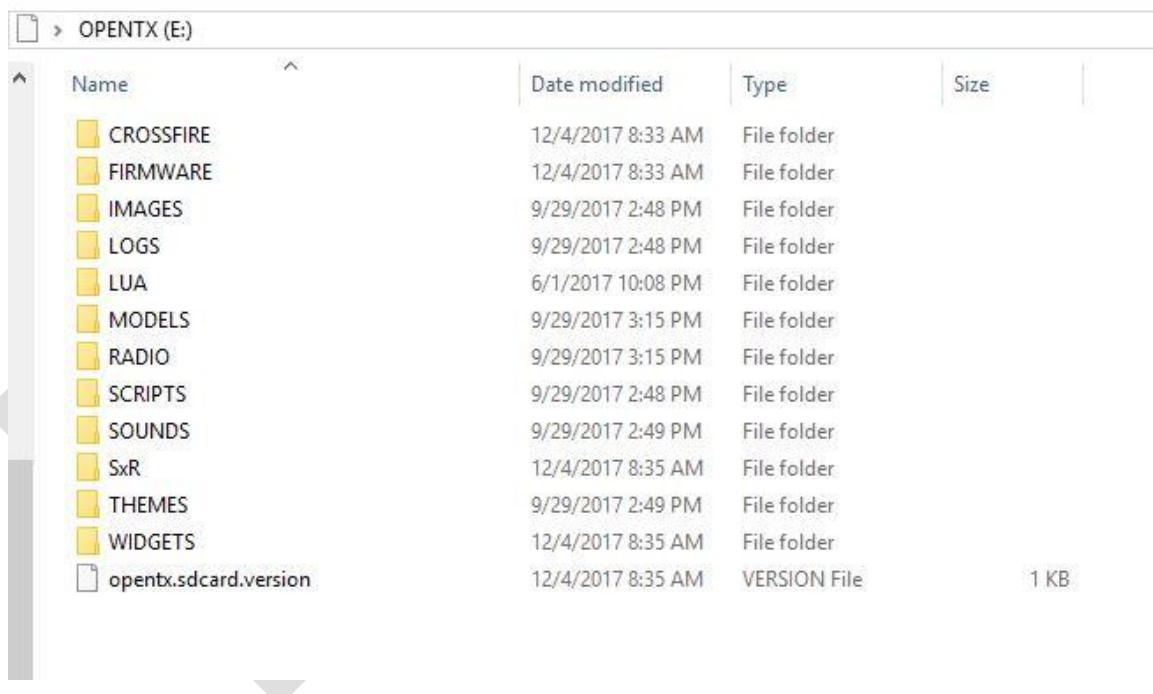
5. With the X10S/X10 power off install new OpenTX SD card.

6. Download OpenTX Companion 2.2.1 from the OpenTX 2.2 branch link here http://www.open-tx.org/downloads.html and install. Currently the link on the page will be OpenTX 2.21RCX until the production version is released. After

selecting, review the instructions on the 2.2.1 page before downloading the Companion build.

7. With the X10S/X10 **power off** connect it to a Windows computer using a USB data cable. Download Zadig from here http://zadig.akeo.ie/ and install. Not all USB cables are actually "data" cables; some are just a charging cable. Even data cables are not all created equal and one that you have used for other data applications may not work with STM32bootloader. You must use a compatible data cable or the X10S/X10 will not connect. .

Zaddig is an installer program to install the USB driver called STM32bootloader so that the USB power off connection can be made to the X10S/X10. Zaddig may replace the existing default USB driver. When installed the STM32bootloader should be visible in the USB section of the Window Device Manager with the X10S/X10 connected.

Even if you think STM32bootloader was installed for a Taranis or other FrSky system you may need to do the installation again. Also some Windows updates like Windows 10 Anniversary updates may remove STM32 Bootloader.   If you need help on installing go here http://open-txu.org/home/undergraduate-courses/fund-of-opentx/using-zadig/

8. The X10S/X10 with **power off** should still be connected to the computer with a USB data cable. Start Companion and in settings, make sure the Radio Type is set to **FrSky Horus X10 / X10S.**   Click the lower icon on the left side of Companion that has the left arrow on it (read firmware from radio). This process will make a valid backup of the FrOS firmware and bootloader. This backup creates an image that can be flashed back to the X10S/X10 to restore the FrOS boot loader and firmware.

Save the file to a folder on your computer. It would a good idea to use a file name with FrOS included and the firmware release as a reminder that it is the FrOS backup file. Make sure that the backup process actually saved the backup file. The extension should be bin and around 2000KB in size. If there is no file saved

check the STM32 Bootloader installation.

9. Click the settings "Gear" Icon on the top bar to open the settings window.
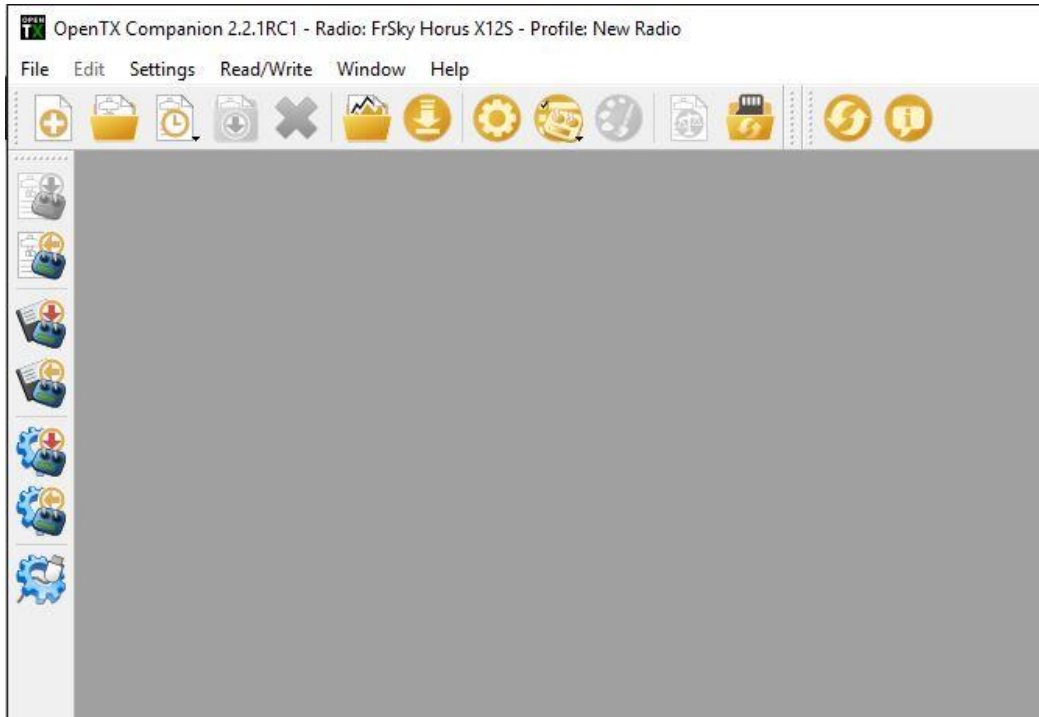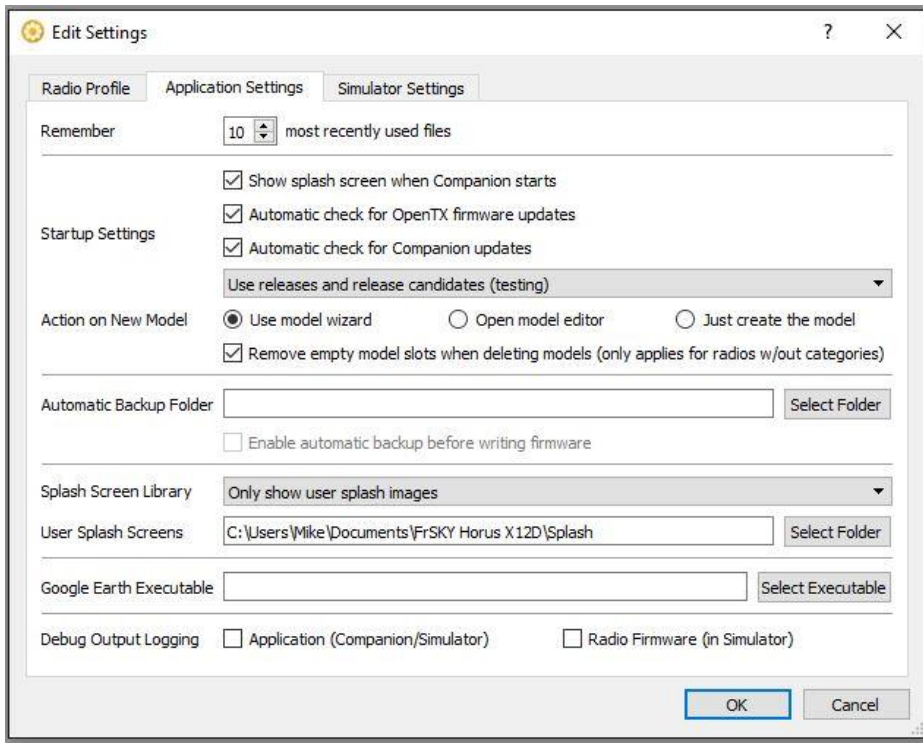

10. In settings, make sure the Radio Type is set to **FrSky Hours X10 / X10S.**
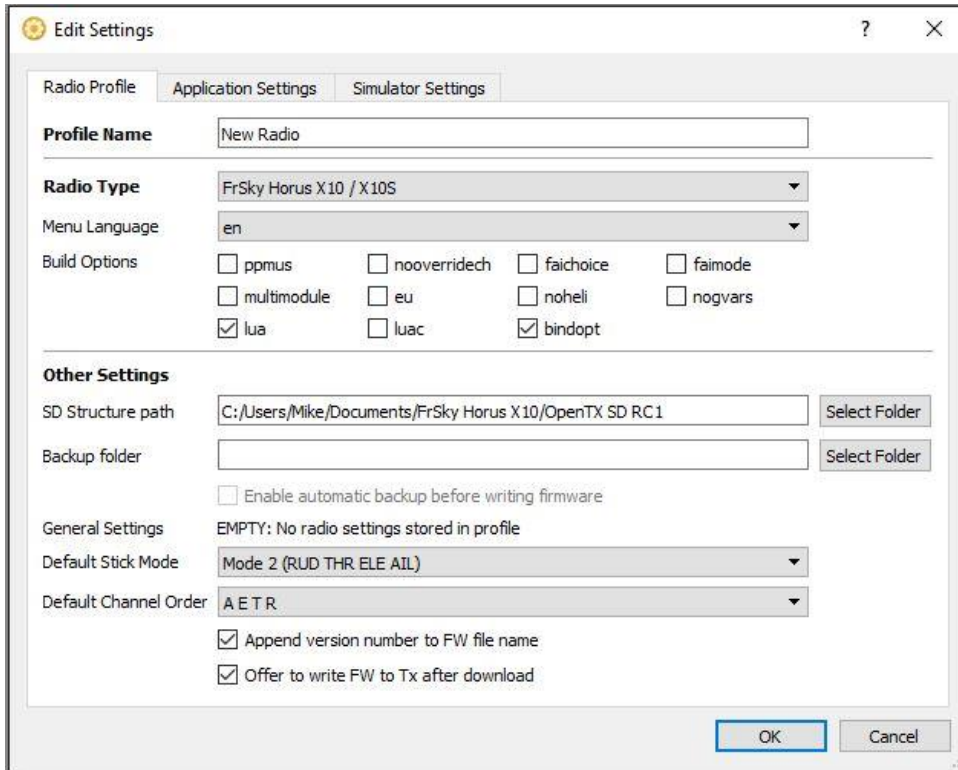
I'm using the optional Lua and bindop

11. In Settings/Application Settings check that the following boxes are checked.

Note: Select use release candidates until the production version is relased.

12. Start the download of the OpenTX Horus firmware by clicking down "arrow" icon on the top bar.   A window opens and then Click the "Download FW" button and save the firmware.
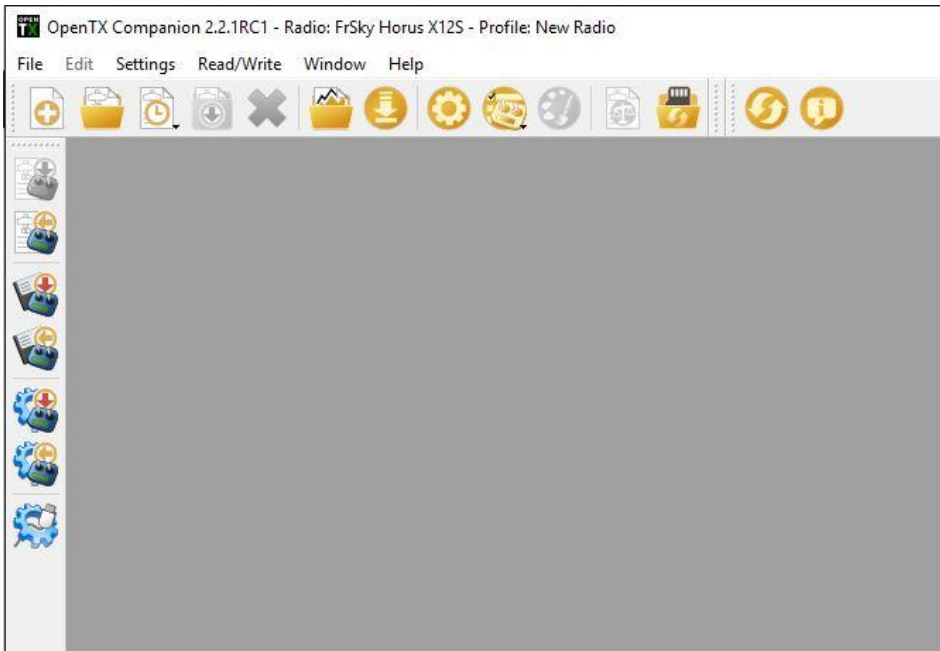
13. In Companion select "write firmware to radio" icon. It is the "radio" icon with the down arrow on the left of the screen. The window below opens. Check that the firmware that was just downloaded is displayed. If not click "Load" and select the OpenTX Hours firmware bin file. Check Hardware compatibility box may need to be unchecked.
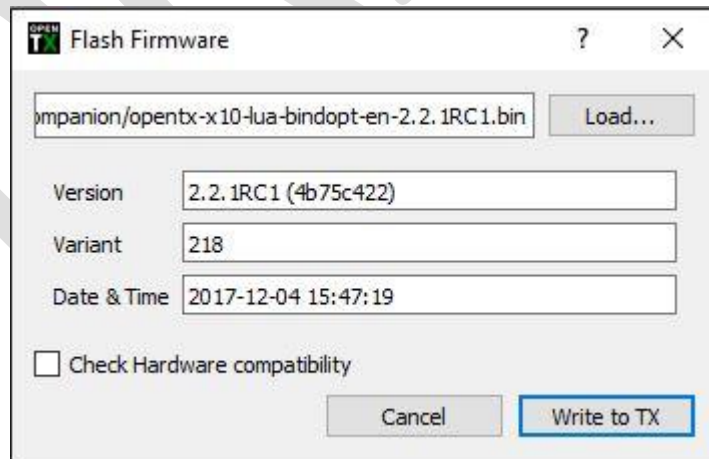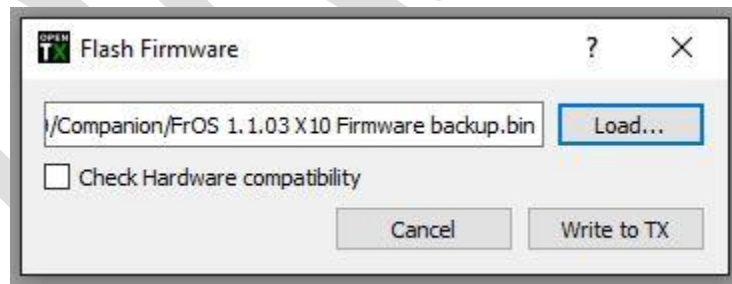

14. Click "Write to TX" and flash the X10S/X10.
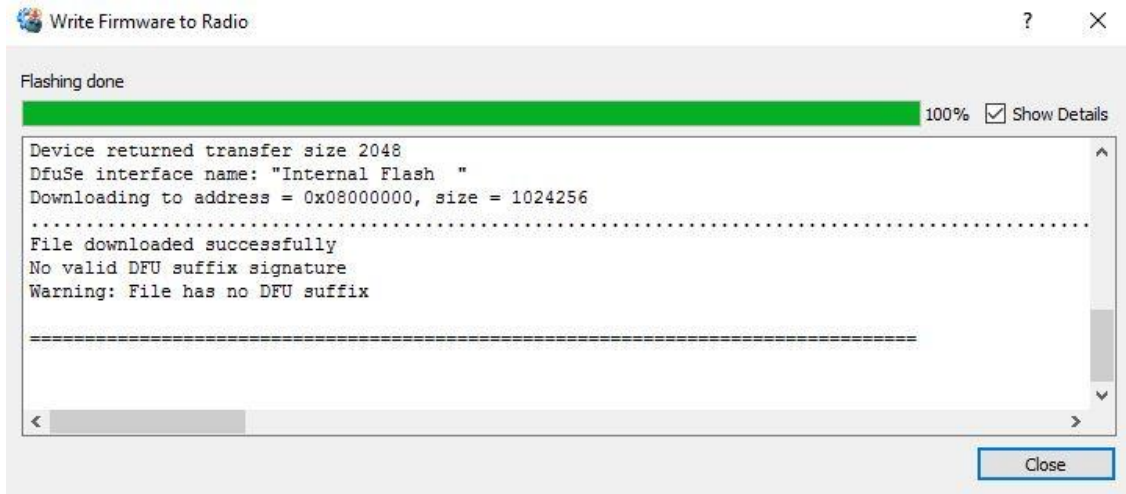
After the flashing is complete the OpenTX Companion screen looks like the above image.

15. Use "Safely Remove USB Hardware" feature on your computer to close the USB port.

16. Disconnect the X10S/X10 from the USB

17. Turn on the X10S/X10 and test (if this is the first OpenTX flash for the system it will start on the calibrate screen) Detailed testing of models should be done before flight to make sure the programming works as expected. Always range check the system in range check mode before flight.

    In the rare case that the X10S/X10 will not start after flashing, reconnect the X10S/X10 to the PC and re-flash the system. If the X10S/X10 system is not recognized by the PC then there is a possibility that a bad flash process has hung the system to be reset of the battery needs to be disconnected for a few minutes to fully shut down the system and then re-flash. In some cases the battery may need to be disconnected until the flashing process is complete. There is also a reset button behind the hole to the right of the SD card (looking with X10S/X10 face down)

Removing OpenTX Option 1 - Flashing the FrOS Bootloader and Firmware – Using the FrOS Companion Backup

1. This process will remove OpenTX and install the FrOS bootloader and the FrOS firmware.

2. With the X10S/X10 power off remove the OpenTX SD card from the X10S/X10
   The OpenTX SD card contains all the X10S/X10 OpenTX configuration information including the model files created while using OpenTX and can be used again starting with step #5 of the OpenTX flashing instructions, **but not before the FrOS folders are backed up**. See the Preparing X10S/X10 For OpnTX Flashing section on page 4.

3. Insert the FrOS SD card in the X10S/X10

4. With the X10S/X10 power off connect it to the computer with a USB data cable.

5. Start Companion. Make sure FrSky X10 radio is set and then select "write firmware to radio" icon, in the window that opens click "Load" and select the FrOS backup file that was made before OpenTX was flashed. Caution make sure the FxTX file is selected and not the OpenTX file. Check Hardware compatibility box may need to be unchecked.

6. Click "Write to TX" to flash the X10S/X10
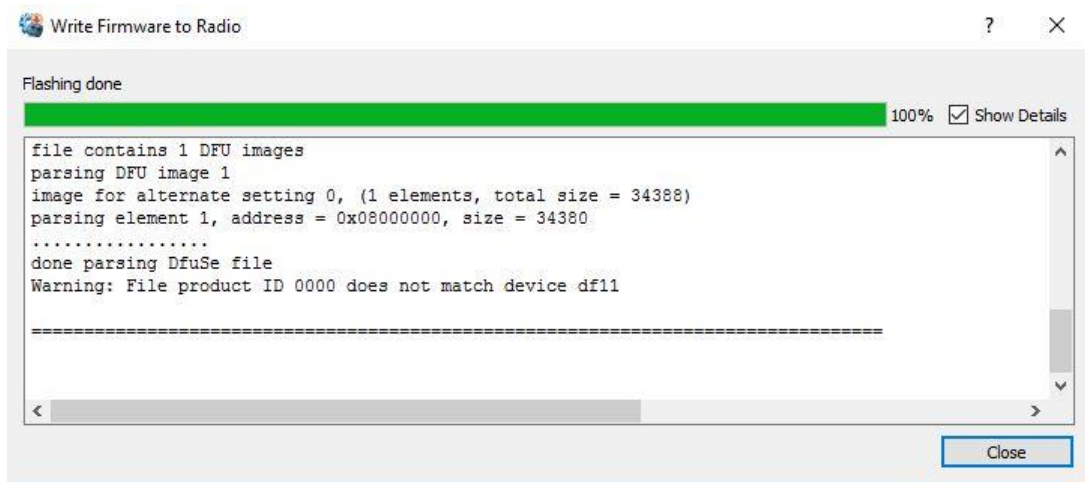
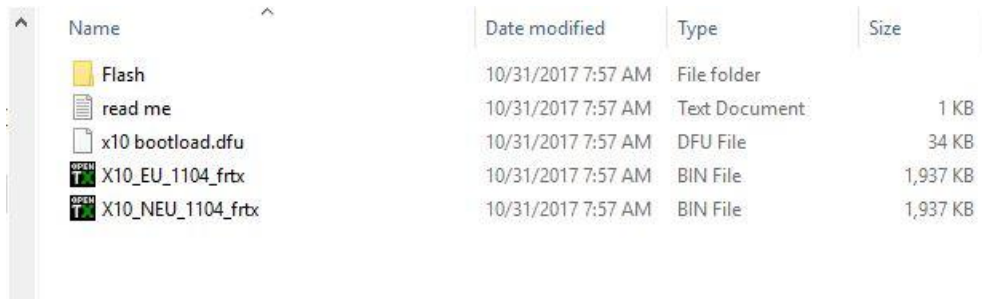After the flashing is complete the OpenTX Companion screen looks like the above image.

7. Use "Safely Remove USB Hardwar" feature on your computer to close the USB port.

8. Disconnect the X10S/X10 from the USB

At this point the system has OpenTX removed. Power on the system and it should be restored to FrOS.

Removing OpenTX Option 2 - Flashing the FrOS boot dfu – Two Steps Using FrOS Files

1. This process will remove OpenTX and install the FrOS bootloader, but no FrOS firmware. The firmware is installed in a second step.

2. With the X10S/X10 power off remove the OpenTX SD card from the X10S/X10 The OpenTX SD card contains all the X10S/X10 OpenTX configuration information including the model files created while using OpenTX and can be used again starting with step #5 of the OpenTX flashing instructions, **but not before the FrOS folders are backed up**. See the Preparing X10S/X10 For OpnTX Flashing section on page 4.

This process assumes you have the FrOS bootload **dfu** file from the X10S/X10 download on the FrSky Website saved on your computer.


Example file list from the FrSky website showing **Dfu** Bootload file.

3. With the X10S/X10 power off connect it to the computer with a USB data cable.

4. Start Companion, In settings, make sure the Radio Type is set to FrSky Horus, then select "write firmware to radio" icon, in the window that opens click "Load" and select the **dfu** file. Caution make sure the FxOS file is selected and not the OpenTX file.
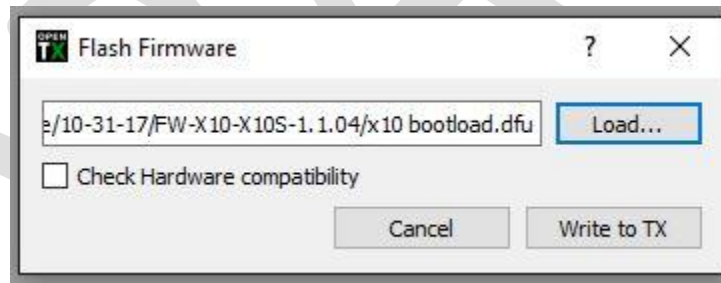
Click "Write to TX" to flash the X10S/X10.
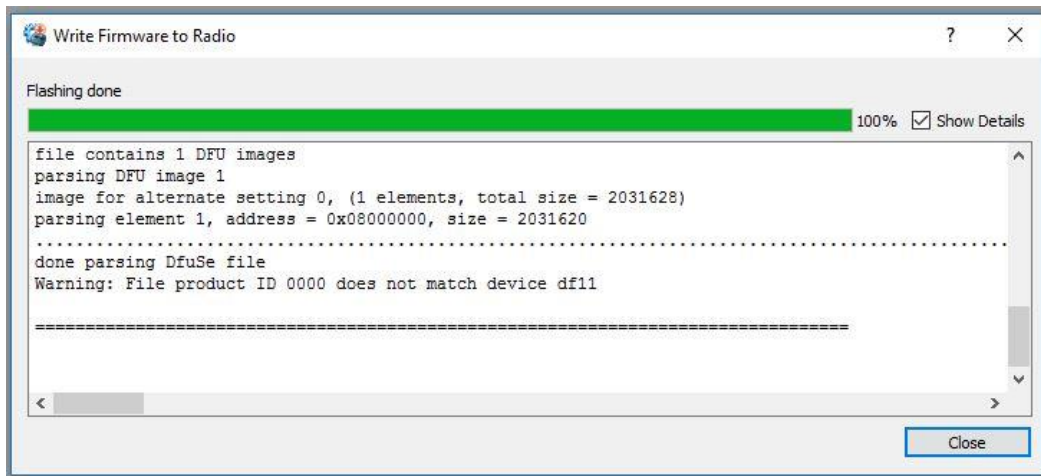
After the flashing is complete the OpenTX Companion screen similar text but not the same to the above image.

5. Use "Safely Remove USB Hardwar" feature on your computer to close the USB port.

6. Disconnect the X10S/X10 from the USB. At this point the system is ready for the actual firmware installation using the "Normal FrOS OS Firmware Update – Using Firmware Bin File" listed below. Please note that the system only has the bootload file installed, cannot start and the FrOS firmware bin file will need to be copied to the SD card using a Windows computer.

Normal FrOS Firmware Update – Using Firmware Bin Files

This process is for performing a FrOS **bin** file update on systems that are currently operating with the FrOS.

Warning

These instructions assume the user has knowledge and experience with copying files with their Windows computer. Significate caution must be used with connecting and disconnecting the X10S and X10 from the windows computer and the file copy process. Accidently copying the wrong file or deleting system files from the internal X10S and

1. From the FrSky Firmware Download Website, X10S https://www.frsky-rc.com/x10s/ and X10 https://www.frsky-rc.com/x10/ . Download the X10S/X10 firmware zip file and un-zip the file.   Usually the builds are named X10_EU_XXXX_frtx for EU systems and X10_NEU_XXXX_Frtx (N=NOT EU).

2. Be sure to read the firmware "read me" document for information on the update changes, fixes and new features. There can be new files that need to be added to the flash memory drive, or new features that need folders to be created, etc.

3. The firmware **bin** file copy function can be done by connecting the powered on X10X to your Windows computer with a data USB cable or removing the SD card and writing directly to the SD card.

4. When the powered on X10X is connected with the data USB cable two Windows File Explores will appear within a minute, one for the SD card and one for the Flash Memory Drive.

5. Copy the correct FrOS firmware **bin** file for your system to the SD FIRMWARE folder. Caution. Only **ONE** file can be in this folder. If computers other than Windows computers are used trash files might be copied with the firmware folder and the update will not work

6. Caution. Always use the "Safely Remove USB Hardwar" eject feature on your computer to close the USB ports.

7. Disconnect the X10X from the USB

8. Press and **hold** the rotary encoder down (the enter knob) and **at the same time press and hold** the power switch until the first text is displayed on the screen.

    See below:

The firmware flashing process will run and finish with a "Successful" press the power off button briefly and the system shuts off.

9. Next. Press hold the power switch until the first text is displayed on the screen.

See below:

10. The IXJT firmware flashing process runs with an ending message to "restart system please" and shuts off automatically.

11. Press the power switch to start the system. The system should have the normal FrOS screen with all models, etc.

12. The version number of the firmware is displayed on the info screen. Press SYS to select the System screen.
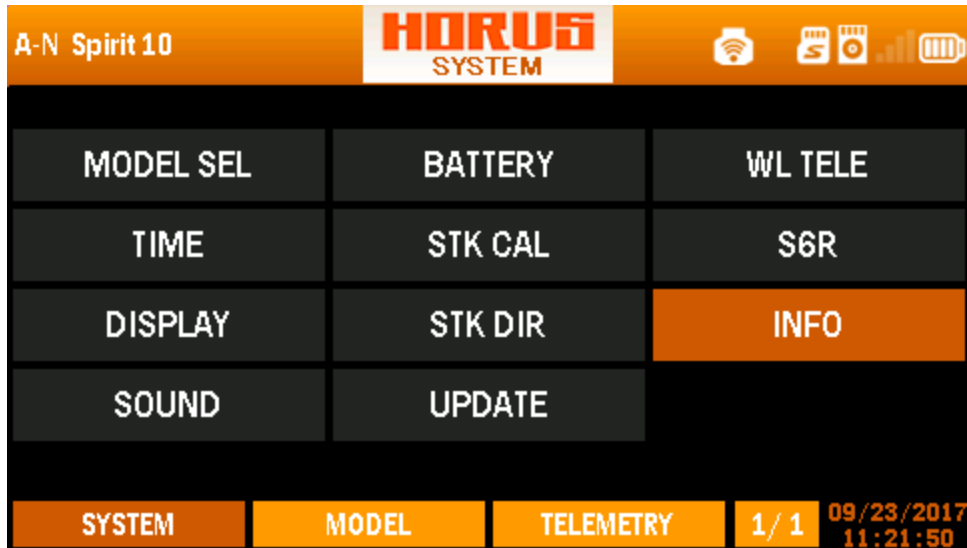
At the System screen select INFO.
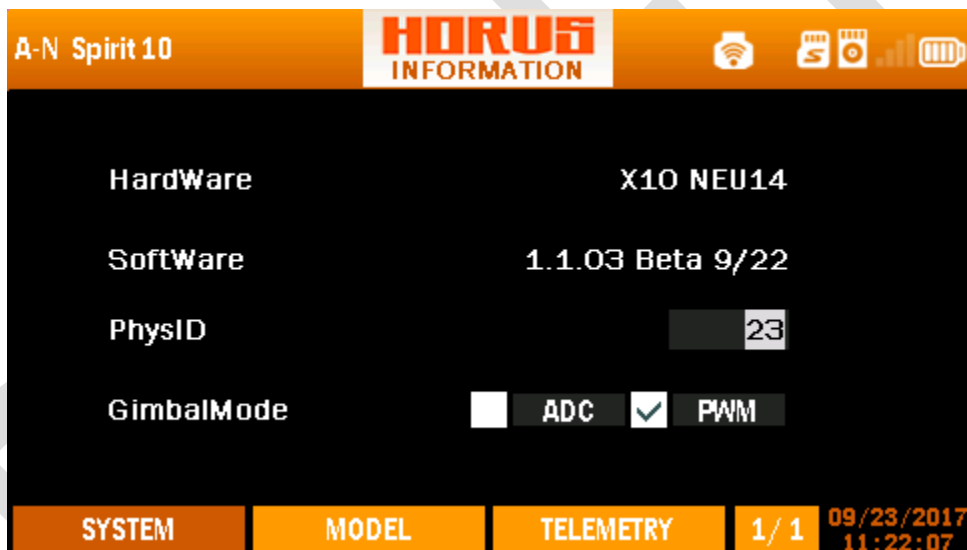
INFO screen.

FrOS Sound and Image Files

Audio Files

WAV -TRACK FOLDER - Flash Memory Drive. Size < 100K; Number <100; name length <10 chars (.wav not included); format should be .wav. Track wav files are the user created files that are used with Special Functions.

If more than a few custom sounds are planned rather than using up space on the

internal USB Flash Memory drive the least used sound files can be stored on the SD card. The files need to be in a path on the SD card that is the same path that is used on the Flash Memory drive. The path on the SD would be SOUNDS\en\Track. When programming a sound in Special Function the system looks for the sound on the Flash Memory drive first and then the SD card.

Model Sounds - Size < 50k ,format should be .wav;, name length < 30. path: SOUNDS/en/model. Model sounds are the user created files that speak the model name when models are selected.

OpenTX Speaker is an easy way to create WAV files http://www.open-tx.org/2014/03/15/opentx-speaker

Image Files

Size 50K or less, max number <100, name length up to 30 chars (.jpg extensions not included), format jpg 155x100 (larger or smaller size will not display as well, cut off, etc..

The Model images go in the folder IMAGES/modelimages on the Flash Memory drive.

Starting with FrOS 1.1.04 and later model images can also be stored on the SD card by creating a SD folder IMAGES/modelimages and placing the image files in the folder.

Smart Port Flashing of Devices with X10S/X10 FrOS OS

1. The smart port flashing feature can be used to flash FrSky products that have smart ports like X receivers, XJT module, Redundancy Bus, etc. **Caution: Because the TX voltage is used for power when you flash devices make sure there is nothing connected to the device, servos, etc.** The IXJT internal RF module can only be flashed as part of the normal FrOS firmware update.

2. Copy the file to be flashed to the X10S/X10 SD card FIRMWARE folder. If the file name is too long it many need to be renamed shorter to appear in the X10S/X10 update selection window.
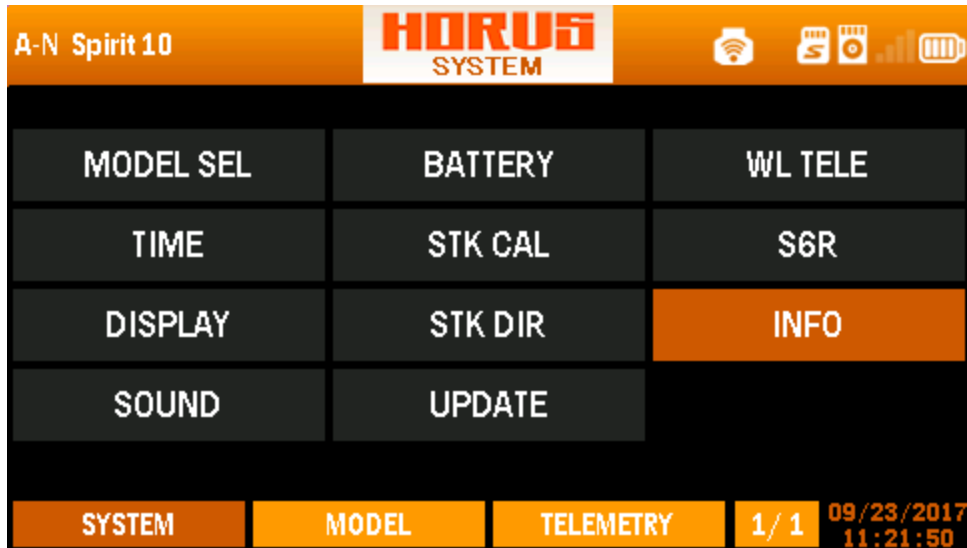
3. With the X10S/X10 powered off connect the cable to the lower three pins of the module bay connector (yellow on the lowest pin) and to the Redundancy Bus.
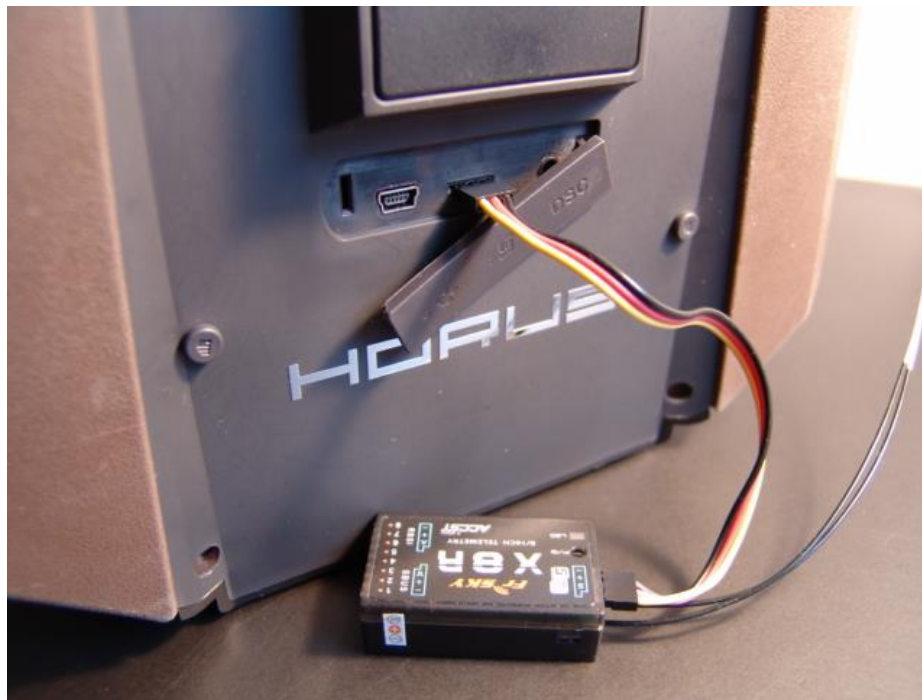
4. The connection of a X8R to the X10S/X10 Smart Port. Note the yellow wire is the signal wire.

5. Power on the X10S/X10. At the main screen press SYS.
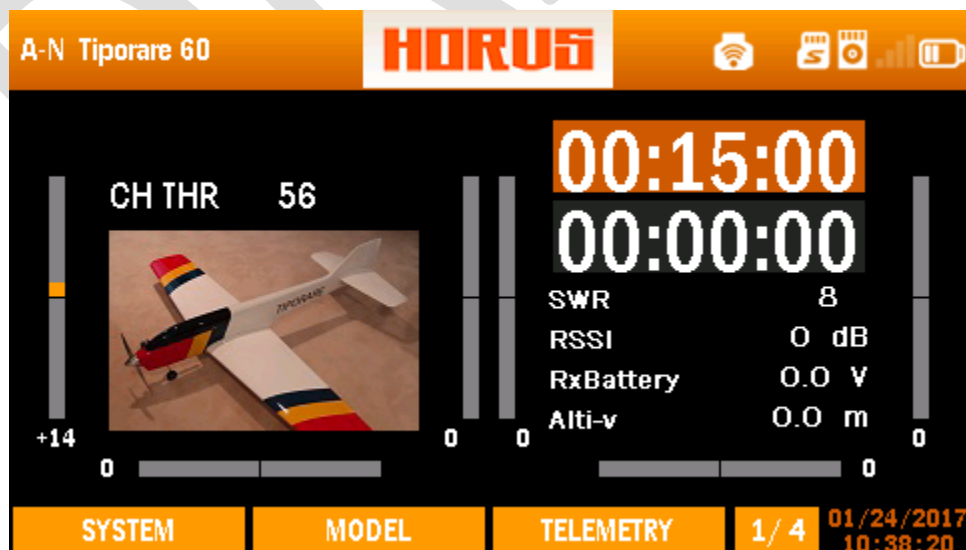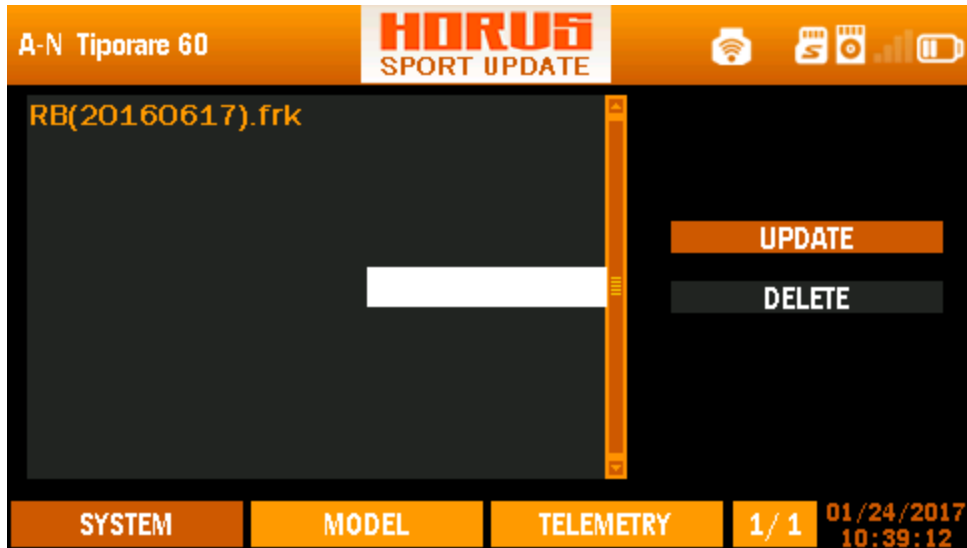

6. At the SYSTEM screen select UPDATE

7. At the SPORT UPDATE Screen select the file to be flashed and select UPDATE

8. When UPDATE is selected a flash progress bar pops up.

9. The progress bar during flashing.

10. When the flashing is complete the progress bar closes and SUCCESS is displayed.

11. SUCCESS is displayed. The delete function can be used to delete the file.

12. Power the X12 off and disconnect the Smart Port cable. As always carefully test any device flashed to make sure it functions correctly.

Happy Flying!