Information Sheet IS24003

VX Series: Creating a New OS SD Card Image

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INFORMATION SHEET

1 INTRODUCTION
This document provides instructions to create a new OS SD card image. This is achieved by downloading a new OS image from the Nautel FTP server, burning the image to an SD card, and installing the SD card into the VX transmitter. You will be required to configure calibration offsets and factors, relicense the transmitter, update the OS password, and other finishing steps.

1.1 Equipment Affected
This procedure applies to all VX series transmitters.

1.2 Responsibility for Implementation of Procedure
This procedure should be carried out by qualified station maintenance personnel who are familiar with VX series transmitters. Personnel should be familiar with SSH (secure shell) and serial communication.

1.3 Scheduling
This procedure should be completed at the earliest convenience of the transmitter maintenance personnel. Some off-air time will be required for installation and configuration of the SD card.

1.4 Manpower Requirements
Implementing these instructions requires one (1) person for approximately one (1) hour.

1.5 Special Tools/Test Equipment

- Anti-static mat and wrist strap (recommended)
- PC or laptop with an SD card reader/writer or SD card reader/writer to USB Adapter
- Straight-through serial cable (only required if SSH is unavailable)
- RJ45 to serial adapter (only required if SSH is unavailable)
- Serial to USB adapter (only required if SSH is unavailable)
- Image-burning software (e.g., Balana Etcher or suitable equivalent)
- Terminal emulator software (e.g., Tera Term, PuTTy or suitable equivalent)
  Visit http://www3.nautel.com/Utilities/puTTy/putty.exe
- Your transmitter's factory test report, shipped with the transmitter (see **NOTE** below)
- Contact Customer Service with your transmitter's model and serial number to obtain the unique licensing files for the VX: **License.json** and **License.json.sha512**

NOTE

The factory test report that shipped with the transmitter contains important calibration offsets and factors that will be required for this procedure, including:

Forward Power Calibration Factor
Reflected Power Calibration Offset
Analog Left Calibration Factor
Analog Right Calibration Factor
MPX 1 Calibration Factor
MPX 2 Calibration Factor
Frequency Calibration Factor

If any PWBs have been replaced on the VX transmitter since factory delivery, or if you cannot locate the factory test report, contact Nautel Customer Service to ensure that you have the most current offsets and factors.

1.6 Publications Affected

This procedure does not affect the VX series documentation.

2 PREPARING THE SD CARD FOR THE TRANSMITTER

2.1 Downloading the VX OS Image

(a) From an internet browser navigate to the following address:

http://www3.nautel.com/pub/VX_Series/ (see Figure 1).

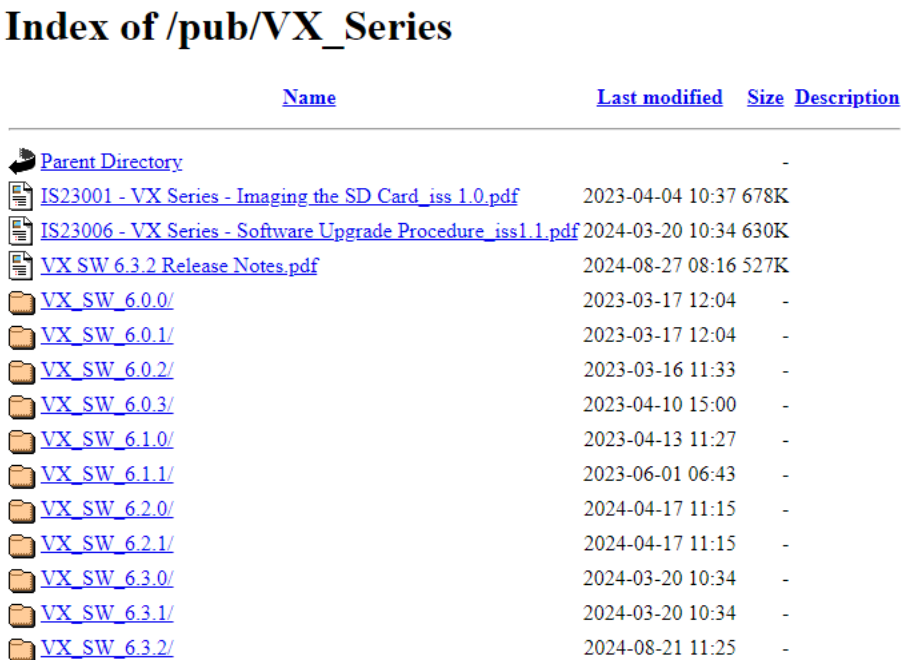

Figure 1: VX Series OS Directories

(b) Locate the desired OS Version and download the image for the SD Card. Typically, you will want the most current image. Click on the subdirectory “VX_SW_#.#.#/” where “#.#.#/” is the most current version. i.e., VX_SW_6.3.1 is newer than VX_SW_6.3.0. If unsure of the correct version to use, contact Nautel Customer Service for assistance.

(c) In the sub directory click on the filename link ending in “img.zip” to begin the download of the OS image file.

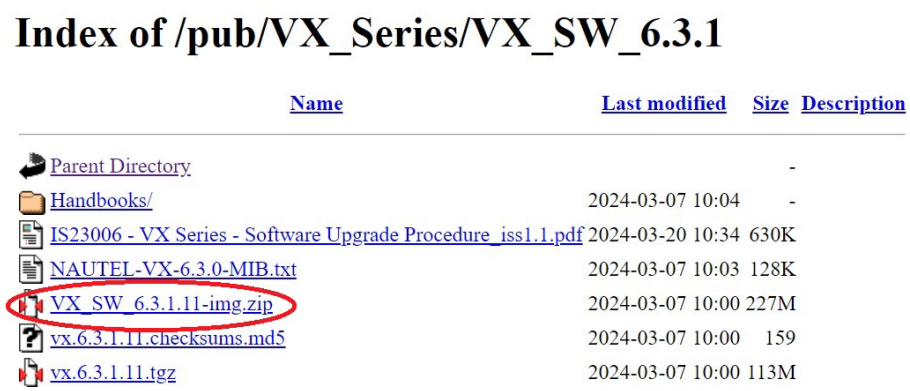

Figure 2: Typical image file name

2.2 Burning the OS Image to the SD Card

(a) Once the file is downloaded (see paragraph 2.1), extract it to a known location. The extracted file will have an extension of ".img". Image the SD card with the ".img" file using an appropriate imaging software.

NOTE

For further assistance burning the OS image to the SD card, refer to Appendix A.

2.3 Installing the VX OS SD Card in the Transmitter

(a) Ensure the transmitter is powered off by disconnecting the Ac power cable from the **AC IN** connector on the rear panel.

(b) At the rear of the transmitter, locate the **SD CARD** slot, noting it is between the **ANALOG AUDIO** and **AES/EBU** connectors (see Figure 3). If there is an existing SD card already installed, press inward on the card using a small flat tool (e.g., coin, screwdriver or pen) until you hear a click, then release the pressure to allow the SD card to eject slightly. Remove the SD card from its slot.

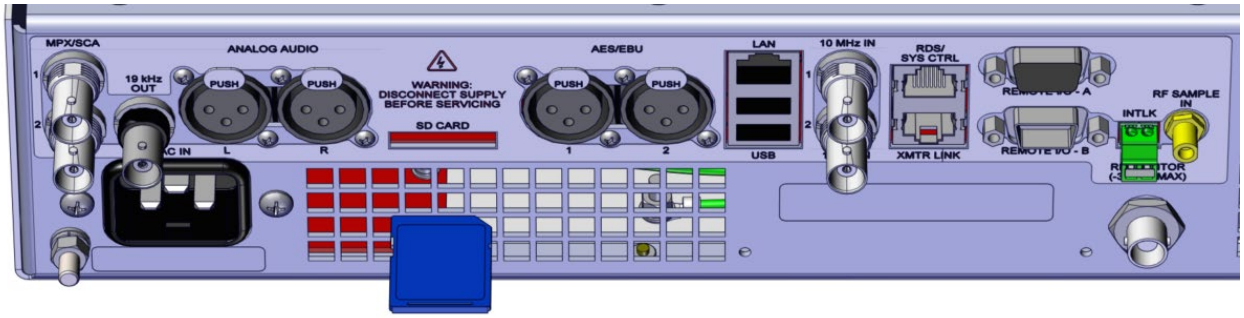

Figure 3: VX Transmitter Rear View, showing SD card slot and correct SD card orientation

(c) Install the SD card burned in paragraph 2.2 in the **SD CARD** slot with the notched corner forward and to the right (see Figure 3), until you hear a click. If necessary, use a small flat tool (e.g., coin, screwdriver or pen) to fully insert the SD card. Typically, the SD card is properly inserted when you can no longer remove it with your hand.

(d) Reconnect the ac power cable to the transmitter and proceed to paragraph 3.

3 CONFIGURING THE TRANSMITTER

NOTE

If transmitter does not start correctly, disconnect ac power and ensure the SD card is correctly inserted by repeating paragraph 2.3.

(a) Complete the transmitter's initial Setup Wizard with your site-specific parameters: Frequency, Audio Source, etc.

(b) After the completing the Setup Wizard, the following alarms will be present (they will be addressed later):

- **No Nameplate License**
- **Invalid License(s)**
- **Need to run auto-bias routine**

(c) Use the transmitter's front panel user interface (FPUI) to navigate to the **Network** menu option and configure the network settings. Consult with your Network Administrator for the appropriate settings.

(d) Confirm that you can connect to the transmitter using the AUI via HTTPS, as follows:

- Connect a computer to the same network and same subnet as the transmitter.
- From an internet browser, input the transmitter's IP address in the address bar.
- User-entered login credentials for the AUI will be replaced with the factory default.
    - User: Admin (case sensitive) Password: change_me
- It is recommended that you change the administrator password. For more information, refer to the Operations & Maintenance Manual.

(e) Navigate to the FPUI's **Settings ► Transmitter** menu. Observe the transmitter's factory test report (see paragraph 1.5) and enter the calibration information in the appropriate sub menu as follows:

NOTE

In the transmitter's factory test report, the names may differ from what is displayed on the FPUI (e.g., Forward Power Calibration Factor).

Settings ► Transmitter ► Calibration menu:

- Forward Power Calibration Value (default = 1)
- Reflected Power Calibration Value (default = 5)
- Analog Left Calibration Value (default = 1)
- Analog Right Calibration Value (default = 1)
- MPX/SCA 1 Calibration Value (default = 1)
- MPX/SCA 2 Calibration Value (default = 1)

NOTE

In the transmitter's factory test report, the Frequency Calibration Factor value is called VCXO 10 MHz DAC Value in the FPUI.

Settings ► Transmitter ► Exciter VCXO menu:

- VCXO 10 MHz DAC Value

(f) Ensure that RF is off and that the external interlock is connected and is operating in the closed position.

(g) Navigate to the FPUI's **Settings ► Transmitter** menu and run the **Auto-Bias Routine**. For more information, refer to the Operations & Maintenance Manual.

4 RE-LICENSING THE TRANSMITTER

NOTE

Failure to relicense the transmitter will result in having the transmitter operate in an unlicensed configuration, which may limit output power and present unexpected fault indications. Table 1 shows the power restrictions for unlicensed configurations.

Table 1: Maximum Power Capability for Unlicensed VX Series Transmitters

VX Transmitter	Maximum Unlicensed Power
VX150, VX300, VX600	165 W
VX1	400 W*
VX1.5, VX2	1650 W
VX3, VX3.5, VX4	3300 W
VX5, VX6	5500 W
* - an unlicensed VX1 will report a PA failure due to the absence of PA2 current. This will trigger a PA failure foldback condition, restricting maximum power to 400 W.	

4.1 Obtaining the Licensing Files

(a) Contact Nautel Customer Service to obtain the VX licensing files. The contents of the files are unique to each VX transmitter and are matched to its serial number. The licensing files should have the following file names:

- license.json
- license.json.sha512

4.2 Installing Licensing Files

(a) Install the licensing files using one of two methods:

i. ***Recommended***: establish an SSH or serial connection to the OS console, then copy and paste the licensing files (see paragraph 4.2.1 for details)

ii. ***Alternative***: apply the license though the transmitter's FPUI by manually inputting the licensing key (see paragraph 4.2.2 for details).

4.2.1 INSTALLING LICENSING FILES USING SSH OR SERIAL

Connect to the VX transmitter's OS console via SSH (see 4.2.1.1) or serial (see 4.2.1.2) connection using an application like PuTTY or Tera Term.

NOTE

Either method described in paragraph 4.2.1.1 or 4.2.1.2 is recommended, as you will require an SSH or serial connection to change the OS password in paragraph 5.

4.2.1.1 Connect to the VX OS Console using SSH

(a) Ensure the computer you are using has the licensing files obtained from paragraph 4.1.

(b) Configure the computer's network settings to be on the same network as the transmitter, as in step 3 (c).

(c) Use a terminal emulator application like PuTTY or Tera Term to connect to the transmitter via SSH using Port 22.

(d) Log in with the following credentials:
User: nautel
Password: nautel

(e) Change to the root user by entering 'su root' at the prompt. The password is 'nautel'.

(f) You are now properly logged into the OS console using SSH. Proceed to paragraph 4.2.1.3 to complete the licensing procedure.

4.2.1.2 Connect to the VX OS Console using Serial

(a) Connect a straight-through serial cable using the appropriate adapters, if necessary, between your computer and the **RDS/SYS CTRL** port on the rear of the transmitter to complete the physical serial connection.

(b) Your computer will assign a COM port for this connection. On a Windows machine you can view your COM ports from the Device Manager application or by entering "mode" from the command prompt.

(c) Using a terminal emulator application like PuTTY or Tera Term, configure the session as follows:

- COM: computer assigned
- Baud Rate: 115200
- Data bits: 8
- Stop bits: 1
- Parity: None
- Flow control: Off

(d) Login using the user: "root" and password: "nautel"

(e) You are now properly logged into the OS console using SSH. Proceed to paragraph 4.2.1.3 to complete the licensing procedure.

4.2.1.3 Completing Licensing

(a) Ensure the computer you are using has the licensing files obtained from paragraph 4.1.

(b) Navigate to the location of the downloaded licensing files and use Notepad (or suitable equivalent) to open the licensing file, license.json. Copy its contents in full.

(c) From the SSH/Serial VX OS session input the following command:

NOTE

The Notepad copied content from step (b) is pasted in the command line between the quotation marks (exclude the brackets in the command line).

echo -n '(paste the contents of license.json file here)' **> /data/nautel/fwsettings/license.json**

(d) From the location of the downloaded licensing files and use Notepad (or suitable equivalent) to open the licensing file, license.json.sha512. Copy its contents in full.

(e) From the SSH/Serial VX OS session input the following command:

NOTE

The Notepad copied content from step (d) is pasted in the command line between the quotation marks (exclude the brackets in the command line).

echo -n '(paste the contents of license.json.sha512 file here)**' > /data/nautel/fwsettings/license.json.sha512**

(f) From the SSH/Serial VX OS session, enter the reboot command and the transmitter will be rebooted and load the new license.

4.2.2 INSTALLING LICENSING FILES USING THE FPUI

(a) Use the transmitter's FPUI to navigate to the **Software ► Nameplate License** menu.

(b) On your computer, navigate to the location of the downloaded licensing files and use Notepad (or suitable equivalent) to open the licensing file, license.json. Find the following: "NAMEPLATE license","data" : "

- If the VX model has five (5) characters, such as VX1.5 or VX600 (a decimal place is considered a character), enter 31 characters following the data" : " in the FPUI's VX Nameplate license field.

- If the VX model has three (3) characters, such as VX2 or VX6, enter 29 characters following the data" : " in the FPUI's VX Nameplate license field.

(c) Select Save. When the "Save changes? Transmitter will reboot and previous license will be lost." dialog appears, select Confirm to reboot.

(d) If your transmitter has VX OS 6.3.1 (or earlier) installed, the message in step (c) will not appear. In this case manually reboot the transmitter by navigating to the FPUI's **Software ► Reboot Exciter/Controller** menu.

NOTE

The license key can contain characters such as hyphens (–) and ampersands (&). When entering a 29-character licensing key, the last two fields will be left blank as shown in Figure 4.

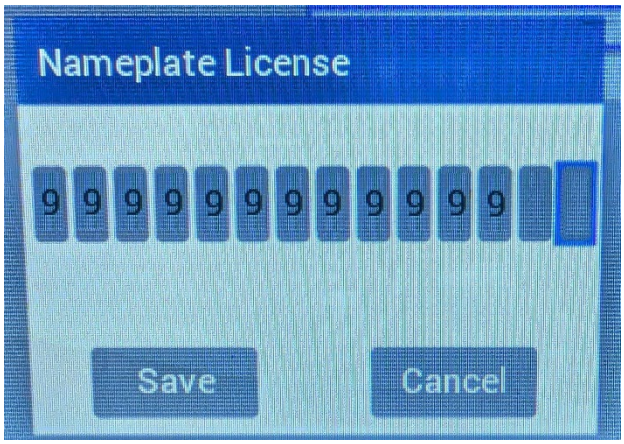

Figure 4: Entering a 29-character length licensing key

5 CHANGING THE OS PASSWORD

NOTE

Nautel strongly recommends that you change the OS Password from the software image default. You can change it to any password desired, however, please record it and keep it safe.

Alternatively, you may wish to reuse the factory applied, unique password, as found in the documentation shipped with your transmitter. Nautel retains a record of these factory configured passwords for Customer Service, if required.

(a) Log into the VX OS using SSH or serial as described in paragraph 4.2.1.

(b) At the prompt type the following:

- Enter the command ‘passwd root’
- When prompted enter the new password for root user
- When prompted enter the new password again
- Enter the command ‘passwd nautel’
- When prompted enter the new password for nautel user
- When prompted enter the new password again

(c) While still logged into the VX OS, enter the command “reboot” to reboot the transmitter.

(d) After the transmitter reboots, log into the transmitter via SSH or serial as in paragraph 4.2.1.

(e) Log in to the VX OS using the newly configured password created in step (b).

(f) Confirm that you can log in to the VX OS and the prompt is displayed.

6 COMPLETING SETUP

(a) Verify the calibration factors and offsets set in step 3 (e) are correct.

(b) While logged into the remote AUI, select the three (3) horizontal bars on the top right of the AUI window to display the Main Menu. Select **Presets** to open the presets page and add or modify presets as required. For more information, refer to the Operations & Maintenance Manual.

(c) Verify the following alarms are no longer present:

- **No Nameplate License**: see paragraph 3, step (b)
- **Invalid License(s)**: see paragraph 3, step (b)
- **Need to run auto-bias routine**: see paragraph 3, step (g)

(d) If any of the alarms in step (c) are present, go to their corresponding paragraph and step and repeat the procedure. If you are unable to resolve these or any other alarms, contact Nautel Customer Service for assistance.

APPENDIX A

A1 IDENTIFYING THE DISK NUMBER FOR THE SD CARD

NOTE

This procedure can be performed on Windows, Linux or MacOS operating systems. The instructions for Windows are described in this document. For Linux and MacOS, instructions may vary when installing and identifying media.

(a) Using a PC or laptop, connect the SD card using the **SD CARD** slot or SD card to USB adapter, and allow it to be recognized by your OS.

(b) Gain access to the 'Computer Management' application. This can be done using various methods. Examples are:

i. For Windows 10 and 11: click the search icon (next to the Start button), type 'computer management' and select the Computer Management application.

ii. For Windows 7: click the Start button, type 'compmgmt.msc' in the 'search for programs and files' window and select the applicable program that appears.

(c) The Computer Management window will open. Select 'Disk Management' on the left.

(d) Identify which 'Disk' represents your SD card. You may have to disconnect the SD card to confirm the 'Disk' disappears. Record the 'Disk' name listed under the Volume column for future reference.

NOTE

*Windows may display a message prompting you to format the SD card. **DO NOT** do this. Cancel the window.*

A2 BURNING AN IMAGE TO THE SD CARD USING BALENA ETCHER SOFTWARE

WARNING

The following procedure will completely replace any existing data on the SD card.

(a) Connect the SD card to the PC or laptop using the **SD CARD** slot or SD to USB adapter and run Balena Etcher. **NOTE**: The SD card must be connected prior to running Balena Etcher.

Depending on your operating system and administrative rights, you may have to right-click on the SelfImage icon and select 'Run as administrator'.

(b) In Balena Etcher select 'Flash from File' (see Figure A-1), then use the browsing window to locate and select the .img file downloaded from the Nautel FTP site.

(c) Click **Select Target** (see Figure A-1), then click the 'checkbox' beside your 'Disk' (see Figure A-2), as determined in step A1 (d).

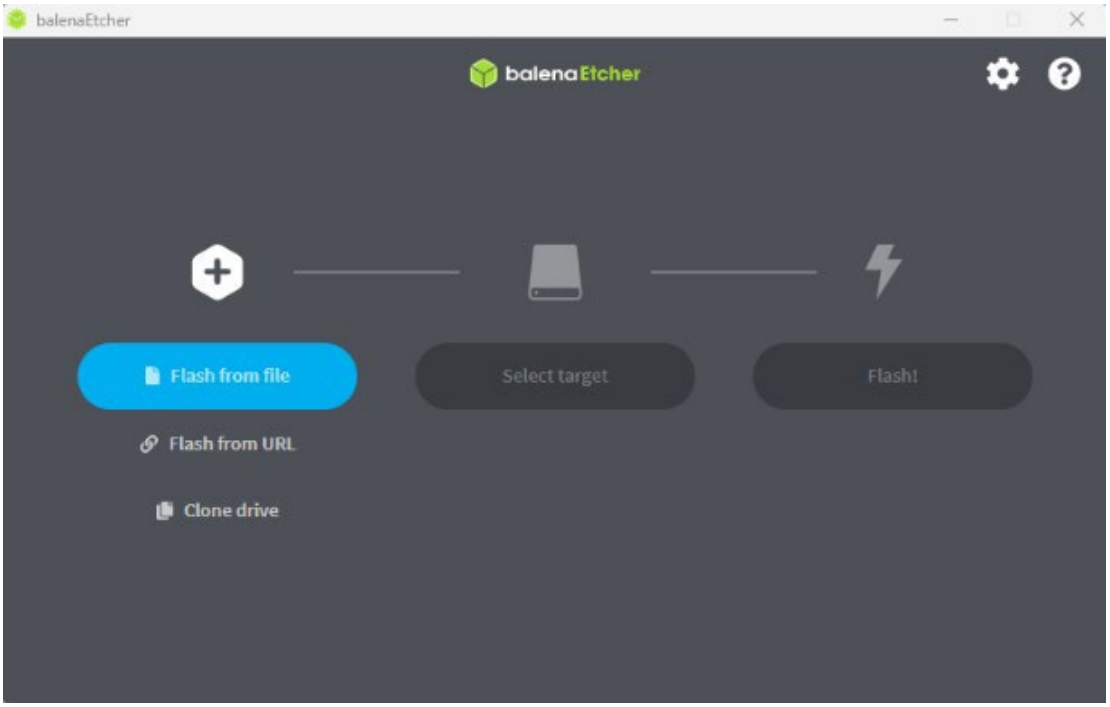

Figure A-1: Balena Etcher – Main Screen

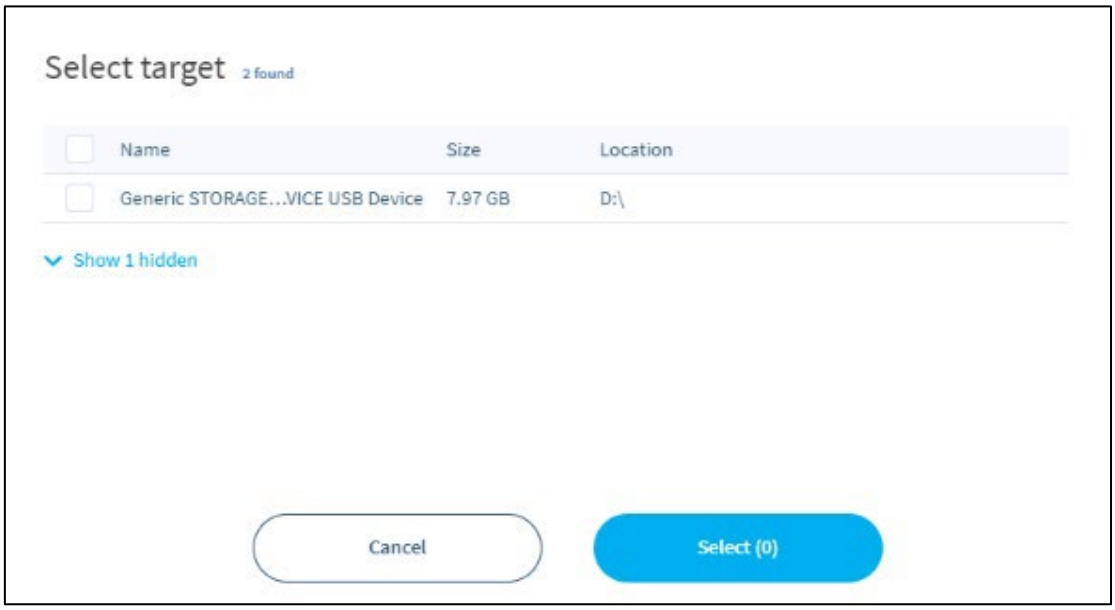

Figure A-2: Balena Etcher – Select Target Screen

(d) Click **Flash!** from the Balena etcher main screen. This process can take between 5 and 15 minutes. depending on the speed of your computer. A progress window appears (see Figure A-3) to indicate the progress.

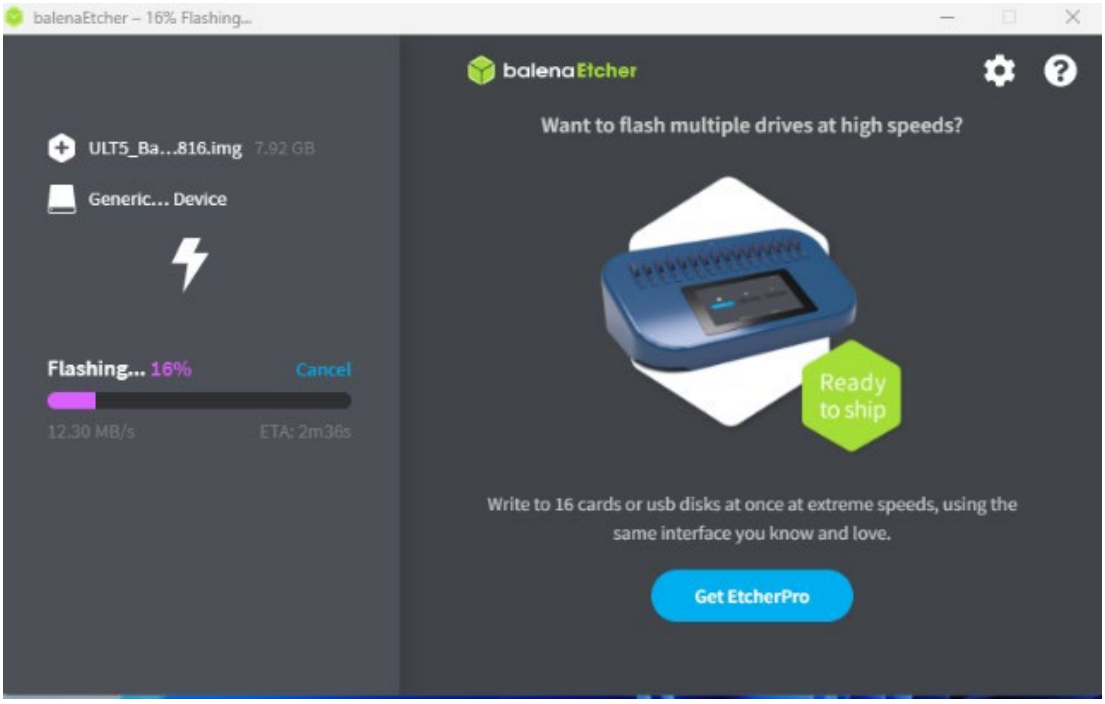

Figure A-3: Balena Etcher – Progress Window