SHUTTLE CONTROL FIRMWARE UPDATE PROCEDURE
(from v.1 to v.2 to v.3 and vice versa)

Why to update?

Endorphin.es continuously work on the new features and improvements as well as existing bug fixes.
It is recommended to use the last firmware update with appropriate web-editor to obtain the latest features and flawless module's behavior.
It is also possible to downgrade to v.1 firmware back in case you find it better.
For update procedure scroll down. *Warning* – during update procedure you will lose your presets and probably v3 calibration data.

FIRMWARE HISTORY AND DOWNLOAD (as zip archive or uncompressed DFU file):

Shuttle Control Cargo 3 v. 3.8 R2 – 13.01.18 (for OSX, Windows and DFU)
http://firmware.endorphin.es/Shuttle_v3_OSX_update.zip

v.3.8 (13.01.2018) R2 final release:
- Portamento/slew added for dynamic smoothing CC messages. CC#6 is reserved for slew amount. CC#6=0 or unchanged on power-up gives default smoothing (fast, but no steps). CC#6=127 gives maximum 2-3 seconds of smooth CC value change on a certain MIDI channel (thanks Iftah Gabbai for the hint, testing and video).
- Fixed monophonic notes allocation when mono and cycling poly setups occur in same preset (thanks Pauk for the hint)
- Fixed BPM clock: corrected to unipolar 0...+5V output (thanks Helmut Stant for the hint)

v.3.8 (12.11.2017) R1 release:
- MIDI clock delay eliminated. Initially that delay was set manually to a few extra samples to fit Machinedrum's audio output while MD's MIDI clock advanced ahead its audio out (thanks Alex Angst for the reminder)

v.3.8 (07.11.2017) initial:
- Increased dividers for MIDI Clock sync'd LFOs for more musical values (PPQN: /12, /24, /48, /96) so that LFO are slower (thanks Moritz Scharf for the hint)
- CC#14 is reserved for setting the amplitude of LFOs (tap, sync, cc based). By default (when no CC#14 is sent or CC#14 value is 127) is set to maximum (full amplitude). CC#14 value of 0 corresponds to silent output of certain LFO (thanks Greg Sullivan for the hint)
- Shuttle start-up animation updated. Shows current firmware version on power-up
- Only reserved CC#48 is accepted from MIDI Channel 10. All rest reserved CC numbers can be accepted from a certain set channel

v.3.7R (30.09.17 non-public beta):
- MPE implementation (thanks Roli team and Konstantin Hess especially)
- Auto-legato is always on. Same checkbox when on – enables all triggers set to 10ms instead to default 1ms. In v.3.5-3.6 works as auto-legato on-off (thanks Jon Simon for testing)

v.3.6R (03.08.17):
- Fixed auto-legato (thanks Iftah Gabbai for hint)
- Fixed pitch CV Calibrator. In case you obtain wrong pitch CV tracking, just enter to Calibrator from web editor and press WRITE (even with default values: https://www.endorphin.es/cargo3/calibration.php) or reinstall v.3.6R firmware. Then 1 and 1.2 v/oct tracking becomes proper (thanks Quinn Djinn for report)
- Fixed web MIDI editor and Calibration test notes playback (bugs occured probably because browser's new security updates. In case you experience long presets upload response with Chrome (under Windows 10), then enable that option: chrome://flags/#enable-midi-manager-dynamic-instantiation. If you experience Chrome hanging, we advice to close webMIDI browser tab earlier than switching off Shuttle Control from your computer (as a temporary solution)
- 1v/oct pitch CV merged with pitch bender of +/-2 semitones range added
- New pitch bender ranges (+/-2 semitones and +/-2 octaves (48 semitones) instead +/-2.5V, 0...+5V and inverted -5...0V unipolar (thanks Iftah Gabbai)
- AD envelope fixed (attack is finished to the end during note off) and sustain pedal works properly with ASR envelope
- All envelopes have expo-curves and apply velocity amplitude via velocity checkbox added (thanks James Holden for hint)
- Elektron Digitakt compatibility (thanks to Andrew Ostler from Expert Sleepers for hint and Hemi C. for testing)
- Sine wave oscillator that follows MIDI notes (thanks Iftah Gabbai). Two generators with root A at 440 hz and 432 hz added
- Added velocity trigger/gates based on voices (thanks Benjamin Kilchhofer). Before were only based on certain note only
- All polyphonic voices allocation rewritten. Now with 'keep voices' checkbox voices rotate each time the polyphony pressed is more than amount of allocated CV voices
- All iConnect+ devices compatibility is confirmed, just on every startup (interface + computer power-up) one have to load every MIDI/USB-MIDI device in iConnect's control panel (thanks Ove Holmqvist for test)

- MIDI clock reserved CC values #12 (divider), #13 (random distribution) and #48 (shuffle) are accepted exclusively from MIDI Channel 10. That is made to avoid issues with other devices, e.g. Octatrak whose CC#48 mapped on crossfader slider (thanks Leonardo Mirabal for hint)
- Checkbox added to disable Program change (presets switch) in Shuttle Control for a certain preset. If checkbox is enabled, then from that preset is impossible to switch to another preset or make preset dump (thanks Hemi C.)

v.3.5:
- Auto-legato SH-101 alike (thanks Christo Dessau). When checked for preset, then in all mono modes in current preset will be slide (with portamento amount defined by CC#5) only when you play legato (upcoming NOTE ON message comes earlier than previous NOTE OFF is received)
- Fixed 1v/oct pitch CV merged with pitch bender of +/-2 octaves range

v.3.4:
- LFO controlled by MIDI clock. Start/stop/continue doesn't influence the frequency, however after start/continue all LFOs are re-synchronized. Same as with random CV generators (controlled by MIDI clock), CC#12 is reserved for choosing the divider of incoming MIDI clock same as with random CV generators
- All notes off or 0xFF (system reset) commands (usually sent from DAW) don't reset pitch, CC and rest generators values at CV outputs
- 1v/oct pitch CV merged with pitch bender of +/-2 octaves range added

v.3.3:
- Arpeggiator. Tempo is continuously generated under incoming MIDI clock (Start/stop/continue do not work here). CC#11 is reserved for choosing the divider for incoming MIDI clock (By default 1/16 (PPQN/6). If CC#11 is from 0 to 31, then 1/32 (PPQN/3). If from 32 till 63, then 1/16 (PPQN/6). If from 64 till 95, then 1/8 (PPQN/12), and if from 96 till 127, then 1/4 (PPQN/24). CC#50 is reserved for arpeggiator's shuffle (no shuffle at startup or if no CC#50 value was sent). CC#64 is reserved for sustain pedal (for arpeggiator's triggers/gates as well as for pitch/notes sequencing)
- Bank/presets reverse retrieve from Shuttle Control right into Web editor
- Various random CV generators that are generated under incoming MIDI clock. Start/continue enables them to generate and Stop makes them pause. Same as with CC#11 in arpeggiator, CC#12 here reserved for choosing the divider for incoming MIDI clock (1/32 (PPQN/3), 1/16 (PPQN/6), 1/8 (PPQN/12), and 1/4 (PPQN/24)). CC#13 is reserved for random CV distribution (for quantized and stored voltage generators)
- Save/load from/to cloud buttons of Web-editor are hidden on mobile browsers. Minor cosmetic edits to Web-editor
- 'Any voice' added for polyphonic modes for CV/Gate
- Additional pitch CV mode added that combines 1v/oct pitch CV merged with pitch bender (range: +/-1oct)

v.3.2:
- fixed all clock outputs shuffle – zero shuffle by default or when CC48/49=0. Also minor fix with Tap clock.
v.3.1:
- PPQN/96 divider works properly divided by 96 (was 128 before)
v.3.0 (Cargo 3 release):
- all notes lists shifted: C notes correspond to integer voltage values in 1v/oct mode. C3 corresponds to middle note (zero volts). MIDI note numbers acceptance: 0-120
- all notes correspond exact octaves as in Steinberg Cubase or Ableton Live piano-rolls
- Liine Lemur/Max MSP integration in terms of presets editing
- reverse preset sysex dump
- 'program change' message changes the preset number
- pitch CV calibrator to eliminate DAC scaling error for every of 16 CV outputs
- consequent notes generator for oscillators 1v/oct tuning
- probability and velocity based trigger/gates
- envelope and pulser function generators for simple AD/ASR actions
- fixed clock output
- shuffle for all clock generators
- new Fibonacci sequence tap-based clock generator
- more noise generators (brown, pink, 808 inspired noise sources useful for drum synthesis)
- more PPQN dividers added incl. separate trigger events for certain transport commands (start, stop, continue)
- source of uncertainty inspired random voltage generators incl. stored, quantized and fluctuating randomness
- polyphonic notes allocation modes
- named as 'Shuttle Control v3' in the list of your MIDI devices
- new startup animation :)

Shuttle Control v.2.0.16– 281215R

http://firmware.endorphin.es/Shuttle_Control_v2.0.16_281215.zip
http://firmware.endorphin.es/Shuttle_Control_v2.0.16_281215.dfu
http://firmware.endorphin.es/Shuttle_Control_v2_OSX_v2.0.16.zip - for OSX
- MIDI Sync code re-written. Now all output MIDI Sync pulses from Shuttle Control are sample-to-sample accurately synchronized to incoming MIDI Sync. Fine-tuned to work perfect with Elektron® gear along with any native based DAWs. In case you obtain shifted clock

output in relation to the notes played from the sequencer (e.g. 1/16- notes triggered with PPQN/6 MIDI Sync), simply press (send) STOP command on your sequencer/DAW in the beginning of your session and afterwards the clock will be synchronized.
- Shuttle Control now works with Elektron® TM-1 USB-MIDI interface out of the box (turbo mode is not supported).
- Polyphonic modes (for 2-8 voices) revised. Now the voices are allocated in cycling order thru the CV outputs in the manner as was introduced in first Oberheim and Sequential Circuits polyphonic synthesizers to avoid voices overlap and giving a natural polyphonic response. When new upcoming note comes in case all voices are busy (on), the place for this voice is taken (stolen) instead of the first pressed note and so on.

Shuttle Control v.2.0.2– 241115R

http://firmware.endorphin.es/Shuttle_Control_v2.0.2_241115.zip
http://firmware.endorphin.es/Shuttle_Control_v2.0.2_241115.dfu

- New editor with new features. V.2 editor isn't compatible with v.1 module's hardware and vice versa.
- Bi-directional host>device, device>host and host>host (host loopback) MIDI data transfer (incl. MIDI sync). You may play notes from USB-MIDI keyboard and besides outputting CV you may send all MIDI signal (or sync) into your DAW (PC/MAC/iOS) or vice versa. You may also return all sent MIDI signals from your MIDI keyboard to same MIDI output that acts as a midi thru to chain other MIDI devices. Shuttle module may become a bit warmer than earlier when using that feature.
- Tap LFO generators added. All the waveforms are same as LFO CC generators but controlled/synced from a three and more taps of a certain MIDI note.
- Fixed MIDI sync stability. All dividers are now properly synced to the main MIDI sync source to ensure stable precise synchronization from a sequencer or other MIDI devices (especially after multiple times of playback/restart commands etc).
- Start and Stop behavior change. MIDI clock outputs pulse triggers only after start (play/continue) is pressed and shuts off when stop is pressed nevertheless sends MIDI DAW MIDI sync continuously when stopped or no.
- More divisions for synchronization and Tap clock added.
- Velocity note added to obtain velocity from a certain MIDI note. That type of event is useful for making drum mappings with velocity/accent.
- All gate/trigger events now may be either uni-polar (0&+5v as before) but also bi-polar (-5v at 'off' and +5V at 'on' state). That may be useful when you need to have 10Vpp pulse signals, which you may offset afterwards.
- CC messages now can be either 'smoothed' (interpolated to 12-bit values without audible steps) or 'stepped' (direct 7-bit CC values).
- *CC#0* is replaced with '*any CC*' in all lists where output CV is based on certain CC number/value.
- '*Any note*' added in any list where event is based on a certain MIDI note.
- Portamento control in monophonic mode fixed. It is smooth now over the whole range of CC#5. Maximal sweep to note time extended.
- Original PID/VID of Shuttle Control licensed by USB-IF.
- Factory presets are loaded at web-editor startup by default. Clear factory presets button added.
- Fixed issue with SysEx dumps upload via USB CoreMIDI at Mac OS X.
- Shuttle Control now identifies as 'Shuttle Control v2' in MIDI devices and hardware list:

Shuttle Control v.1.0.1 – 150615R

http://firmware.endorphin.es/Shuttle_Control_v1.0.1_150615.zip
http://firmware.endorphin.es/Shuttle_Control_v1.0.1_150615.dfu

- Fixed trigger note response output messages for proper drum mapping.

v.1.0.

- Initial launch.

WARNING: after the update procedure all your V.1 presets will be lost – you have to re-generate them with the new Cargo2 editor.

UPDATE PROCEDURE ALGORITHM

1) Download and install free **DfuSe USB** device firmware upgrade STMicroelectronics extension (STSW-STM32080) from official STMicroelectronics web-site: http://www.st.com/web/en/catalog/tools/FM147/CL1794/SC961/SS1533/PF257916 Current version is 3.0.3 (3.0.5). No SMS or registration required to download the installer. It is recommended to have Windows XP or later version of operating system.

2) Download the latest Shuttle Control firmware update file (see download links above).

3) Turn off your Shuttle Control (or the whole modular rack in case Shuttle is powered from its busboard). Connect your Shuttle Control module to your PC via *to device* connector with supplied USB cable.

4) Power-on the Shuttle Control (or modular system where Shuttle powers from busboard) *while holding UP button* on the Shuttle Module. Hold the button up to 5 seconds after powered on and then release. Shuttle will be loaded into *DFU* (Direct Firmware Update) mode – no animation is started, the display will not light up and some of LEDs will randomly light up, however Windows will detect some new plug-n-play generic USB device which will be appear in your Windows Devices list (*STM32 Device in DFU Mode / STM32 BOOTLOADER*). Wait for a while until Windows installs driver for it – the usual procedure just like you insert ordinary USB-flash drive first time in your computer.
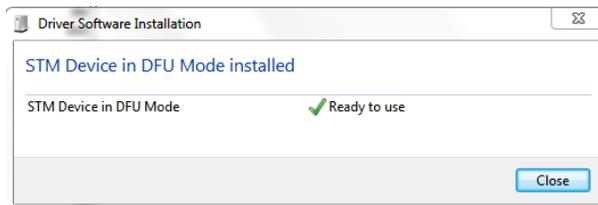
Don't afraid to see Shuttle Control being in DFU mode – any time you can exit it by turning Shuttle off and on again.

5) After Windows successfully installs drivers for new devices (they should be installed automatically after you installed DfuSe software) you may go to: *Start* > *All Programs* > *STMictoelectornics* > *DfuSe* > *DfuSe Demonstration*. You will see *STM Device in DFU Mode* in the available DFU Devices list:
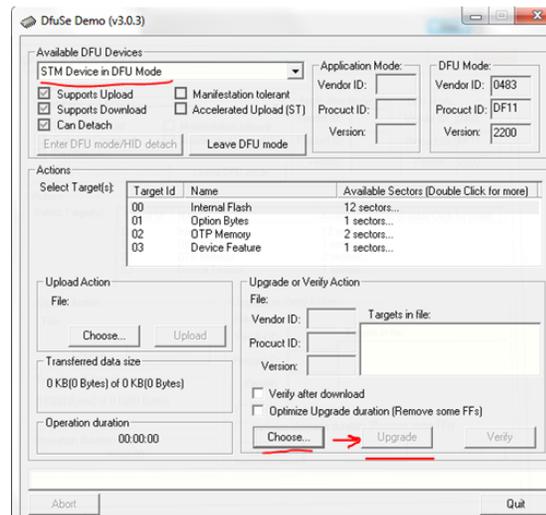
If your Shuttle still does not appear in the available DFU devices list, go to Control panel > Device Manager and find there STM32BOOTLOADER device marked with '!' sign. That means drivers were not automatically installed for it. Simply double click on that device and press *Update driver* > *Choose manually* and choose the folder where you have installed DfuSe before (usually it is located at *C:\Program Files (x86)\STMicroelectronics\Software\DfuSe v3.0.5*). Afterwards the driver will be installed and you may repeat that step 5) again.

6) After your Shuttle appeared in available DFU devices list, press *ChooseE* from *Upgrade or Verify Action* part of the window and after the new window will open – choose new firmware file (DFU) you've downloaded (see the links with firmware above).

7) Afterwards press *Upgrade* and wait until the operation will be finished (usually up to 10 seconds). Before updating you have to confirm that firmware file is correct for that device.
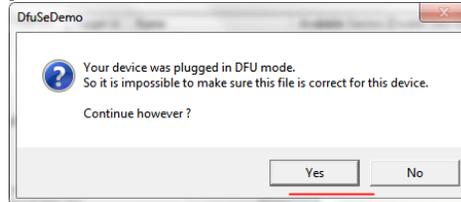
Don't disconnect or turn off the Shuttle during that procedure!

8) After upgrade operation is finished you will see successful green upgrade message in the bottom of DfuSe window:
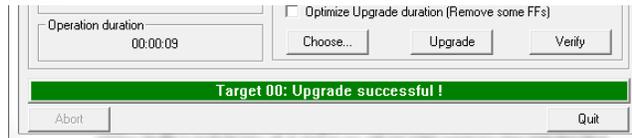
You may now quit DfuSe Demo and turn your Shuttle Control off and on again. If it's powered with own PSU – just turn the switch off and on. If it's powered from your powered busboard – simply turn the power of your modular rack off and on again.

9) Your Shuttle is ready for take-off. At start-up you will see some updated loading animation (first two lines appeared II means you are running v.2 firmware). You may use v.2 editor with all new listed above features. You will see your Shuttle now as **Shuttle Control v2** in your MIDI devices list:
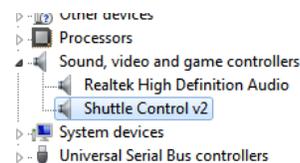
10) After the update Shuttle needs your presets to be loaded. You should re-generate them (or make own custom) with new editor at http://cargo2.endorphin.es (green button SAVE ALL PRESETS to get all factory ones to start with).

11) Factory presets for V.2 illustrated for simple starting patches understanding and easy access as a sketch: http://cargo2.endorphin.es/shuttle_control_presets_v2_cheat_sheet.pdf

12) For **downgrade** (installing v1 from v2) – simply follow the same procedure just uploading v1 firmware file. You may upgrade or downgrade as many time you wish.

UPDATE PROCEDURE UNDER MAC OS X. FOR WINDOWS UPDATE SCROLL UP.

WARNING: after the update procedure, all your V.1/2 presets will be lost – you have to re-generate them with the new Cargo2 editor.

1) Download and unpack the recent firmware archives from the history above into one folder.
2) Turn off your Shuttle Control (or complete modular rack in case Shuttle is powered from your rack's bus-board). Connect your Shuttle Control module to your MAC via **to device** connector with supplied USB cable.
3) Power-on the Shuttle Control (or modular system where Shuttle powers from bus-board) **while holding UP button** on the Shuttle Module. Hold the button up to 5-7 seconds after powered on and then release. Shuttle should be loaded into **DFU** (Direct Firmware Update) mode – no animation is started, the display will not light up and some of LEDs will randomly light up, however MAC OS X should detect new plug-n-play generic USB device which will be appear in your Hardware>USB list (**STM32 BOOTLOADER**): Applications > Utilities > System Information:
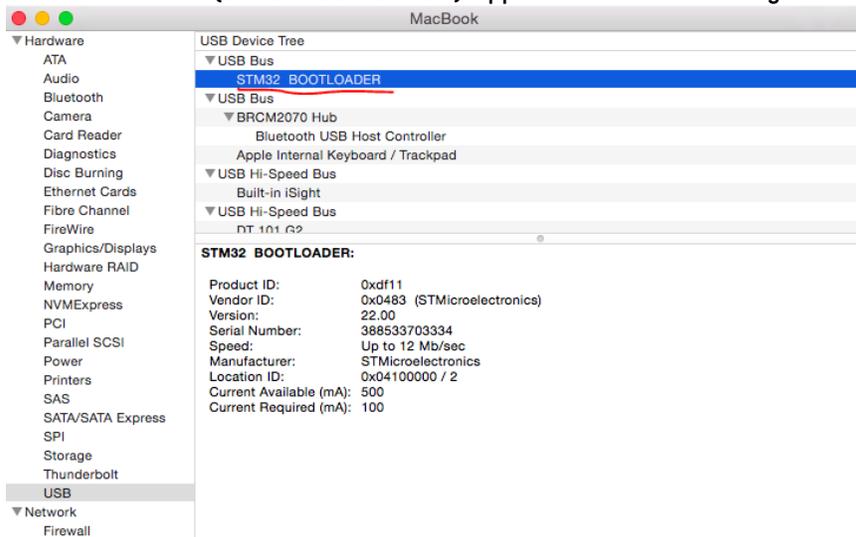
Sometimes when you release the UP button the Shuttle starts to play animation – it means it's not put in DFU mode. There is a simple however a bit weird solution we found out: while turning the Shuttle on with UP button pressed try to put the finger on the backside area of the Shuttle as shown on the photo:
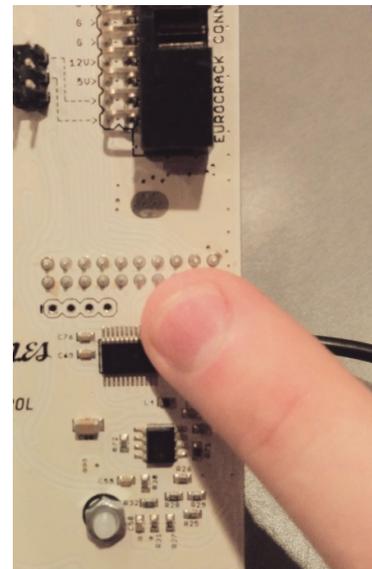
4) After you ensure the **STM32 BOOTLOADER** is present in your hardware list, navigate to '*Shuttle_v1_v2_MAC_OSX_update*' folder you unpacked before.
5) To load v2 firmware on your Shuttle – simply double click on the following command file: **Shuttle_v1_v2_MAC_OSX_update\update_shuttle_v2.cmd.command**

After clicking the command you may receive the message that you are not allowed to launch third party apps on your MAC. Simply follow [that instruction](#) to enable that:
https://rampagedev.wordpress.com/os-x-tweaks/app-cant-be-opened-because-it-was-not-downloaded-from-the-mac-app-store-fix-2/
and next time and launch the command simply confirm when launching it.

6) The Terminal window will be opened with the update process:

7) After roundabout 10 seconds the process will be finished. Don't interrupt it.


8) Once the process has completed, Shuttle will reboot with the new V2 firmware.
NOTE: you may have '*Error during download get_status*' message at the end of the upgrade procedure. This is normal. Close the Terminal window afterwards.

9) Your Shuttle is ready for take-off. At start-up you will see some updated loading animation (first two lines appeared 11 means you are running V2 firmware). You may use Cargo2 editor with all new listed above features. You will see your Shuttle now as 'Shuttle Control v2' in your MIDI Studio (Applications > Utilities > Audio MIDI Setup > CMD+2 (Show MIDI studio):

and in Hardware > USB list:
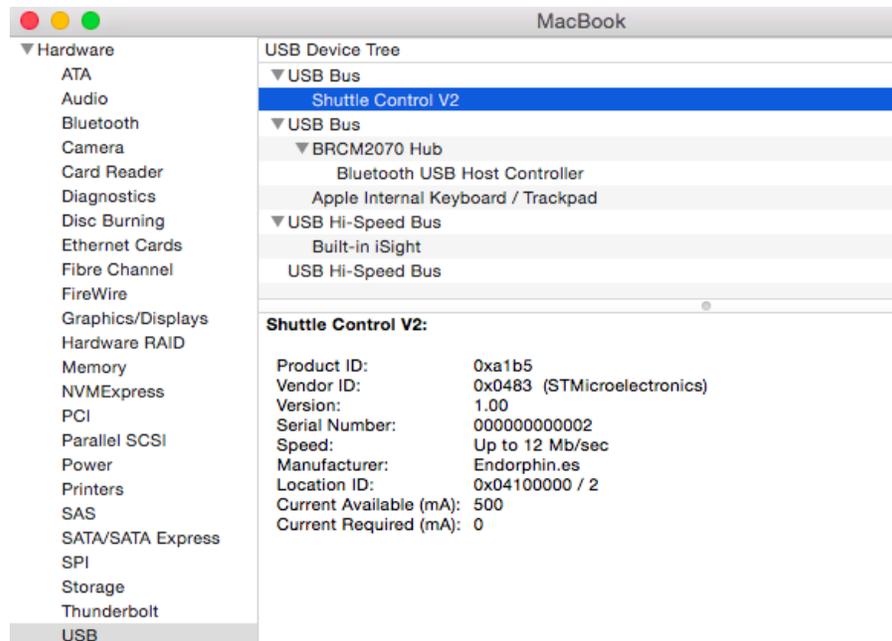
10) After the update, Shuttle needs your presets to be loaded. You should re-generate them (or make own custom) with new editor at http://cargo2.endorphin.es (green button SAVE ALL PRESETS to get all factory ones to start with).

11) Factory presets for V2 illustrated for simple starting patches understanding and easy access as a sketch: http://cargo2.endorphin.es/shuttle_control_presets_v2_cheat_sheet.pdf

12) For downgrade (installing v1 from v2) – simply follow the same procedure from the beginning just clicking on
Shuttle_v1_v2_MAC_OSX_update\update_shuttle_v1.cmd.command
command file on the step **5)**. You may upgrade or downgrade as many time you wish.

Special thanks go to Samuel Montassier from Audiothingies (http://www.audiothingies.com) for MAC OS X firmware update script.