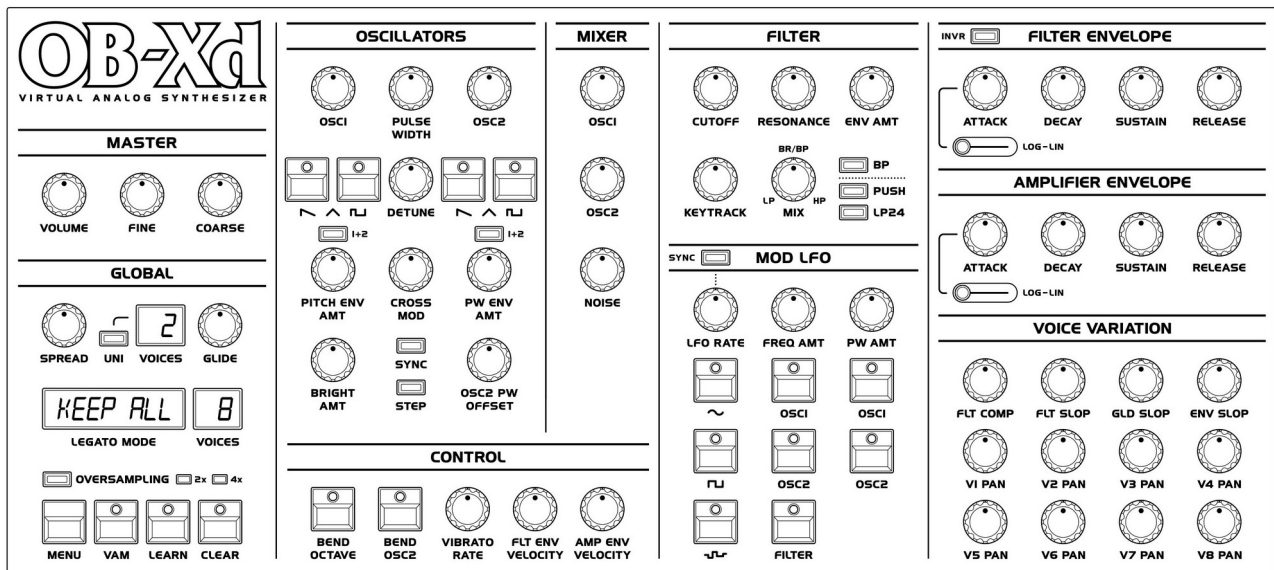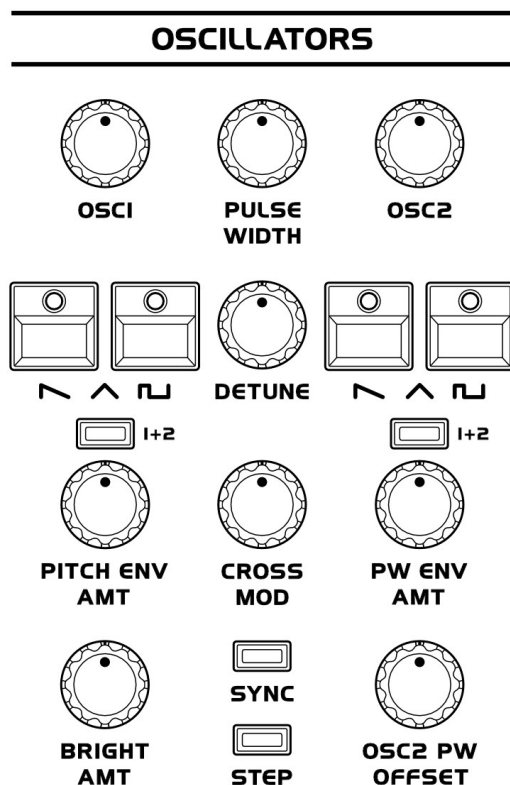# OB-Xd Virtual Synthesizer

Introduction

The OB-Xd is based on the Oberheim OB-X. It attempts to recreate its sound and behaviors, but as the original was very limited in some important ways a number of things were added or altered to the original design.

If you're unfamiliar with the OB-X, its user manual can easily be found from various sources on the net. This manual will make no attempt to explain basic synth programming or the operation of the OB-X, but will discuss modifications from the basic design and in some cases their ramifications.

The OB-Xd was designed to sound as good and as rich as the original. It implements micro random detuning which is a big part of that sound. Also, like many synths of the OB-X's generation, the OB-Xd has no internal effects so its sounds and textures can be greatly enhanced by the use of additional processing like chorus, reverb, delay, etc.

Thanks to all who participated in its creation and also to the various people who stepped up to create excellent free patches for the OB-Xd.

Oscillators

OSCILLATORS

OSCI   PULSE WIDTH   OSC2

DETUNE

1+2   1+2

PITCH ENV AMT   CROSS MOD   PW ENV AMT

BRIGHT AMT   SYNC   STEP   OSC2 PW OFFSET

Mixer Section
The mixer section has been overhauled to offer more flexibility in blending the two oscillators and a noise source. This new design allows for adjustable levels rather than the fixed levels found in the original design, providing users with a more nuanced control over the balance and mixture of sounds.

Oscillator Cross Modulation
In a departure from the OB-X, where Oscillator 2 modulated Oscillator 1, the OB-Xd features reverse cross modulation, with Oscillator 1 modulating Oscillator 2 (Frequency Modulation). This alteration yields more musically useful sounds, favoring harmonic sync and cross-modulation over the inharmonic results of the original modulation path.

Step Switch Button
The Step switch enables precise tuning of the oscillators in semi-tone increments. When this feature is disengaged, the pitch control returns to a continuous adjustment mode, allowing for gradual, fine-tuning rather than locked semi-tone steps.

Brightness Control
The Bright control specifically adjusts the presence of higher harmonics, affecting the perceived 'clarity' or 'brightness' of the sound. This control can bring forward or suppress the shimmering qualities of the sound's upper harmonic spectrum.

OSC2 Detune
Unlike the original OB-X's bilateral detune capability, the OB-Xd's OSC2 Detune control solely allows for upward pitch adjustments from the base pitch, offering a different range and character of detuning effects.

Tip: To transpose the OCT range into a 12-semitone range, hold the SHIFT key while using the mouse. For transposing by a single semitone, hold the Option key on macOS or the Alt key on Windows/Linux. To switch to the cent range, use the Control key.
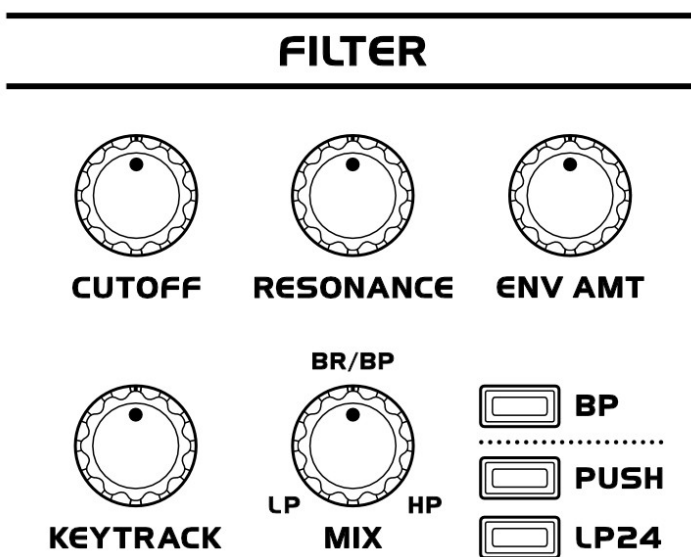
Global Oscillator Controls

Transpose: This control in the Master section transposes the pitch of both oscillators in parallel, strictly by octaves. It is important to note that this does not affect the filter cutoff frequency, which maintains the harmonic center of the filter relative to the oscillators' fundamental frequencies. This design choice preserves the characteristics of the original OB-X. For transposition by steps, external MIDI processing is required to achieve the desired pitch adjustments.

Spread: The Spread control introduces a randomized detuning to each oscillator. This simulates the natural drift of Voltage-Controlled Oscillators (VCOs) and contrasts with the precise tuning stability of Digitally-Controlled Oscillators (DCOs). The result is a thicker, more organic sound reminiscent of vintage analog synths.

Tune (Master Section): When a sound created is out of step with concert pitch, the Tune control allows for fine adjustments to align with the nearest concert note. For full step transposition to match concert pitch, external MIDI transposition is necessary as there is no built-in function for step transposition within the OB-Xd itself. A mixer was introduced to blend the two oscillators and noise source which is much more flexible than the fixed levels of the original design.

Filter

FILTER

CUTOFF   RESONANCE   ENV AMT

BR/BP

KEYTRACK   MIX   LP   HP   BP   PUSH   LP24

The OB-Xd synthesizer elevates the filter design from the original OB-X's single 12dB/octave low-pass filter to a multifaceted Multimode filter, inspired by the renowned Oberheim SEM module.

With the rotary MIX control, users can fluidly transition between filter behaviors: from a low-pass filter at the extreme left, to a notch (default setting) or a bandpass filter (when the BP switch is activated) at the 12 o'clock position, and finally to a high-pass filter at the extreme right.

A distinctive 24dB/octave low-pass mode is also available, which is engaged using the LP24 switch. In this mode, the MULTI control adjusts the filter's slope from a steep 24dB/octave to a milder 6dB/octave. The BP switch is disabled in 24dB mode, becoming a playful, non-sonic feature in the user interface.

Enhancements to the filter section in 3.x include:

Filter Envelope Invert (FEnv Invert Button): This feature inverts the output of the Filter Envelope across all its modulation targets, allowing for creative and reversed envelope shaping effects.

Filter Keytrack (Knob): The keytracking feature has been upgraded from a binary switch to a continuously variable knob, offering meticulous control over the extent to which the filter's cutoff tracks the keyboard's pitch.

Self-Oscillation Boost (Self-Osc Push Button): When the filter is set to 12dB mode, this button can be engaged to amplify the resonance. This makes the resonance more pronounced to the point of self-oscillation, effectively turning the filter into a sine wave generator at the cutoff frequency.

The previous HQ mode is now located in the Global Section as an Oversampling option. This mode improves the interpolation and processing of high-frequency components, rendering a smoother filter experience. This high-resolution processing is designed to be more CPU-intensive, offering a trade-off between sound quality and system performance.

Global Section

GLOBAL

SPREAD UNI VOICES GLIDE

KEEP ALL **8**

LEGATO MODE VOICES

OVERSAMPLING 2x 4x

MENU VAM LEARN CLEAR

Volume: This master volume knob controls the overall output level of the synthesizer.

Fine Tuning: Adjusts the pitch of the entire instrument in small increments, allowing precise tuning.

Coarse Tuning: Adjusts the pitch in larger increments, typically by semitones, for quick shifts in pitch range.

Spread: This control detunes the oscillators relative to each other to thicken the sound and add stereo width.

Unison (UNI): This mode layers all available voices onto a single note, creating a richer, more complex sound. The Spread and Voice Panning features enhance the stereo image in this mode.

Unison (UNI) Voices: This feature allows you to add multiple voice layers to each note played, creating a fuller and richer sound. You can choose from 1 to 16 voices, where each additional voice adds complexity and depth to the sound. For the best effect, use this with the spread control set at half or higher to clearly distinguish the layered voices. This parameter is ideal for enhancing pads, leads, and basslines with a thicker, more immersive sonic character.

Glide: Adjusts the portamento effect, creating a smooth pitch transition from one note to another.

Legato Mode (Keep All Button): In 'Keep All' mode, when playing legato over the maximum number of available voices, the held notes continue sustaining. If additional notes are played above the voice limit, the synth will re-allocate held notes, but the envelopes will not re-trigger until they reach their sustain phase.

Voices: Here, you can select the number of active voices. This feature can be used to conserve CPU resources or as a creative tool. More active voices increase CPU usage proportionally.

Oversampling: Increases the sample rate of processing, which can enhance sound quality, particularly at high frequencies, at the expense of higher CPU usage.

Voice Allocation Mode (VAM): Switches the priority of voice allocation from the default low-note priority to last-note priority.

Learn and Clear: These functions are used to map OB-Xd controls to MIDI CC messages for external automation. 'Learn' is used to assign a control to a MIDI CC message, while 'Clear' is used to remove this assignment.

Additional Legato Behaviors

Keep Filter Envelope: This mode maintains the filter envelope's sustain level for held notes. Newly played notes above the voice limit will cause held notes to be re-allocated, with the amp envelope being re-triggered.

Keep Amplifier Envelope: In this mode, held notes maintain the amplifier envelope's sustain level. When the voice limit is exceeded, additional notes will cause held notes to be re-allocated, and only the amplifier envelope will be re-triggered.

It is recommended to experiment with these modes with a reduced polyphony setting (2 or 3 voices) to fully grasp their behavior.
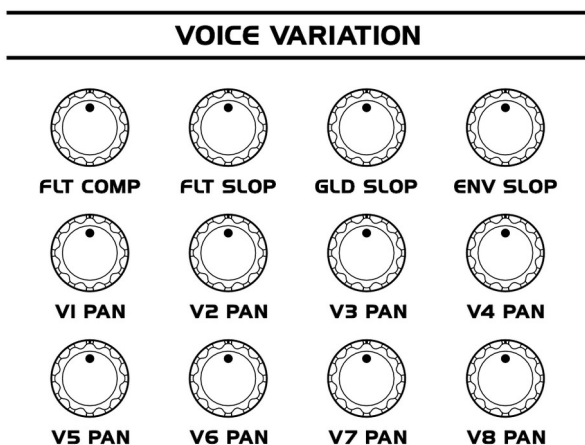
Saving and Loading Mappings

To learn a new control, click 'Learn,' adjust the desired control, and send the corresponding MIDI CC message; the 'Learn' indicator will turn off, confirming the assignment. To clear an assignment, enable 'Clear,' adjust the control, and resend its assigned MIDI CC message; the indicator will turn off, indicating the assignment has been removed.

Reassignment is possible by performing the 'Learn' procedure with a new MIDI CC message, even if a control is already assigned.

Voice Variation & Panning

The Voice Variation section of the OB-Xd synthesizer adds a layer of analog unpredictability to the sound. By increasing the variation settings, parameters will deviate randomly from their initial values upon repeated note triggers, emulating the characteristic instability of vintage analog synthesizers.

VOICE VARIATION

FLT COMP   FLT SLOP   GLD SLOP   ENV SLOP

V1 PAN   V2 PAN   V3 PAN   V4 PAN

V5 PAN   V6 PAN   V7 PAN   V8 PAN

Filter Compensation (FLT COMP): This knob adjusts the resistance in the exponential converter for the filter. It modulates the cutoff scaling behavior, affecting how the filter responds across different pitches.

Filter and Envelope Velocity Modulation (FLT SLOP and ENV SLOP): Unlike the original OB-X, which lacked velocity sensitivity, the OB-Xd introduces velocity responsiveness to the depths of both the Filter and Amplifier envelopes. Altering the filter envelope depth with velocity can also cause pitch variations when the Filter envelope is assigned to modulate Oscillator 2's pitch (P ENV).

Voice Panning (V1 PAN to V8 PAN): Each voice can be independently panned across the stereo field directly from the front panel, allowing for intricate spatial positioning of each voice in the mix. Double clicking the knob resets the value.

Glide Slope (GLD SLOP): This control adjusts the variation in the glide or portamento effect, introducing more or less predictability to the slide between notes.

Vibrato Rate (not shown, but discussed): On the OB-X, the vibrato depth was linked to the modulation paddle by default. The OB-Xd maintains this design, binding the vibrato depth to the modulation wheel (CC#1). The vibrato rate can be adjusted, and if the vibrato control is set fully to the left, it disengages the effect. While the rate can be remapped to another controller, CC#1 will always control the vibrato depth, ensuring consistent performance behavior across different setups.

To fully experience the organic nature of these controls, it is recommended to use them actively during performance and observe the variances they introduce. This approach captures the essence of playing an analog instrument where each note played can have a subtle uniqueness, much like the acoustic variations found in traditional instruments.

Preset Bar

A significant enhancement is the addition of Disk mode to the Preset Browser, augmenting the preset management capabilities of this synthesizer. This mode introduces a file-based system for loading and organizing presets, diverging from the traditional bank-based approach.

Enhanced Individual Preset Management

Unlike the bank-based system, where presets are grouped in sets of 128, the Disk mode facilitates saving and automatically sorting individual FXP presets in the designated `Documents > discoDSP > OB-Xd > Presets` directory.

Elimination of Preset Limits per Folder In Disk mode

The constraint of storing only 128 presets per folder is removed. This allows for unlimited presets in each folder, offering extensive flexibility in preset management.

Customizable Folder Structure

Users have the liberty to create multiple folders within the `Documents > discoDSP > OB-Xd > Presets` directory, enabling them to categorize and organize presets based on personal preferences. This feature enhances the ease of accessing and managing a large array of presets.

Upon activating the Disk mode, the bank selection interface is repurposed into a "sound type" selector. This adjustment modifies the display in the adjacent preset window, where every preset stored in the selected folder is now listed. The organization within the `Presets` folder dictates the categorization and display of these presets.

This innovative feature in OB-Xd 3.x offers users a more intuitive and efficient way of handling a vast number of presets, thereby enhancing the overall user experience in sound management within the synthesizer.

MIDI CC Map

Since 2.4 OB-Xd can select custom, default and pre-configured MIDI CC boards from: Arturia MicroFreak, Dave Smith Instruments OB-6, Elektron Analog Four MKII, Elektron Digitakt, Elektron Digitone, freds-lab buzzzy, IK Multimedia Uno Synth, KORG micro KORG, KORG minilogue xd, KORG minilogue, KORG monologue, KORG MS2000, Modal Craft, Modal Skulpt, Moog Minitaur, Moog Sirin, Moog Sub 37, Moog Sub Phatty, Mutable Instruments Shruthi, Novation Circuit, Roland JD-XA, Roland JD-Xi, Roland JP-08, Roland JU-06, Roland JX-03, Roland SE-02, Roland SH-01A, Studiologic Sledge, Tasty Chips GR-1, Waldorf Blofeld.

OB-Xd for iOS only have the default MIDI CC mapping detailed below:

15	VOICE_COUNT	59	OSC2Saw
16	UNISON	60	OSC2Pul
17	OCTAVE	61	PW
18	FILTER_WARM	62	BRIGHTNESS
19	LFOFREQ	63	ENVPITCH
20	VAMPENV	71	VOLUME
21	ASPLAYEDALLOCATION	72	LREL
22	LFO1AMT	73	LATK
23	PORTAMENTO	74	CUTOFF
24	UDET	75	BENDLFORATE
25	LFO2AMT	76	VFLTENV
33	TUNE	77	OSC1MIX
31	BENDRANGE (OCTAVE)	78	OSC2MIX
34	BENDOSC2	81	PAN1
35	LEGATOMODE	82	PAN2
36	LDEC	83	PAN3
37	LSUS	84	PAN4
38	FATK	85	PAN5
39	FDEC	86	PAN6
40	FSUS	87	PAN7
41	FREL	88	PAN8
42	RESONANCE	102	NOISEMIX
43	OSC2_DET	103	FLT_KF
44	LFOSINWAVE	104	MULTIMODE
45	LFOSQUAREWAVE	105	BANDPASS
46	LFOSHWAVE	106	FOURPOLE
47	LFOOSC1	107	ENVELOPE_AMT
48	LFOOSC2	108	ENVDER
49	LFOFILTER	109	FILTERDER
50	LFOPW1	110	PORTADER
51	LFOPW2	111	ECONOMY_MODE
52	OSC2HS	113	PW_ENV
53	XMOD	114	PW_ENV_BOTH
54	OSC1P	115	ENV_PITCH_BOTH
55	OSC2P	116	FENV_INVERT
56	OSCQuantize	117	PW_OSC2_OFS
57	OSC1Saw	118	LEVEL_DIF
58	OSC1Pul	119	SELF_OSC_PUSH

Troubleshooting

Assets or License Not Found

If you are having trouble with OB-Xd Pro and seeing the message "Assets not found" or getting a license invalid error, one possible solution to this issue could be to disable iCloud Documents. This is because it might be interfering with the software's ability to access the necessary files.

Additionally, we recommend checking if there are any files existing at the user's "Documents > discoDSP > OB-Xd " folder. If the folder is empty or doesn't exist, it could be the reason why the software is not able to locate the assets or license file.

It's also worth checking that Logic Pro or the DAW app has access to the "Documents" folder under Security settings on your Mac. This can be done by going to **System Preferences > Security & Privacy > Privacy**, then select the "Files and Folders" tab, and look for the "Logic Pro" or DAW application in the list of apps. Make sure it has permission to access the "Documents" folder.

Assets Not Appearing in Linux

In some cases, the document folder path may not be set properly on your Linux distribution, which could cause the GUI to not show. Please check if the document folder path is available on your system.

You need to display the $(xdg-user-dir DOCUMENTS) folder path in Linux but are unsure how to do it.

To display the $(xdg-user-dir DOCUMENTS) folder path in Linux, you can use the following terminal command:

```
echo $XDG_DOCUMENTS_DIR
```

This command will print the full path to your Documents folder. If the folder path is not set correctly, you can try setting it manually by creating a .config/user-dirs.dirs file in your home directory and adding the following line:

```
XDG_DOCUMENTS_DIR="$HOME/Documents"
```

Replace "Documents" with the desired name of your Documents folder. After saving the changes, log out and log back in to apply the changes.

By using the terminal command and creating a .config/user-dirs.dirs file, you can easily display and set the $(xdg-user-dir DOCUMENTS) folder path in Linux.

Plugins Not Appearing in Logic Pro

1. Try rebooting your computer. This can often resolve any software conflicts or issues that may be preventing your plugins from appearing in Logic Pro.

2. Open Terminal and use the command

```
sudo killall -9 AudioComponentRegistrar
```

This command will force quit the AudioComponentRegistrar process, which is responsible for managing audio units in macOS. Killing the AudioComponentRegistrar process is a temporary solution used to avoid the need for a reboot. It should not have any significant impact on the system. However, it's always recommended to reboot and avoid force quitting system processes.

3. Remove AU cache

- In Finder, go to Go > Go to Folder in the menu bar at the top.
- Copy-paste the following path and click Go: ~/Library/Caches
- Delete any folder named AudioUnitCache.
- Delete any file named com.apple.audiounits.cache.
- Reboot the system.

4. Remove Logic preferences

- In Finder, go to Go > Go to Folder in the menu bar at the top.
- Copy-paste the following path and click Go: ~/Library/
- After opening the library, navigate to the locations listed below and move the specified files to the Trash:
- ~/Library/Caches/com.apple.logic10/ (Files: Cache.db, Cache.db-shm, Cache.db-wal)
- ~/Library/Preferences/ (File: com.apple.logic.pro.cs)
- ~/Library/Preferences/ (File: com.apple.logic10.plist)
- Once the files are moved, empty the Trash.
- Finally, restart your Mac for the changes to take effect.

Ensure you're logged in as an Admin account to perform these steps, or you might not have the necessary permissions.

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