

Audio Unit

With the release of iOS 9, Apple introduced the Audio Unit V3 format which enables multiple instances of the same plug-in running at the same time.

You can load these modules with compliant hosts like Apple's own GarageBand or other audio editing and mixing apps. These plug-ins are compatible with the host-automations, host-save/load presets and host-save/load state in the session. Three modules are available in AUv3 format:

Instrument units, which take MIDI as input, **Effect** units and **Music effect** units. The Music effect combines features of instrument units (such as frequency control) with features of effect units.

The 'Instrument' and 'Music Effect' Plugins use the MIDI Note/On to change the pitch according to the Keyboard grid.

When you are loading apeMatrix Fx or MFX, the LIVE Input is enabled by default and you can see the Dry/Wet slider on the top right.

Conversely, when you load apeMatrix as an Instrument, you will start with a default sample. The Audio Unit Extension (i.e. AUv3) can share data only with the main App. The extension has two Managers called QuickSamples and QuickPresets to facilitate audio/presets sharing. When you copy samples or preset banks, from/to, apeMatrix will make a copy in a shared folder which is accessible from both.

For iOS 11 or higher, apeMatrix can Host the AUv3 Extension which sends MIDI messages.

WARNING:

The memory limit imposed for AU Extensions on iOS is 300 MB for 32-bit devices and 360 MB on 64-bit devices.

These are performance considerations as you can expect from iOS devices having limited shared resources.

Navigation Gestures

iPad

- 1) Swipe Left/Right to the empty area in the Main view to Navigate Between views
- 2) Swipe Down to the empty area in the Main view to open Mixer, MIDI Patchbay, MIDI Monitor etc...
- 3) Double Tap in the empty area of the Main view to show/hide all sub-views (if opened)

iPhone

1) Two Fingers to Scroll Up/Down the Audio Matrix, MIDI Patchbay and Mixer

iPad/iPhone

- 1) Single tap the loaded app's Icon to open the Remote Audio Unit or Inter-App Audio (RAU) view.
- 2) Swipe Down or Long Tap to remove the current Remote Audio Unit or Inter-App Audio (RAU) Pinch In/Out the Audio/MIDI Matrix to clear connections.
- 3) Single Tap to make a node connection, scroll Up/Down to adjust the connection gain (in dB).

Simple connection, the FX takes audio from the Input source and sends to the Master Output.

The Synth Instrument audio is processed by two chain Effects.

You can control Instrument, FX Musical Devices, Monitor and send Out the MIDI through two Aux Busses or Via MIDI Virtual/Hardware.



For more detail about Gestures refer to the In-App tutorial.

Tips & Tricks

- Double tap on the **Sliders** to show the options. In the '**Edit**' field you can enter the value from the keyboard. Tap '**Random**' to generate a random value, '**Default**' to reset to the factory settings and configure the knobs dragging behavior. '**Step fine resolution**' sets how many points of movement result in slider's position.
- Long Press Tap on the **Toggles** to open Control Manager Assignments.
- Swipe up/down or Long-press the Inter Audio App or Audio Unit V3 (i.e. RAU) icon to remove the node from Audio or MIDI Matrix.
- Pinch In/Out on the Audio or MIDI Matrix to clear connections.
- Swipe gesture (right to left) on a preset or bank to rename/duplicate/delete it. See Presets for more details.
- You can load Presets (current selected bank) by remotely sending a MIDI Program Change message. See MIDI section, below for further details. You can select the MIDI channel where you can receive PC messages. A PC

value of zero will select the first preset in the list, a value of 1 for the second etc... The range is from 0 to 127.

- We suggest you to disable the screen rotation, otherwise the accelerometer doesn't work properly.
- **Init** will reset to default values, a reset message will be displayed.

apeMatrix:Sampler (AudioUnit)

Touch and drag the waveform to scrub the audio file. The speed of the scrubbing is relative to the position of the finger inside the waveform: higher positions produce faster scrubbing.



Load an audio sample.



Reset scanning to the start position.



In Ratio mode you can set the play ratio: 1 means play the sound file at the original speed, 0.5 means play at half speed, -0.5 means play at half speed and in reverse and so on.



In Time Signature mode you specify the number of Measures and Quarter per Measure the sound file contains, and the tempo is linked to the general Metronome Tempo; for instance if we specify 2 measures of 4 quarters each, and the general Tempo is 120 BPM, the sound file will be executed in 4 seconds.



In MIDI mode you can trigger the sampler (play) from a MIDI note-on and stop it by sending a MIDI note-off. The reference base-note is C4 (60) which means no pitch transposition, the sample play at original speed. A MIDI note of C5 will cause a transposition of twelve semitones and a double reproducing speed, conversely the C3 will produce -12 semitones and half of original speed.



Enable/Disable the LFO for the all assigned parameters (only Sampler Ratio is assignable).



Draw Waveform in Minimal Style or Normal.



Enable/Disable Sampler LOOP points Fade.




Waveform Scrubbing Mode, when selected the pointer jumps to the **Absolute** position of the finger that touches the waveform. If unselected (**Relative**) it does not jump but the scrubbing occurs from Sampler position toward finger touch.



Tap the symbol to set the loop points. When in "loop edit mode" you can:

- tap and hold inside the selection for the fine regulation of the loop
- double tap inside the selection to select again the whole file

When a loop is set, deselect the (tap again ) to zoom-in into the loop selection.

apeMatrix: Mixer Send Receive (AudioUnit)

Share Audio Between Plugin Instances, it works as a normal AUv3 plugin in apeMatrix and/or all common audio hosts.

The plugin Input is used to RECEIVE and mixes an audio signal into a selected buss, the plugin Output is used to SEND an audio signal that has been mixed onto a selected buss.

There are 16 busses available, default bus is 'A', the badge number, shows the actual instances of plugin which are sending/receiving audio relative to bus.

You cannot send/receive audio outside of the host app boundary (sandbox), there is no imposed limit to the number of plugin instances".

Transport Bar



The main tool bar contains the Transport buttons to play/stop/rewind the RAU (Remote Audio Units) Clients, see 'Audio Unit'. Since apeMatrix acts as an

Audio unit HOST, these buttons are indispensable to trigger on/off the RAU clients (if they require this information), as well the apeMatrix Virtual Keyboard to play RAU instruments.



Captures Output stereo signal (post Effects) and creates an audio file *wav* format 44.1 kHz 16 bit in the Documents Folder. Files created by apeMatrix are saved with an id-name followed by a number, for example:

Output Rec 1.wav, Output Rec 2.wav etc.

Each new file will be numbered with the next consecutive number.

Slide Bar



Open the lateral slide view to access Settings, MIDI, Presets etc...



Enable/Disable Accelerometer X/Y and LFO, see the Control Manager for more details.



In-App tutorial.Audio Matrix

The Matrix provides a flexible and easy way to make complex connections between the RAU (i.e. Remote Audio Units).

RAU (AUV3 and Inter App Audio) Gestures:

1) Tap on the “+” sign to open an external app (IAA) or AUv3. The “+” sign is replaced by the app icon.

2) Single tap a node to switch to the app window if the node is an IAA.

The user interface of an Audio Unit Extensions appears directly inside the apeMatrix app in a floating resizable window (tap the node to bring up the plugin user interface).

3) Swipe Down or Long Tap to remove current Remote Audio Unit or Inter-App Audio (RAU).

Plugins Support

apeMatrix can host up to 30 Nodes (i.e. RAU, Remote Audio Units), which can contain Audio Unit Extensions (AUv3) and IAA (Inter-App Audio) as instruments, generators, effects and music effects, on iOS 9 and later.

The Audio Unit Extension is a new audio Apple standard (more on it below).

Both types of plugins can receive the host transport state and a beat clock signal for sample accurate synchronization. For iOS 11 or higher, apeMatrix can Host the AUv3 Extension which sends MIDI messages.

AUv3

Unlike standard music apps, the AUv3 plugins can be launched multiple times. This way you are able to create multitimbral instruments with the same synth plugin or use multiple instances of an effect plugin (filter, delay, etc.) in multiple audio pipelines.

The user interface of an Audio Unit Extensions appears directly inside the apeMatrix app in a floating resizable window (tap the node to bring up the plugin user interface).

Inter-App Audio

An IAA (Inter-App Audio) node is actually a separate app, so when you tap the node inside apeMatrix, the display switches to the IAA app.

The IAA Instruments and Music Effects can receive MIDI messages directly from apeMatrix: there's no need to run a separate Virtual MIDI port.

Note that the state of the IAA nodes is NOT saved with the apeMatrix presets.

Connections Gains

Each Audio Connection on the grid has its own gain control. Just a tap on the node and drag, will give you the full range of volume control.

You can adjust up to 169 values for each Audio Matrix.

Aux Audio Bus A B

The main goal of the Auxiliary couple of Bus its to share Audio and MIDI throughout the Matrix (three audio and three MIDI). In this way you can make a sub-mix and send it to a bus while you can receive as input in a second Matrix etc... Moreover the bus A and B sends audio to it's own virtual audio ports in order to make it available via Audiobus or Inter-App Audio.

 For more detail about Audio/MIDI Matrix routing, refer to the In-App tutorial.

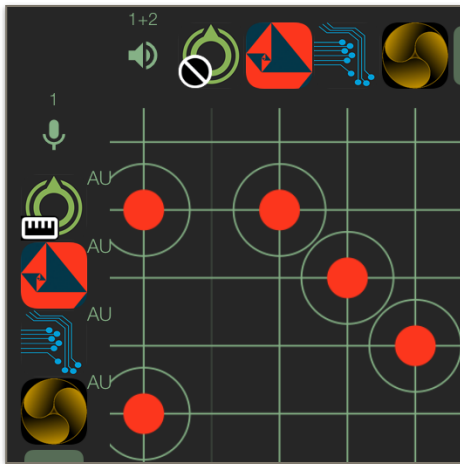
Matrix Audio Connections

The audio matrix connections should be done top-down/left-right. When you make a connection, for example an instrument which feeds a plugin, you should respect as much as possible, this scheme.

In that way the audio connections will not introduce any delay, conversely a delay gap will be introduced.

The delay is depending from the buffer frame and the sampling rate.

For instance with a buffer of 256 and a sampling rate of 44100, the buffer delay is $256/44100 = 0,00580$ seconds, ossia 5,80 milliseconds.




In the example, no delay is added to the output. The top most instrument (**mood**) sends the audio to **apeFilter** then to **Dedalus** and to **Delayrium**. Since the audio flow is topdown, no delay is added so the **Delayrium** output will play perfectly in sync with the first sender (**mood**).





Since the '**mood**' synth it has been moved to the fifth slot, now the plugins chain is fed down-top, every connection will introduce a buffer delay and **apeFilter** will play out of sync (three buffers delay).

Latency Compensation

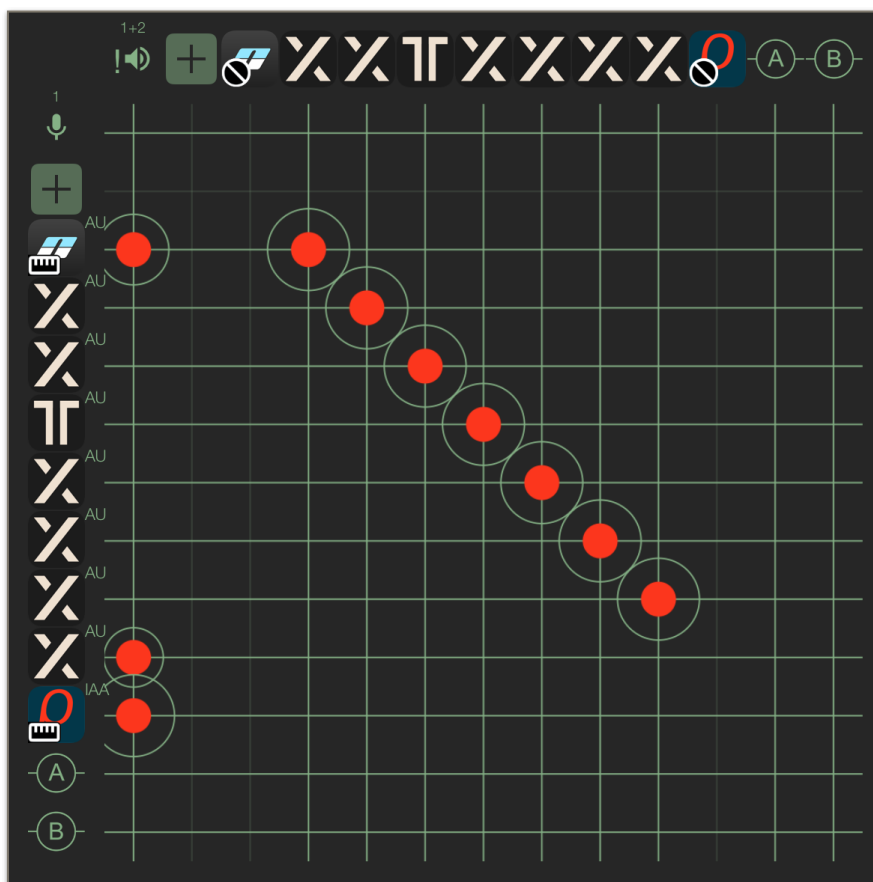
Some plugins can introduce a delay of the signal, so connecting one or more plugins, the delay is accumulated causing a delay gap between the dry/wet output. In the plugin view you can see the latency in milliseconds, if the plugin is reporting delay.

 Show the latency compensation parameters that will appear on the matrix rows.

 Show the latency compensation statistics for each matrix and the round trip latency.

 Enable/disable the latency compensation.

In the example we have six instances of the FAC Maxima which introduce 1024 samples of delay (i.e. 23,22 milliseconds) and one instance of FAC Transient which introduce 6,08 ms. Since the connections are in cascade, the delay is accumulated.



When the Latency Compensation is enabled, the Ableton Link transport clock and the apeMatrix metronome is affected when calculating the current beat time.

Aux AUDIO Bus as Inter-App Audio

apeMatrix is an AU and IAA Host. However it can also be connected as client app (IAA) in the most of the popular audio Hosts like Garage Band, AUM, Cubasis, Auria, Ferrite etc..

When you attempt to connect apeMatrix as a client you will see multiples ports available.

apeMatrix (Bus A)

apeMatrix (Bus B)

apeMatrix (Instr)

apeMatrix (Fx)

For example, if you wish to connect apeMatrix as source you will see the first three ports displayed as (Fx) when you connect apeMatrix as an Effect.

The main port which is full-duplex with apeMatrix is **apeMatrix (Instr)**, use this port to send and receive audio from the apeMatrix Global Master (the loudspeaker icons in the top left corners of the three Matrix grids will send audio and the mic/line input will receive audio).

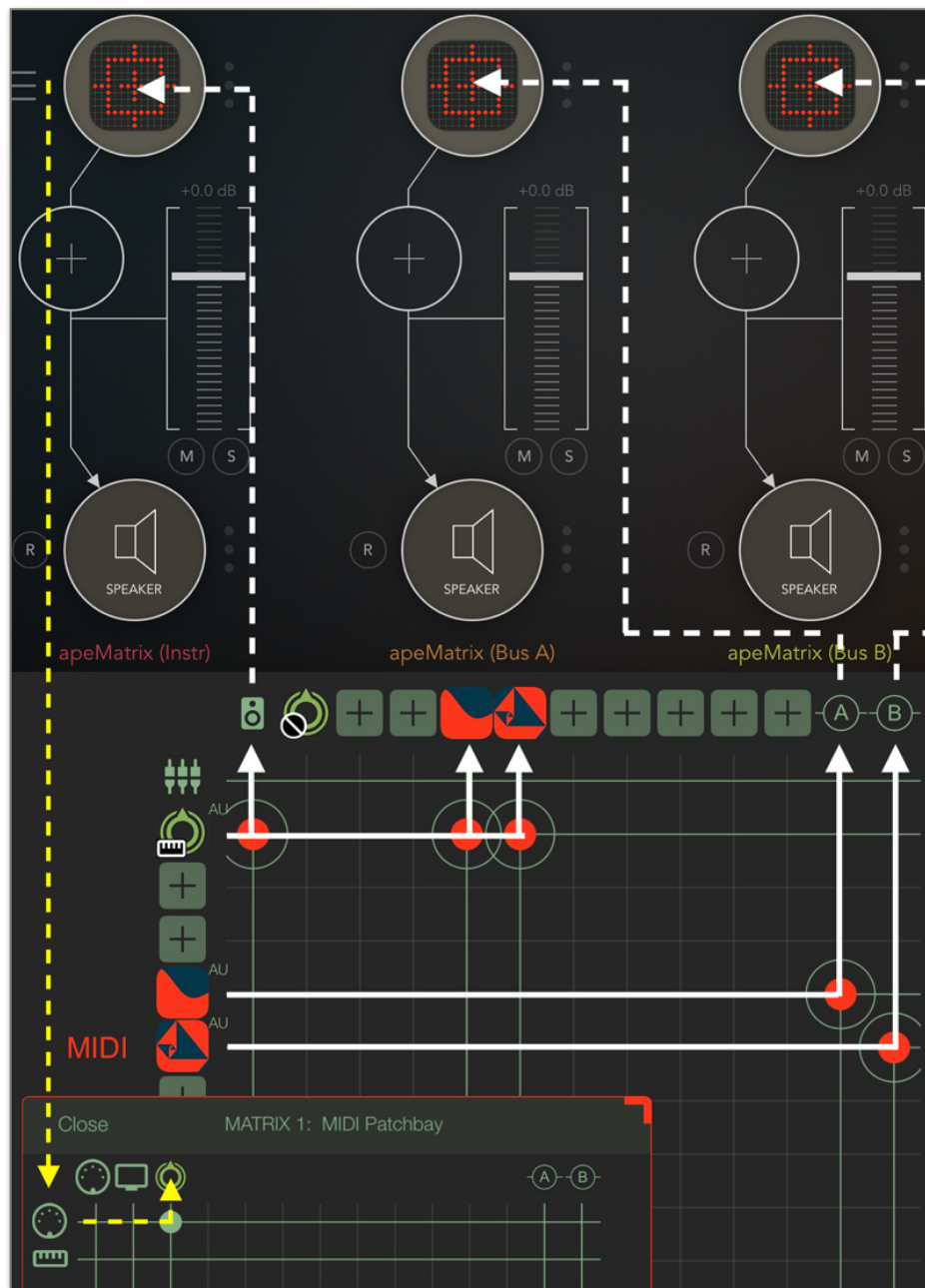
This connection responds also to the MIDI messages sent by the Host and it can receive midi messages. However you need to enable MIDI Input from MIDI Patchbay (see later for more details).

Unlike the main connection which is a classic IAA Instrument connection, the apeMatrix (Bus A) and apeMatrix (Bus B) cannot receive MIDI. They only send audio that you are sending from these Busses.

In this way you get the benefit of three independent stereo channels: the GLOBAL MASTER and two Busses.

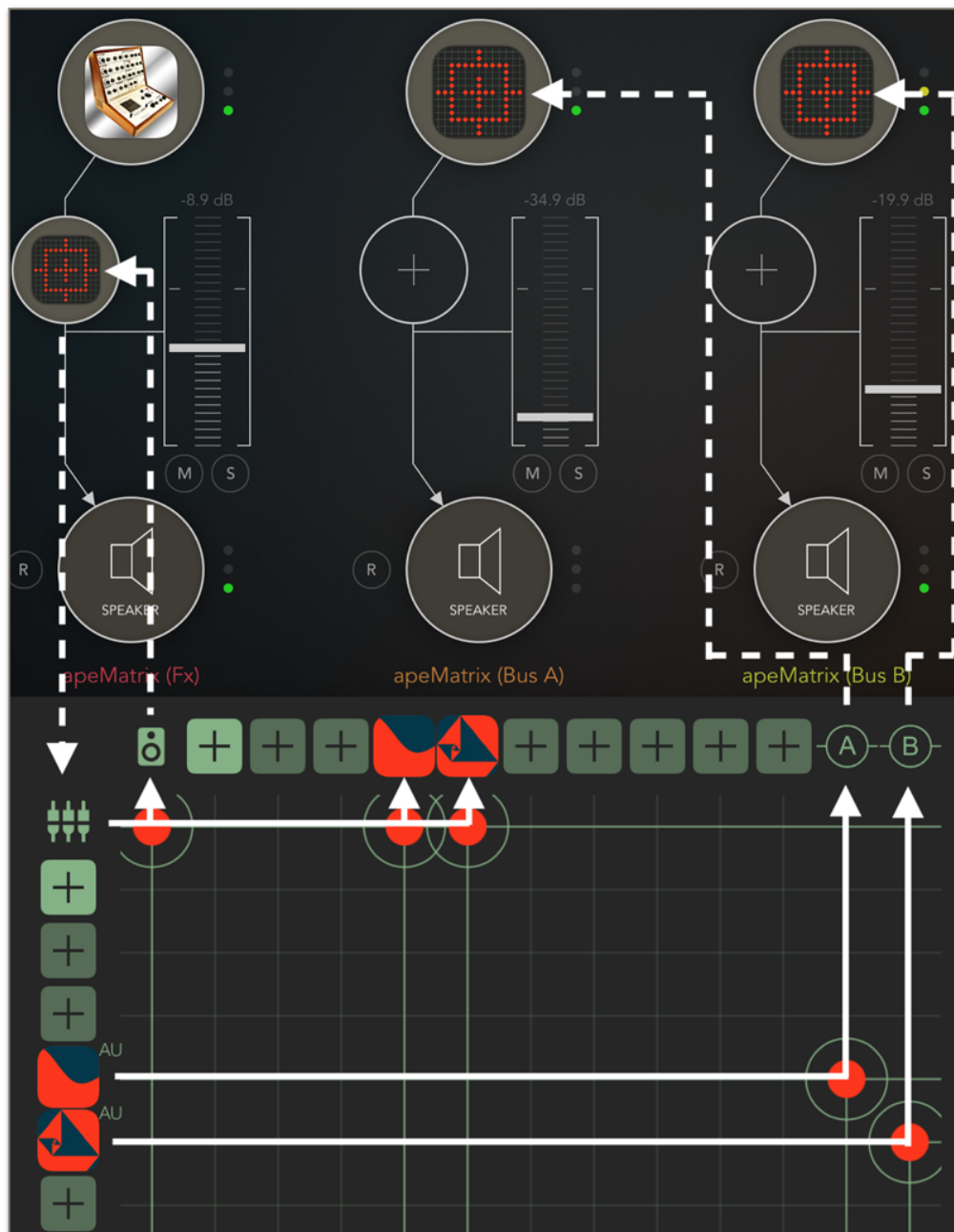
In AUM (Kymatica - Jonatan Liljedahl) the left channel is apeMatrix (Instr) which is receiving MIDI from AUM Keyboard.

The connections in apeMatrix are very simple.



The first RAU (*mood* Synth) sends audio to the output and to the two effects (apeDelay and apeFilter), apeDelay sends audio to Bus A and apeFilter to Bus B. Please note in order to receive MIDI from AUM you need to connect in the MIDI Matrix the MIDI input port to *mood* Synth. When you are connected in IAA you will bypass the MIDI Manager and receive MIDI directly even if no sources have been selected.

In this last example, apeMatrix is connected as Effect (Fx) and will take input from the synth app iVCS3.



As you can see, the Input is connected directly to the Output since we want to forward the iVCS3 signal, like the above example the iVCS3 signal is processed by a couple of effects which are sending audio through Bus A and B.

Input/Output Multi-bus plugins

apeMatrix supports multiple inputs and/or outputs busses for the AUv3 plugins.

This is useful for getting an individual signal from a multi-bus instrument or for feeding side-chain signals into a compressors, for instance.

All the multi-bus plugins, which are loaded, will be added to a list so when you attempt to add a new RAU you will see also the multi channels plugins instances.

When you chose a channel from the list, you will create an alias of the main plugin which strictly depends from the main RAU (father). Removing the main RAU (sender or receiver) all his children will be consequentially removed.

You can load the same bus number many times and you can share in/out busses over the three matrix, tap over his icon to change the bus number.

You can use his audio (or MIDI) input/output in the matrix in the same way of the others RAU.

MIDI Patchbay



The MIDI Patchbay also offers endless possibilities for MIDI routing and control in a similar grid design for both internal and external MIDI control. So you can send and receive MIDI and have ultimate control over where its routed. Only the connections for the plugins which can send or receive MIDI are showed in the Matrix.

For iOS 11 or higher, apeMatrix can Host the AUv3 Extensions that send MIDI messages.

The pure MIDI processors (plugins which do not output audio) are hosted normally, you will see the icon MIDI and they will be visible in both Audio/MIDI Matrix although they cannot send out any audio signal.

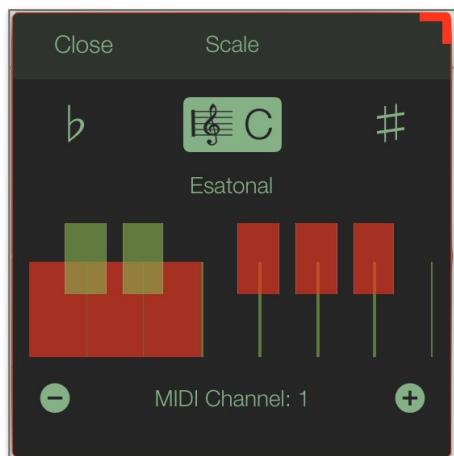


The MIDI icons on the Matrix have different functions. The icon on the matrix row opens the general apeMatrix MIDI Input list, see 'MIDI' for more information. The identical icon on the Matrix column can also open the MIDI Out menu where you can enable physical, virtual and network ports that send MIDI. Unlike the MIDI Sources, you can select for MIDI Destinations different devices for every Matrix views. Please note that at the moment the selected devices are not saved in presets but only in general app state. So, when you exit from the app and open again you will restore the last state.

 For more detail about Audio/MIDI Matrix routing, follow the In-App tutorial.



Connecting the built-in Virtual Keyboard you can play RAUs (Remote Audio Units) according to a custom Musical Scale.



The \flat and \sharp transposition keys allow you to change the base note of the keyboard (C) and the Scale button opens a menu where you can choose among several scales. The first item on the list (User Defined Scale) is a special feature which allows you to setup your own scale through the Musical Keyboard. Also you can chose a MIDI Output Channel.

On the Keyboard view, the padlock icon activates the “sustain mode”. In “sustain mode” when you tap a key it will remain on until you tap it again.

The “+” and “-” circular icons in the tiny keyboard are used to increase/decrease the number of keys visible in the keyboard.

The amplitude of each note i.e. its key velocity (0 - 127), changes in relation to the vertical position of the tapping. The Pitch Bend Slider range can be changed via the two side buttons, the new range is saved on presets.

The **Aftertouch Y Scrub**, can be assigned to one or more parameters, see the Control Manager. Tap and hold a note, then scrub along the vertical axis (Y) to control the assigned parameters.



The “panic” triangle on the bottom toolbar, sends all notes off to all available RAU at all Matrix view.



MIDI Monitor its self-explanatory, the buffer list is 50 items maximum. After that will delete the list.

Aux MIDI Bus A B

Just like for the Audio Aux Bus but for the MIDI.



If a plugin can send MIDI out, you will see in the MIDI matrix a switch at the right of corresponding Matrix row. Enabling this switch you will send MIDI

to the Control Manager. Now you can use MIDI either for control of the Built-In parameters, or for the AUv3 ones as well.

Please note at the moment the Control Manager system can receive only CC (Control Changes) so if you are sending different MIDI messages as Note on/off PC Aftertouch etc... they will be discarded. See 'Control' for more details.

MIDI Filtering

When a plugin is connected to receive MIDI, you can filter the incoming MIDI streaming according to various methods.

Range: all the MIDI notes outside of selected range are discarded.

Channels: select one or more channels where MIDI is received.

Transpose: trasposition factor in semitones.

Scale: quantize on the selected scale grid. See 'Virtual Keyboard' in this section for more details.

Matrix View Mixer



Each of the three Matrix views have a Mixer wherein you can set the Amplitude, Panning and Solo/Mute of connected Remote Audio Units as well you can rescale the Master Output.

SYNC



The goal of SYNC is to setup a global Metronome (MASTER BPM). This will affect the Control Manager LFO (Low Frequency Oscillators) and the RAU Clients.

You can set the BPM (Beats Per Minute) by scrolling up/down (or left/right) the label value (♩ 120 ←○→) or tap out the tempo.

Single Tap or Long Tap the minus/plus buttons to increase or decrease by 0.25. By default 120 BPM corresponds to 1 Hz frequency for the LFOs.

Ableton Link description

Ableton Link is a new technology that synchronizes the beat, phase and tempo of Ableton Live and Link-enabled iOS apps over a wireless network. It lets you play devices together with the freedom of a live band. Anyone can start and stop their part while others keep playing, and anyone can adjust the tempo and the rest will follow. You can use Link to play with several copies of

Ableton Live, with Live and iOS apps, or with iOS apps together – even without Live in your setup.

MIDI Clock description

The clock signal is broadcasted via MIDI to ensure that several MIDI-enabled devices such as a synthesizer or music sequencer stay in synchronization.

The iOS implementation is designed to provide precise, jitter-free MIDI clock transmission and robust, error-tolerant MIDI clock reception.

Quantization

When you are connected to an Ableton Live Session, the Play/Stop/Rewind transport will wait until the next sync quantum boundary before starting.

The 'Sync' button waits for the next beat (Tempo Forte) from the MIDI Clock or Ableton Link and resets all phases for LFOs, Sequencer etc.

Send MIDI Clock

Will create a virtual MIDI port for the MIDI Clock Output.

In Play/Stop mode the MIDI Start/Stop Clock messages

are sent according to Transport Play/Stop. In

'Always' they will not be sent every time, but only at start.

Please note when you are connected to Ableton Link, the incoming MIDI Clock is disabled while you can send MIDI Clock out, converting the Ableton Link to MIDI Clock.

Receive Sync

1) Local-Host

2) MIDI Clock signal

3) Ableton Link

When Ableton Link is enabled the Local-Host and MIDI Clock will be disabled and visa-versa.

In Local-Host when the app is connected through Inter-App Audio, it will receive the Sync from the HOST (if available, i.e. tempo/start/stop) and the current BPM is overridden.

When MIDI Clock is activated, you cannot change the BPM (Slave) since it is controlled by the MIDI Clock (Master). Through the 'CLOCK' button you can select a MIDI Clock Source.

Samples

N.B. *apeMatrix* does not use audio file for synthesis.

N.B. *apeMatrix* does not have any Built-In audio files.

N.B. *apeMatrix* Samples Manager serves for only files sharing.

Samples manager can read/write in the Documents folder, you can also share files through AudioCopy, Document Picker (iCloud, Dropbox etc...) and AudioShare. Samples manager can also read the Built-in files, but you cannot rename or delete them. Touch on a file in the list to show the actions popup. Open In... contains all system actions over the file, according to file type. For example you can send files as an e-mail, open file with a listed app etc...



You can rename files in the Documents Folder, if you omit the file extension then Samples Manager will fill the original audio file extension for you. N.B. Samples manager shows only audio files supported, the other files in the Documents folder will not be seen.



You can pre-listen to the samples before you load them.



Starts audio capture from the microphone immediately and saves new stereo audio file in wav format 44.1 kHz, 16 bit in the Documents Folder. Files created are composed by ID-name followed by a number, for example:

Input Rec 4.wav, Input Rec 5.wav etc...

Every new file will be numbered with the next consecutive number.

N.B. You can record a mono or stereo file in wav format 16 bit 44.1 kHz according to the iDevice channels. Even if the *apeMatrix* is connected to Audiobus or IAA, the Grab Audio will record always from iPad microphone/line



You can import files from AudioCopy, Music Library, Document Picker (iCloud, Dropbox etc...) and AudioShare.

Access to the iTunes library, this allows the application to read user's songs, audio books, and audio podcasts. The file can be converted in .wav (PCM 16 bit 44.1 kHz) or .caf formats and stored in the local app Documents Folder. If the file exists at this path then progressive number will be attached to the file name.

The document picker feature lets users select documents from outside your app's sandbox. These include documents stored in iCloud Drive and documents provided by a third-party extension. Users can open these documents directly, editing them in place. This access simplifies sharing documents between apps and easily enables more complex workflows.

Use iTunes to share files between your computer and your device

- 1) Open iTunes on your Mac or PC.
- 2) Connect your iPhone, iPad, or iPod touch to your computer using the USB cable that came with your device.
- 3) Click your device in iTunes.
- 4) In the left sidebar, click File Sharing.
- 5) Select an app to see which files are available for sharing in that app on your device.

Control



MIDI



Scrub Y



Accelerometer X

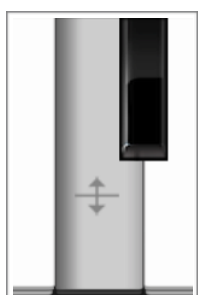


Accelerometer Y



LFO

After selecting **MIDI**, *apeMatrix* enters into "learn mode" i.e. it "hears" incoming MIDI Control Change messages. It's then possible to send messages with MIDI hardware, Virtual MIDI and Network MIDI. Flashing screen means the association between the parameter and the MIDI message has been successful and displays the corresponding control Change and Channel. Alternatively you can enter direct CC and MIDI Channel number through number keyboard. You will also receive an additional setting: 'Widget Range' that allows you to resize the range of action on the parameter. This is because you can use all 128 steps MIDI to precisely control particular parts of the parameters.



Scrub Y binds the widget to vertical movement on the keyboard (Scrub Y). An additional setting allows you to specify the speed (gravity) of the action.

Aftertouch Y Scrub, you **can** assign one or more *apeMatrix*

parameters to aftertouch scrub Y, so after a played note, you can scrub in the vertical axis (Y) by controlling one or more of the parameters. An additional setting allows you to specify the speed (gravity) of the action.

N.B. Playing keys from top to bottom, you can change the amplitude of each note i.e. key velocity (0 - 127). The same with black keys.

Accelerometer X and **Y** are used to control the parameters through the horizontal or vertical inclination of the device.

LFO, Low Frequency Modulation is a table look-up oscillator with seven built-in shapes. The frequency of LFO is expressed in Hz and BPM (Beats per Minute). You can get the period time by dividing $1/\text{freq}$. The LFO Frequency value is converted in BPM (Beats Per Minute), you can adjust this value through the minus/plus buttons, these will replace current value with the integer BPM (previous/next) or you can TAP to set your own Tempo.

φ Will reset to zero the phase of current LFO.

Φ Will reset to zero the phase of ALL LFO actives.



Enabling the Link symbol, you will disable the 'Low Frequency Oscillator in Hz' Slider, so the value of the current LFO is sampled from the global 'MASTER BPM'. You can adjust the BPM value from SYNC view. When the MIDI Clock or Ableton Link is enabled (see MIDI Manager and SYNC) the BPM value will affect all LFO enabled for SYNC mode. The goal of the 'SYNC Subdivision' Slider is to rescale the 'MASTER BPM' from SYNC according to the relative symbol (abbreviate musical note time values):

Normal : 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64

Triplets : 1/1T, 1/2T, 1/4T, 1/8T, 1/16T, 1/32T, 1/64T

Dotted : 1/1D, 1/2D, 1/4D, 1/8D, 1/16D, 1/32D, 1/64D

Where 'D' is a **dotted** note and 'T' is **triplet**.

With 1/4 (Default), the BPM follows the 'SYNC BPM' or 'MIDI Clock' BPM when enabled, i.e. 120 BPM corresponds to 1 Hz.

- 1/4 - each step is a quarter note (or BPM), e.g. 60 BPM is 0.5 Hz
- 1/4D - each step is a dotted quarter note (or $1.5 \times \text{BPM}$),
- 1/4T - each step is a triplet quarter note (or $0.5 / 3$) etc.

⌵ Reset default value (1/4 = 120 BPM)

Control AUv3

A very special and important feature in apeMatrix is the ability to employ the apeSoft's unique Control Manager MIDI, Accelerometer, Scrub and LFO's to modulate any parameter available inside the AUv3 (Audio Unit Plugins).



Opening the Audio Unit view will allow access to AUv3 Control. If the AUv3 expose his AUParameters, you will see the name in the list. Unlike the Built-In Parameters, you can access the AUv3 parameters only through this list but the functionalities are identical. See 'Control' section for more details.

The apeMatrix Control Manager receive MIDI from selected physical, virtual and network sources, just like the Control for AUv3, see 'MIDI' for further information.

For iOS 11 or higher, apeMatrix can Host the AUv3 Extension which sends MIDI messages.



If a plugin can send MIDI out, you will see in the MIDI matrix a switch at the right of corresponding Matrix row. Enabling this switch will allow you to send MIDI to the Control Manager. Now you can use MIDI either for controls of the Built-In parameters, or for the AUv3 parameters.

Please note at the moment the Control Manager system can receive only CC (Control Changes) so if you are sending different MIDI messages as Note on/off PC Aftertouch etc... they will be discarded.

MIDI Sources

You can enable/disable the incoming MIDI signal from all the physical, virtual and network ports available. The MIDI Clock is managed by SYNC, see the SYNC section for more details.



If the Core MIDI Network is connected the wifi symbol will appear in the Network port cell.

Channel sets the input channel for the selected port, the Piano Keyboard will receive the Note On/Off messages in OMNI (from all 16 channels) or, one of the 16 channels.

Configure Bluetooth LE MIDI

With the release of iOS 8 and OS X Yosemite, sending and receiving MIDI data is supported using Bluetooth Low Energy connections on any iOS device or Mac that has native Bluetooth Low Energy support. All established connections are secure which means that pairing is enforced and connections cannot be made to your devices without your explicit consent. After a connection is established, it simply appears as an ordinary MIDI device that any MIDI application can communicate with.

Enable NRPN

NRPN stands for "Non-Registered Parameter Number" and is part of the MIDI specification for the control of electronic musical instruments. NRPNs allow for manufacturer-specific or instrument-specific MIDI controllers that are not part of the basic MIDI standard.

Unlike other MIDI controllers (such as velocity, modulation, volume, etc.), NRPNs require more than one piece of controller data to be sent. First, controller 99 - NRPN Most Significant Byte (MSB) - followed by 98 - NRPN Least Significant Byte (LSB) sent as a pair specify the parameter to be changed. Controller 6 then sets the value of the parameter in question. Controller 38 may optionally then be sent as a fine adjustment to the value set by controller 6.

This fine adjustment is part of the conventional MIDI controller specification, where any of the first 32 controls can be optionally paired with a control offset 32 higher. This is the rare 14-bit Continuous Controller feature of the MIDI specification, and NRPNs simply take advantage of that existing option in the same way offering 16,384 possible values instead of only 128.

(<http://en.wikipedia.org/wiki/NRPN>)

When you enable NRPN, you should not employ CC 99 and 98 as the normal CC in order to avoid an undesired overlap. An NRPN message must be sent with this order: CC 99 98 6 38 where the first couple is the CC number and the second couple is the data. You can MIDI learn as for the normal CC, and NRPN works for all knobs and parameters. Although an NRPN CC number can be greater than 127, you will not be able to learn CC beyond 127.

Program Change for Presets Selection

You can select Presets (current selected bank) by remotely sending a MIDI Program Change. You can select the MIDI channel where you can receive PC messages. A PC value of zero will select the first preset in the list, a value of 1 for the second etc... The range is from 0 to 127.

MIDI Destinations

This menu is accessible through one of three MIDI Matrix or through the menu in the each Matrix view.

You can enable/disable the outbound MIDI signal by physical, virtual and network ports available. Unlike the MIDI Sources, you can select for MIDI Out different devices for every Matrix views. Please note that at the moment the selected devices are not saved in presets but only in general app state so when you exit from the app and open again you will restore the last state.



If the Core MIDI Network is connected the wifi symbol will appear in the Network port cell.

Presets

Preset Manager will collect all the **Banks** (i.e. *.apematrix suffix*) and **Snapshots**. A *Snapshot* is a simple “photo” of the parameters in the UI (i.e. User Interface). Both the Matrix and Keyboard/Sequencer are included but they can also be excluded, see the Settings for more details.

So, once you find an interesting sound you can take a snapshot (i.e. save this new preset) by touching the ‘plus’ icon and this new preset will be added to the selected Bank. The top four elements of the Snapshots list are assigned for ‘HV Snapshot Pad’, you can then sort or delete the Snapshots in the List by tapping the ‘List Icon’. You can even share the selected Bank and you can restore the factory Built-In Banks from the ‘Cloud’ icon.

Backup



Factory preset-banks (Excluded from iCloud back up)



Library preset-banks (if available as In-App Purchasing) (Excluded from iCloud back up)



User preset-banks (Included in iCloud back up)

If you delete, overwrite, rename or save new presets in factory/library banks, the icon will change as User preset-banks , being backed up.

Snapshot banks are located in Documents folder, you can access files via iTunes Sharing, see ‘Samples’.



You can add new files by copying in the app's documents (through iTunes or from another app) and refresh the list from there.



Load a preset, randomly from the banks list.



Delete all Presets for a selected bank. A warning message will be displayed.

The Snapshots bank file is a kind of Property List format (.apematrix), you can edit as text and modify the values just rename in *.plist*

Swipe (right to left) on a preset or bank to rename/duplicate/delete it.



The purpose of the unique **Snapshot Pad** is to obtain intermediate values between four snapshots (corners). You can change snapshots assigned in the corner through the Snapshots list (see above).

The Snapshots Pad performs complex interpolations between four snapshots on a two-dimensional space. By scrubbing your finger on the Snapshots Pad a temporary new snapshot will be created by mixing the four snapshots depending on distance. Thus you can modify hundreds of parameters with a single touch, this is also called *Hyper Vectorial Synthesis*.

Snapshots Pad can be resized on fullscreen for detailed controls (left bottom icon).

N.B. Snapshot Pad have no effect on Switches and RAU parameters.

Presets AUv3

The state of current Audio Unit Extension is saved on the apeMatrix presets and, of course, you can create multiple instances of the same AUv3 plugin.

However its possible to save and load presets individually for each plugin. These are stored in the own folder inside the Documents folder. You can retrieve these files via iTunes or iOS File manager etc...

Thus these presets are available for all instances of plugin, and its easy to select a preset individually for every plugin.

MASTER & Dynamics

Σ

The GLOBAL MASTER and Pan is the gain for the three sub-mixes coming from the three Matrix grids.

You can change the output sound using a conventional compressor and expander effect which is last in the audio chain (post).

This is used to either reduce or expand the dynamic range of an audio signal. The Dynamics Processor controls set high (compression) and low (expansion) threshold volume levels. When the incoming audio is between these levels, it is left unchanged. Audio that rises above the upper threshold is cut in volume to bring it back down to that level (compression). Audio that falls below the lower threshold is cut in volume to make quiet sounds even quieter (downward expansion).

Additional controls adjust the attack and release time for the plugin's volume envelopes, the expansion ratio, the compression headroom, and a master gain to boost or cut volume on the Dynamics Processor's output.

Threshold: when the signal is above the threshold it is compressed

Headroom: upper limit for the compressor, a limiter prevents the signal to go above this threshold

Attack and Release: activation and de-activation times for the compression when it is above the threshold

Exp Threshold: when the signal is below the Exp Threshold it is backward expanded

Exp Ratio: expansion ratio

Settings

Buffer Size set the Audio Device latency. When you run apeMatrix from **Audiobus**, or **Inter-App** this value will be taken from **Audiobus** or **Inter-App Host**. Warning! When an app runs first and keeps running in the background, the Sampling Rate and Buffer Size will impose for the whole iOS while running.

Snapshot Pad Resolution Update sets the time interval for the interpolations, from about 15 to 350 milliseconds. Short times for higher resolution but higher consumption of CPU.

The others switch are self-explanatory.