Klee software sequencer

User Documentation

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Overview

The Klee is a unique step sequencer, unlike pretty much any other step sequencer available today. The fundamental thing that makes it unique is that you can have more than one "step" active at any one time; so instead of just one LED moving across the steps, you can have more than one. Of course, there's lots more details – hopefully this documentation will help you understand those details. But one of the great things about the Klee is that you can just experiment too – you don't need to know all the inner workings to get some great sequences from it!

Like the hardware Klee sequencer, the software Klee sends control signals to other sound generating synthesizers, that in turn make the sound. The hardware Klee generates control voltages, gates and trigger signals, which are then routed to control voltage-based synths. The software Klee on the other hand, generates MIDI signals, which are then routed to either software or hardware-based MIDI synthesizers. Starting with software Klee version 2, the program now hosts VST instrument plugins, and so can itself generate sound as well.

What's New in Version 2.4

Version 2.4 of the Klee software sequencer is primarily a maintenance release, adding compatibility for Mac OS Big Sur (11.x), including Apple M1 support (via Rosetta2), as well as some minor user interface improvements. See the Version History section at the end of this document for details on all changes.

History

The Klee was first developed as a hardware sequencer by Scott Stites over the course of several years, from about 2004 to 2007. He was helped along the way by lots of great and talented people, and rather than try to retell the story, I link you instead to a great online thread at the Electro-music.com forum, where Scott tells the story himself: http://electro-music.com/forum/viewtopic.php?t=36742 .

After a while, the Klee was "adopted" if you will by the folks at the Electro-music.com site, and currently that site remains the "home" of the Klee, hosting an active discussion forum about it, selling printed circuit boards that allow you to build your own Klee, etc... (http://electro-music.com/forum/index.php?f=155) .

Scott has a great summary of the Klee's development now up at the "Birth of the Klee Sequencer" page on his personal web site: http://www.birthofasynth.com/Scott_Stites/Pages/Klee_Birth.html .

When I first stumbled onto the Klee, I was thoroughly fascinated by it, in reading all the documentation I could find, watching online videos, etc... - but I found that I kept asking myself how I would effectively use it in my studio. The hardware Klee works with control voltages, and I only had a few voltage controlled synths that I could use with it. That would have been fine, but I kept thinking about clock sync with other MIDI gear, etc... - in short, although I was sure it would have made a great addition to my studio as a control voltage-based unit, I kept coming back to the fact that I needed a MIDI version of it, both MIDI sync-able as well as MIDI note transmitting. I read through a few posts in the Electro-music.com forum about these issues, and saw that some people had created the ability to integrate MIDI into the Klee (or at

least ideas for such). But then it dawned on me that I could reproduce most of the Klee's functions in software, which would allow me to get that MIDI integration I wanted!

Although there was mention of some software-based Klee sequencers on the forum, none were available in a format that worked for me; they were built for a Nord Modular G2, for a ComputerVoltageSource module, for the Numerology program, or for the ChucK programming language. No regular old Mac or Windows applications that I could use with the rest of my MIDI gear. So I decided to build it myself. And now you have that product!

Finally, many people ask why the sequencer is called the "Klee." Well, here's the story - the following is excerpted from Scott Stites' "Know the Klee" document:

"...In fact, programming a Klee sequence is an exercise in the unpredictable. The programming pots interact with each other according to the Klee pattern driving them, and the Klee pattern itself is as instantly changeable as programming a pot. Some changes will shift your Klee sequence in a slightly different direction, while some changes may shift the flow of things one hundred eighty degrees. In fact, the Klee gets its name from this concept. When the first model was designed, programming it was compared to molding a sculpture out of very loose clay. Some time after that statement, Romeo Fahl built a version of the first Klee model, and named it the Klee (which is pronounced 'clay') both in recognition of the "loose clay" description and in honor of the artist Paul Klee, whose work often, somehow, reflects the abstract nature of programming a Klee sequencer and many of the sequences it's been known to produce."

System Requirements

Macintosh
- OS X 10.11.6 – 11.x (Big Sur compatible, runs on M1 chip via Rosetta 2), 64-bit plugins only

Windows
- Windows 7, 8 or 10, 64-bit only, 64-bit plugins only

Installation

Macintosh

The Macintosh version is supplied as a Macintosh disk image file (.dmg). Just double click the downloaded file, and you will see a new window appear on your desktop. Drag the Klee application icon to the Applications window icon that you see – this will install the Klee application on your computer:

After the file has copied, you can unmount the disk image, and delete the .dmg file (or keep it somewhere safe if you'd like, for future installations). Note that if you are upgrading from a

previous version of the software Klee, the new version will overwrite the old one.

Windows

The Windows version is supplied as a compressed .zip file. Unzip the file, and you will be left with a file called Klee Installer.exe (or Klee Demo Installer.exe if installing the demo version). Double click this file to run the installer, and follow its instructions:
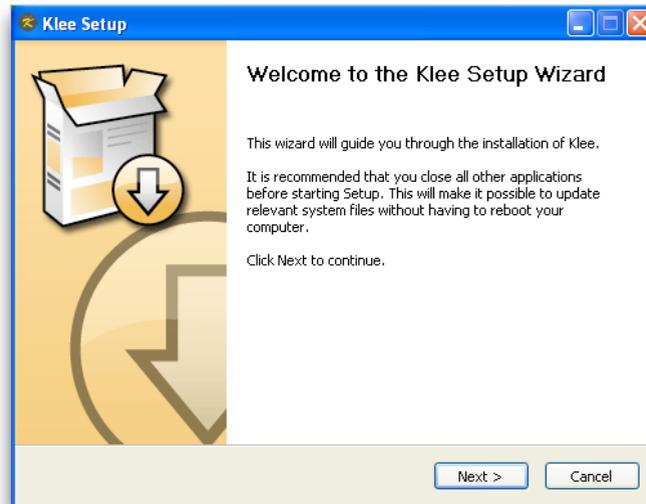
After installation, you will find a shortcut available to launch the Klee application in the Windows Start menu, in addition to uninstallation and documentation shortcuts. You can keep the Klee Installer.exe file somewhere safe if you'd like, for future installations.

Uninstallation

 Macintosh – Just drag the Klee application out of the Applications folder to the Trash.

 Windows – Use either the Windows Add/Remove Programs control panel to remove the application, or use the Uninstall shortcut in the Windows Start menu.

Authorization & Initial Startup

If you're trying the demo version of the Klee sequencer, you can start to use it immediately after installing it.

If you are installing the full version of the Klee sequencer, you'll need to authorize it before being able to use it. Start the application, and you'll find yourself at the About & Authorization screen:

Enter your Username and Password, and then click the Authorize button. Be careful, cApiTaliZation MaTteRs! If successful, the Status field will change to "Registered", and you will see a "Start Sequencing!" button, which when clicked will allow you to begin to use the software. If not successful, you will be left at the Authorization screen to try again.

To verify your authorization status, or to remind yourself of your Username and Password, you

can select the About Klee menu item to be brought back to the About and Authorization screen at any time.

Upon successful first authorization of the full version, or immediately after first startup when using the demo version, the application will proceed to scan your plugins for compatibility, as well as to sort through which are VST instrument versus VST effect plugins. Only VST instruments are supported. If you have a large number of plugins, this scan may take some time. The program will display which plugin is currently being scanned. On subsequent startups, the program will only scan new plugins, so the scan is much faster compared to the initial scan. If the application has a problem with a particular plugin, it will be blacklisted; see "Blacklisted Plugins" in next section regarding the Setup screen.

Setup Screen

The Klee sequencer has a Main screen, where most sequencer interaction occurs. It also has a Setup screen, where audio, plugin and external MIDI controller settings and levels are configured. The buttons on the bottom of the Klee interface allow you to select which window to see.

Audio Settings

This section allows you to turn audio processing on and off, select the audio driver used, configure the audio inputs and output devices, including setting the sample rate and audio buffer sizes. Some of the configuration options will depend on which driver and devices are selected, as well as whether you are working on a Macintosh or a Windows machine.
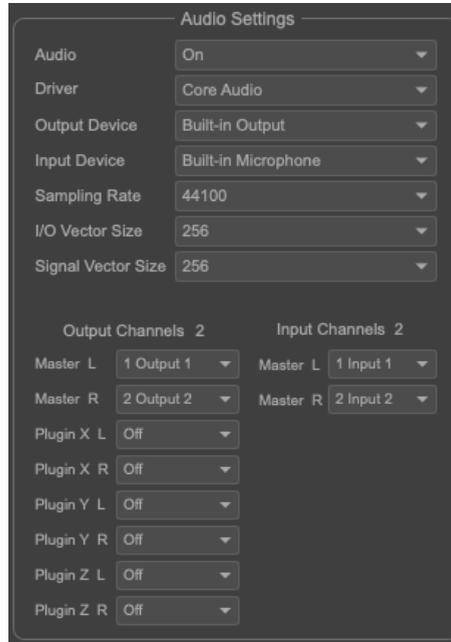
It should be noted that despite its name, Audio processing must be On when using MIDI clock sync, even if you are not using plugins or External Load Audio triggering!

You can also turn Audio processing off and on from the lower right of the Klee window, by clicking on the Audio I/O icon.

The I/O Vector Size controls the number of samples that are transferred to and from the audio interface at one time. The Signal Vector Size sets the number of samples that are calculated by the Klee at one time. This can be less than or equal to the I/O Vector Size, but not more. Use the I/O Vector Size and Signal Vector Size adjustments to improve timing performance, and/or eliminate clicks/pops in the audio output.   Lower values will improve the Klee's timing accuracy, but at the expense of greater CPU load; if you begin to hear clicks and pops in audio coming from plugins being used in the application, try increasing the values for these parameters.

You can specify which of your available audio device outputs the 3 plugin outputs are routed to (if at all), as well as the Master stereo output, which sums the outputs from the 3 plugins.

ReWire Audio Slave Support

The Klee now supports Propellerhead's ReWire standard acting as a ReWire "slave" device, allowing for audio created within the Klee using plugins to be routed directly into a ReWire "mixer" or host device, such as most current DAWs. To use ReWire, select the "ad_rewire" audio Driver – do this *before* starting your ReWire host application (e.g. your DAW):
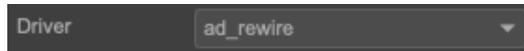
You will now see Klee inputs 1 through 8 in your ReWire host application once you start it – they correspond to the stereo Master and three plugin outputs from the Klee:

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Output Channels 8	
Master L	1 ReW.. Out ▼
Master R	2 ReW.. Out ▼
Plugin X L	3 ReW.. Out ▼
Plugin X R	4 ReW.. Out ▼
Plugin Y L	5 ReW.. Out ▼
Plugin Y R	6 ReW.. Out ▼
Plugin Z L	7 ReW.. Out ▼
Plugin Z R	8 ReW.. Out ▼
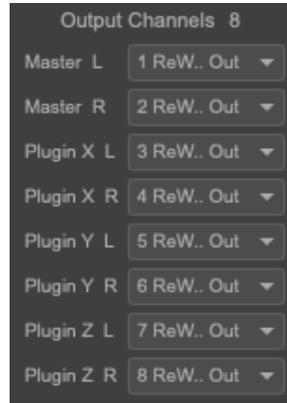
**Please note that on Windows, you may need to run the Klee application as Administrator the first time you select the ad_rewire audio Driver. This will be the case if you don't see the individual ReWire out selections as in the above image.   To run the program as an Administrator, right click the application, and select "Run As Administrator." Then select the ad_rewire Driver. This only needs to be done once to set your system up appropriately.*

Plugins

This is where audio plugins are chosen and assigned to one of three available plugin slots (Plugin X, Y and Z), and also where presets can be chosen for each plugin. In addition, the Mixer section allows you to control the relative volume of each plugin, as well as the Master output volume for the Klee Sequencer.

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Klee software sequencer
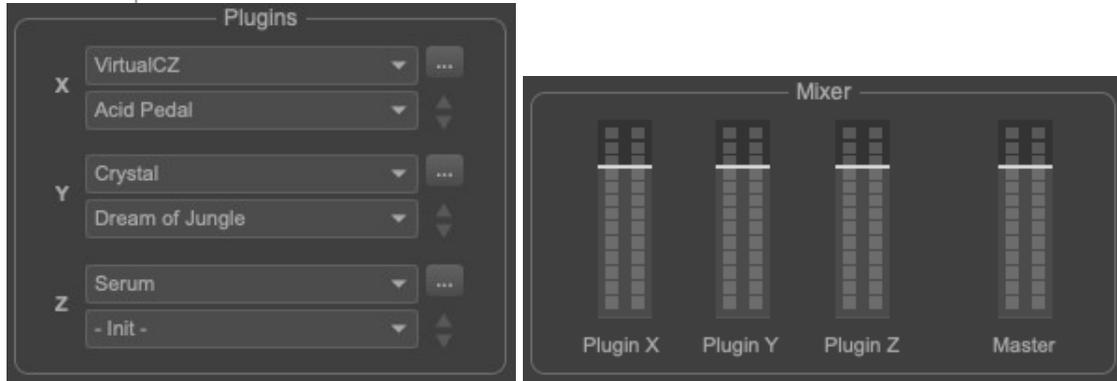
To select a plugin for a plugin slot, just choose it from the appropriate drop down menu. You can use a plugin in more than one plugin slot; the application will just load another instance of the plugin in this case. Once a plugin has been selected for a slot, if it has available presets, you will be able to select them from the drop down menu immediately below the plugin drop down. Alternatively, you can sequentially step through the available presets using the up and down arrows. Finally, you can open the plugin's user interface for further manipulation by clicking its disclose button (button with three dots on it).

Note that if you change a plugin's selected preset using the plugin's custom user interface to do so, the preset displayed on the Setup page may not reflect the plugin's currently active preset.

Blacklisted Plugins

The Klee can use 64-bit versions of VST, VST3 or AU (AU on Mac only) plugins. This section

shows a list of any blacklisted plugins (i.e. they did not pass a plugin validation check), and provides the ability to rescan those plugins (for example, if you installed an updated version of one and want to retest it), or to rescan all plugins.
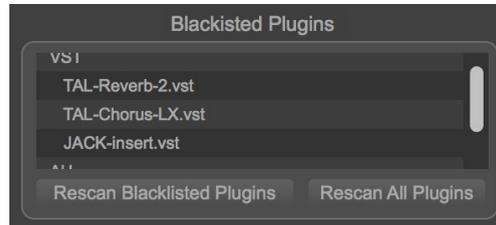
Application Size

The Klee sequencer allows you to scale the application window smaller or larger depending on your screen resolution and personal preference. Once you find a setting you like, you can click the Make Default button to have the application use that size for each subsequent launch. If you choose a size that's too big for your current monitor, you'll be shown a warning, allowing you to choose a smaller size.
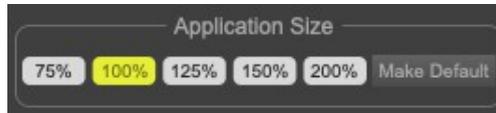
MIDI Controllers

This section contains information about MIDI controllers that have been configured with the

MIDI learn functionality. It is covered in depth in the MIDI Learn/Hardware and External Control section below.

Demo Limitations

The demo version of the Klee sequencer is feature complete compared with the full version, with some exceptions:

- It does not allow use of presets. Although the presets slots are visible in the lower right corner of the interface, and though the save and load functions work, the presets are not usable in any way.
- It does not allow use of the constrain to scale function. Clicking on the Scale button will have no effect.
- It does not allow use of the chord output function. Clicking on the Chord button will have no effect.
- Only one virtual audio instrument slot is enabled. The other two slots will show no plugins available.
- It will time out after 20 minutes of use, showing the following message:

Klee software sequencer

Klee Demo

electro-music.com • defective records software

Klee
Sequencer

Sorry, but you've run out of time! You'll have to restart the application to use it again.

If you like what you've been experiencing, why don't you buy the full version? You'll be done with this annoying time out period, and you'll also be able to load and save presets!

Klee Sequencer Homepage
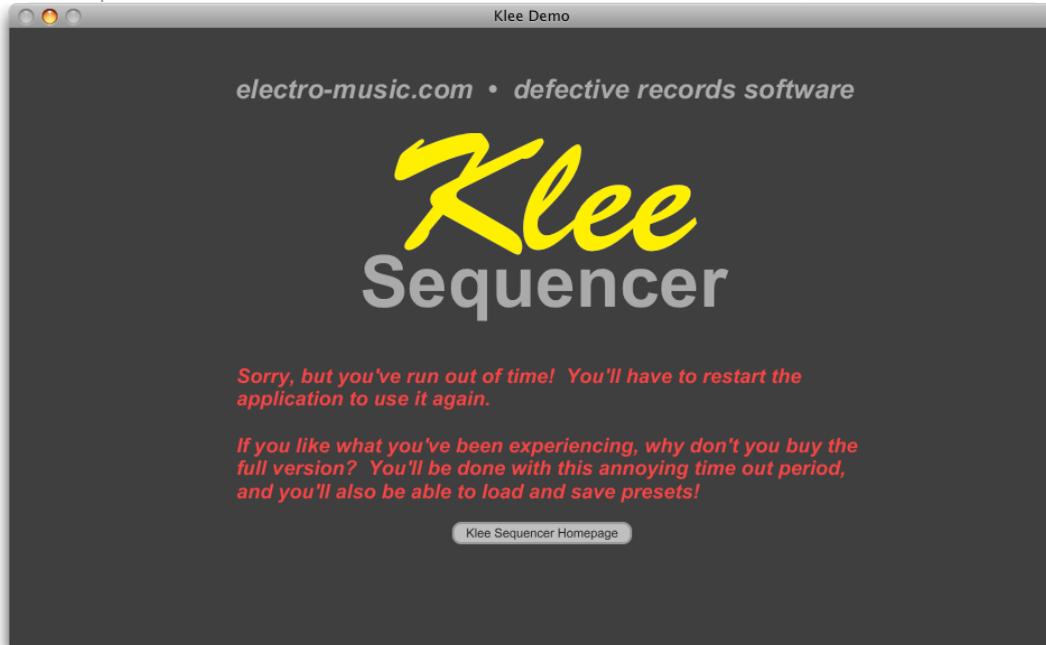
Documentation & Help

The Klee sequencer can launch its full documentation (this document) from within the application itself; just go to the Documentation menu, and choose "Klee Documentation". This will launch a PDF viewing application in which to view the documentation:

On Windows, you can also find a shortcut to the documentation in the Klee Start menu shortcuts.

In addition, the document "Know the Klee", authored by Scott Stites (who created the original hardware Klee), is available from the Documentation menu. This comprehensive overview of the Klee is intended for those wishing to understand how the hardware Klee works, with control voltages, triggers and gates. However, most of the concepts are directly applicable to how the Klee software sequencer works too, so it's definitely worth reading. In fact, the software Klee was developed primarily using this document as a reference!

About Menu

The About Klee menu item (in the Klee menu on Macintosh, and in the Help menu on Windows) will replace the Klee main screen with the About and Authorization screen. You can also reach this screen by clicking the Klee logo at the top of the Main or Setup screens. In addition to the Authorization information described above, it shows version information about the application, copyright information, acknowledgments and has direct links to both the Klee software sequencer home page, as well as the support page.   The "electro-music.com" and "defective records software" text on the Main and Setup screens also link directly to those websites.

Usage – The Basics

The Klee sequencer is a unique step sequencer, unlike most other step sequencers. The fundamental thing that makes it unique is that you can have more than one "step" running at any one time; so instead of just one LED moving across the steps of your sequence to indicate the "active" step, you can have more than one. Although it sounds simple, this and a few other features are game-changing, and what give the Klee its special abilities.

Another important point to understand about the Klee is how note values are arrived at, and when and how those notes are triggered.

What follows in this "Basics" section is an attempt to give a solid but not exhaustive explanation of the Klee, including the concepts mentioned in the above two paragraphs; for a more thorough review, including additional features, the reader is encouraged to also read the "Usage - Beyond the Basics" section of this document, as well as the "Know the Klee" document.

Note Values

The Klee's sixteen steps, or "stages" as they are called, are divided into two groups of eight, called Group A and B. Each stage has a dial associated with it, and it's with this dial that you adjust how many semitones are set for that stage. (One semitone is the distance between notes C and C# for example; two semitones would be the distance between notes C and D). Within each Group (A and B) of eight stages, the note value for the group is the *sum* of the *active* stages' semitone values, plus the current Baseline Note. What? Let's look at an example:

Let's focus on Group A, seen above. Stages 3 and 6 and currently active, indicated by their red LEDs. *Although their numbered squares are red, Stages 1 and 4 are **not** active;* we will review shortly what those red squares mean and what they do. So for Stages 3 and 6, we can see that they are dialed in to add 1 and 2 semitones, respectively, to the final note value. Summing 1 and 2 semitones, we arrive at a total of 3 semitones that are to be added to the Baseline Note. In this example, we can see that the Baseline Note is currently set to C2. **The final note value currently represented by Group A then, is C2 plus 3 semitones, or D#2.**

The Klee allows for individual notes to be created with the value represented by Group A, Group B, the sum of Group A + Group B, and the difference of Group A - Group B. In the case of A+B, the note value is the sum of all active stage semitone values in both groups A+B, added to the current Baseline Note. In the case of A-B, the note value is the sum of all active stage semitone values in Group A, minus the active stage semitone values in Group B, added to the current Baseline Note. In the example below, we show the same Group A settings we outlined above, but also show Group B, which has Stage 4 active, and with a dial setting of 1. Assuming the same Baseline Note setting of C2, this would result in a final note value of D#2 for Group A, a final note value of C#2 for Group B (1 semitone plus C2), a final note value of E2 for Group A+B (3 semitones for Group A + 1 semitone for Group B + Baseline Note C2) and a final note value of D2 for Group A-B (3 semitones for Group A − 1 semitone for Group B + Baseline Note C2). You can see the Group note values shown in the "Output" section, when the Klee's clock is running. This is shown below:
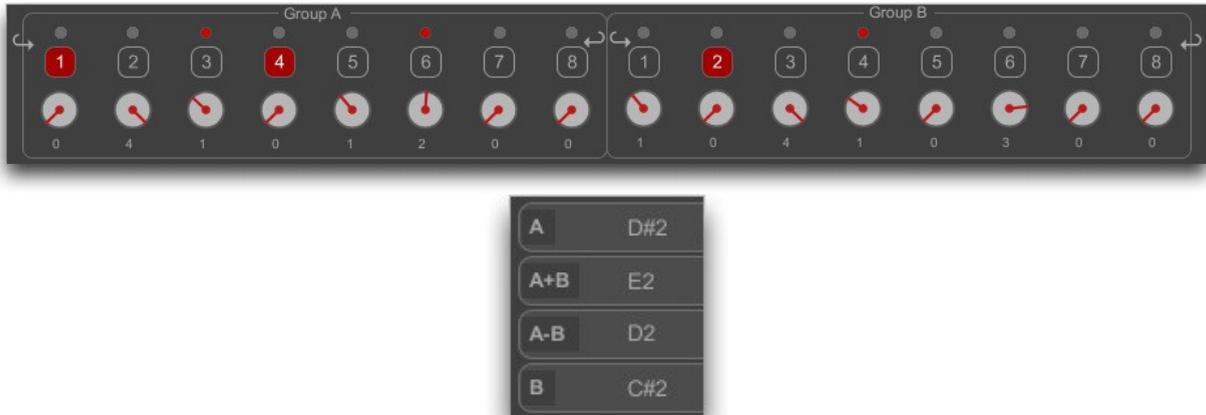
Setting and Loading the Pattern

So what were those numbered square buttons seen in the screenshots above? Those buttons are how we program the *pattern* into the Klee. (In the "Know the Klee" document, this is referred to as the "bit pattern," but we can skip the discussion of bits, shift registers, etc... here!). As alluded to earlier, in traditional step sequencers, there's only one "active" stage at any point in time, only one lit LED moving across your stages as the clock increments. In the Klee, we can specify more than one active stage. This is done by turning on more than one step in the pattern, using the numbered buttons. Let's see how this works with some graphically illustrated examples.

In the first example, let's just turn on one step in the first 8 stages, stage 1. This would emulate a more traditional step sequencer. We click the switch labeled "1" above the first stage, ***and importantly, press the Load button.*** If you do not Load the pattern after making your pattern selections, it will not be used! An alternative to pressing the Load button is to use the Load on Play mode, which will automatically load the pattern each time the Klee's transport is started from a previously stopped state, using the Start button:

Two ways of loading the current pattern

New in version 2.1, the Load button will load the pattern on the next quarter note clock tick, not on any next clock tick (as in previous versions). After loading the pattern, let's get the clock

moving, to invoke the first step of the sequence. You can start the clock using either the Start button shown above (you can also use your computer's Spacebar to toggle the Start button on/off), or alternatively you can manually move the clock forward by one step using the Manual Step button:
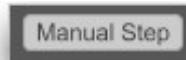
With the clock on the first step of the sequence, we will see Stage 1 active, as indicated by its lit LED:

If we now move the clock forward one step by using the Manual Step button, we will see that the active stage has shifted over by one stage, to Stage 2:
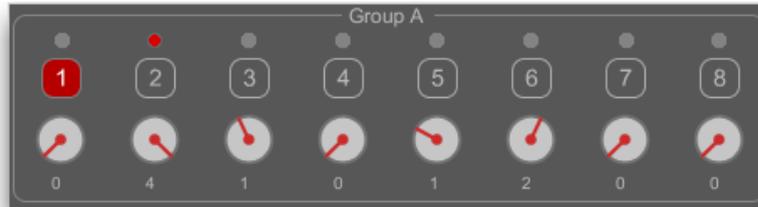
And so on - if we continue to move the clock one step at a time, we will see the active stage march along until stage 8. What happens then? That depends. The Klee has two pattern modes to choose from: **8 x 2** and **16 x 1**. In 8 x 2 mode, the two Groups of eight stages are independent. In this mode, once the active stage passes stage 8, it wraps around and starts at its Group's stage 1 again, like this:
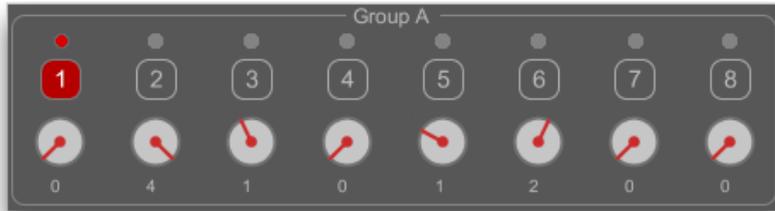
The patterns in Groups A and B are completely independent of each other.

In 16 x 1 mode though, all sixteen stages are grouped together, so after stage 8 is active, then stage 9 will be active (you'll notice that in 16 x 1 mode, the second set of eight stages gets renamed stages 9 through 16):


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Klee software sequencer
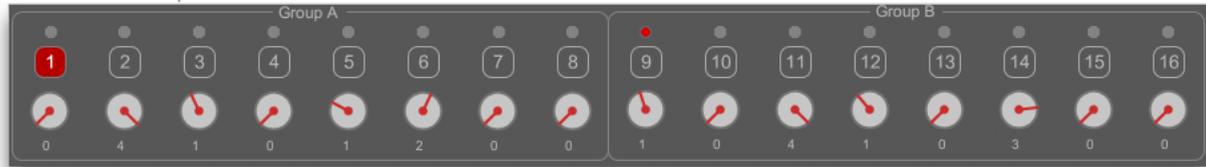
As you've probably guessed by now, when the active stage gets to 16, the sequence then wraps around and starts at stage 1 again.

You set which mode you're in, 16 x 1 or 8 x 2, using the button toggles in the Pattern section:

OK, so now let's start to show what sets the Klee apart. As mentioned, you don't just have to have one active stage – so let's see what happens with a more complicated pattern. Pictures are worth more than words in this case – each successive image below represents the state of the Klee when the clock is moved forward by one step, using the Manual Step button. The Klee is in 8 x 2 mode in this example:

Klee software sequencer
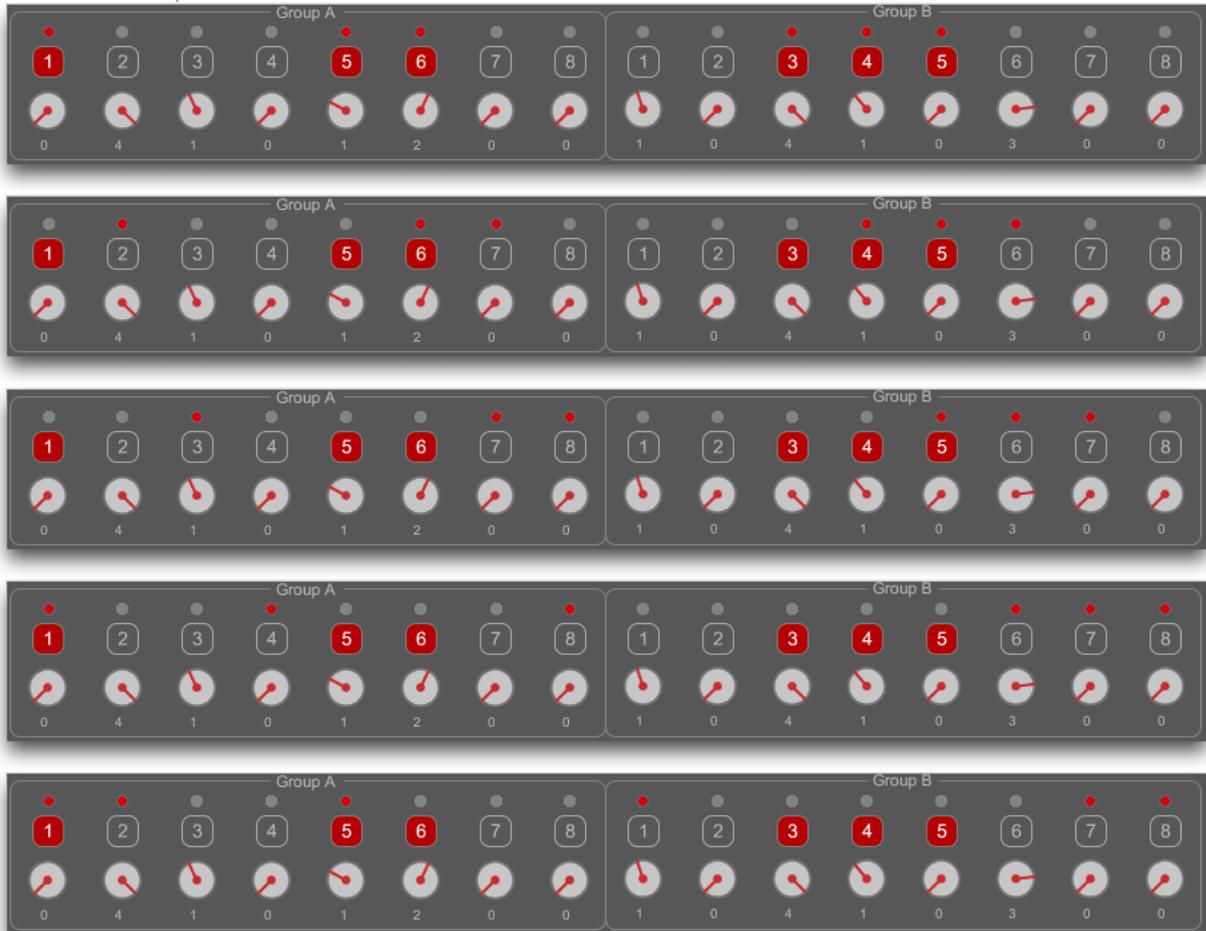
Klee software sequencer
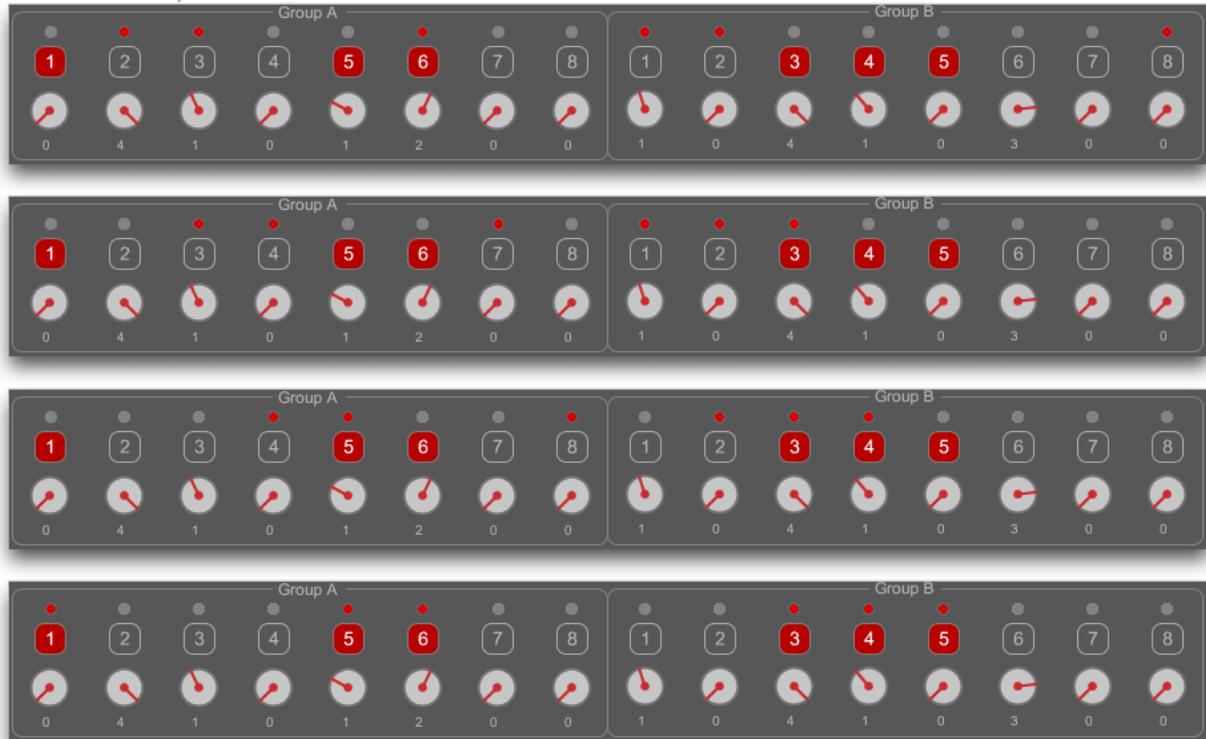
Hopefully that all makes sense! I think you can begin to see how the Klee can easily generate some dynamic (and often unanticipated) patterns. But we're far from being done!

Note Triggers and the Busses

OK, so now we know how the note values are generated for each of the four Groups (A, B, A+B and A-B) by the active stages and their respective dial values. And we've also seen how patterns are programmed and loaded, as well as how those patterns propagate through the stages to create the currently active stages. But when and how are the actual notes created? And how do those notes get routed to our desired MIDI device(s)? Now we begun to discuss the Klee's *Busses*.

We already know how Groups A, B, A+B and A-B have note values that are computed at each clock step, based on which stages are active, as well as the Baseline Note. But knowing when those notes are actually created and sent out via MIDI depends on which Bus that Group is assigned to, and what the current state of that Bus is.

There are three Busses: 1, 2 and 3. Stages are assigned to the Busses using the radio button selector below each stage:

Stage currently assigned to Bus 2

Groups A, B, A+B and A-B can be assigned to one of the three Busses, within the Output section:

Busses can be used by more than one Group, or not at all.

Busses become active, meaning that a note will be triggered for a Group that is assigned to that Bus, when one or more stages that are on the Bus become active. As before, an illustrated example will help to understand the concept.

Let's focus on Group A, with the Klee set to 16 x 1 mode, with a Baseline Note of C2. Let's assign Group A to Bus 1:

Now let's look at what pattern is loaded into the Klee. For simplicity, I have only selected stages 1 and 3 to be loaded, and only stages 2, 4 and 5 are set to Bus 1. This will allow us to focus on the first several stages to illustrate the concept. Here's the entire set though to start:
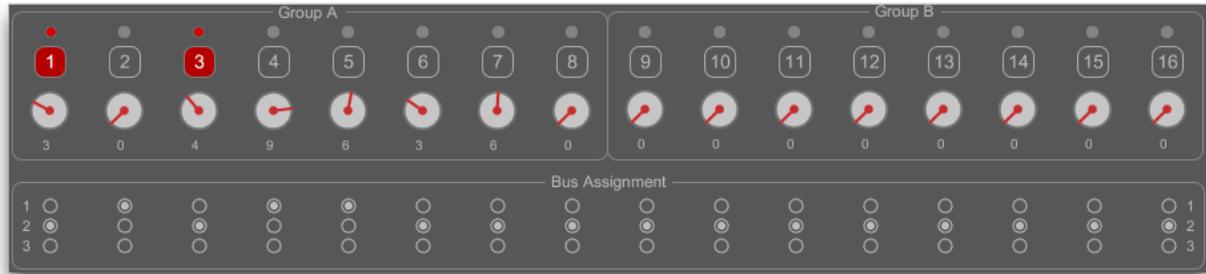

At the first clock cycle, stages 1 and 3 are active, and Group A has a calculated note value of G2 (3 semitones + 4 semitones + C2 Baseline Note), but neither of those stages have Bus 1 selected, so no note is triggered:

Klee software sequencer
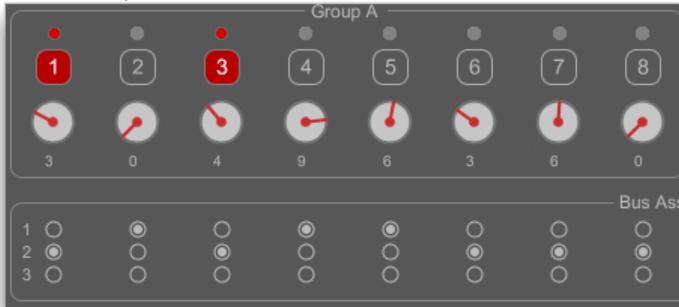
No note created

Now let's look at the next clock step. Stages 2 and 4 are active, Group A has a calculated note value of A2 (0 + 9 + C2), and both of the stages are set to Bus 1. So the A2 is triggered!! When a Bus is activated, the LED in its Bus section will be lit transiently:
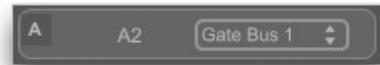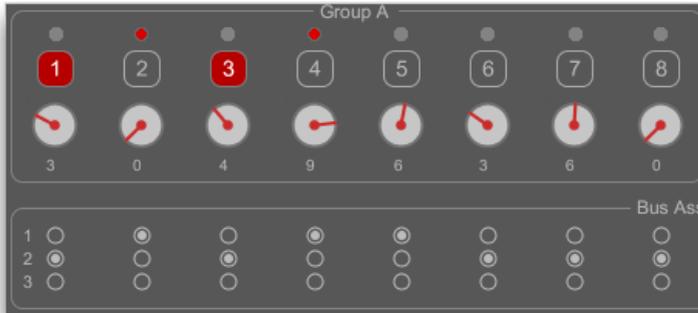
Note created

If we continue along for the next step, Stages 3 and 5 are active, Group A's calculated note value is A#2 (4 + 6 + C2), and the note is created, because Stage 5 is active and it's set to Bus 1:
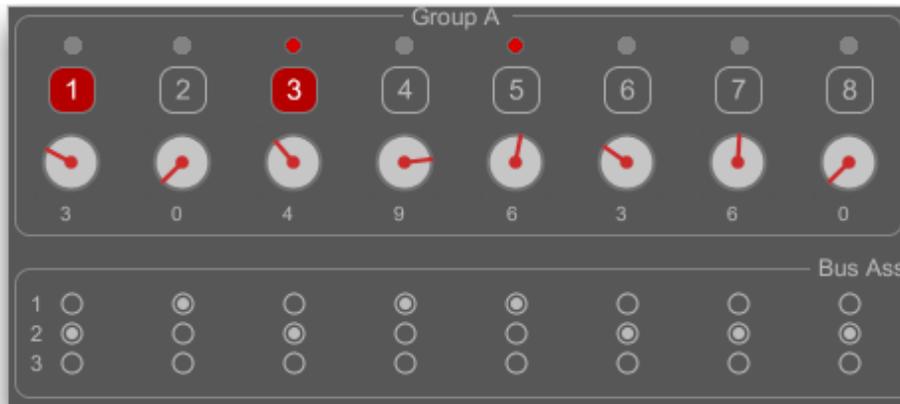
This last example shows that it does not matter how many stages are active on a Bus to trigger it; only one is required. There is no difference in the output if more than one stage on the Bus is active.

And so on. One begins to appreciate how just changing one Bus assignment can have a big impact on the resulting note sequence that is created!

But we're not done with the Busses yet – there's one more important detail. We said above that a Bus is active if one or more stages that are active at that time are set to that Bus. This *is*

always true for Busses 1 and 3, however it is only ***sometimes*** true for Bus 2. The exception occurs if Busses 1 and/or 3 *are also active at the same time*. If so – then Bus 2 will ***not*** be active. Said differently, **Bus 2 can only be active if Busses 1 and 3 are not active at the same time.** Let's take a graphical look again:
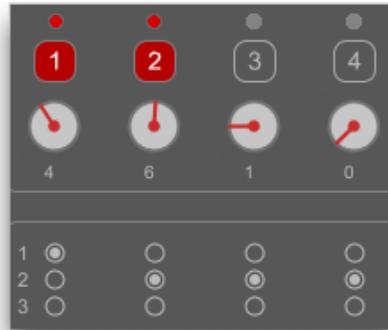
In the example above, stages 1 and 2 are active, and are set respectively to Busses 1 and 2. Only Bus 1 is active, and not Bus 2, since Bus 2 cannot be active if either Bus 1 or Bus 3 are active at the same time. Now let's move the clock forward one step:
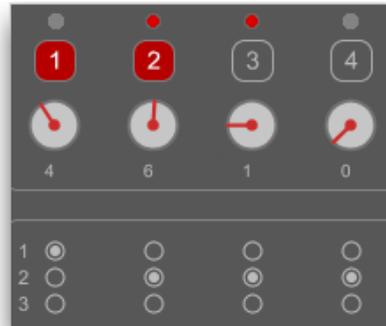
Now stages 2 and 3 are active, and both are set to Bus 2. In this case Bus 2 **is** activated, since neither Bus 1 nor Bus 2 are concurrently active.

The last detail we have to explain about the Busses is how a note that is created on an active Bus gets routed to a MIDI device. In the Busses section, we specify the MIDI device (or VST plugin instrument) and channel for each of the three Busses; this delineates where notes created on each of the three Busses get routed to:

When a Plugin (Plugin X, Y or Z, as defined on the Setup screen) is selected as the MIDI receiving device for a Bus, an additional button is made available next to the device drop down menu, the plugin disclose button (the button with three dots on it). This will open the plugin's user interface window.

At this point, you've learned about the basics of the Klee software sequencer, including how note values are arrived at, how patterns are set and loaded, and how note triggers are created using the Klee's Busses If you haven't already, you should probably put this documentation aside for a moment and just start to experiment with the sequencer! In the next section, will finish talking about the software Klee's other features.

Usage – Beyond The Basics

The software Klee sequencer has many additional cool features that we'll cover in this section. Although use of the basics that were covered in the last section in and of themselves can result in some pretty amazing sequences, it's when you start to get into the features described above that things can get *really* interesting!

Active Stages to Switches function

Especially when using Random mode, interesting patterns are frequently "stumbled upon" when using the Klee. You may wish to store this randomly arrived at pattern for further manual tweaking. To do so on the hardware-based Klee, one has to quickly stop the sequencer and then manually activate the switches for each currently active stage, and likewise inactive all switches for each inactive stage. On the software-based Klee, you can do the same thing with a click of a button, and individually for Groups A and B, or for both Groups A and B together. To do so, simply click the appropriate icon in each area:


Active Stages to Switches buttons for Group A, Group A & B, and Group B

This will immediately turn on all switches for stages that are currently active, and turn off switches for inactive stages, in the selected Group.

Random Pattern Mode

Instead of always cycling through a pre-set pattern, the pattern in Group A can be randomly selected. When the Random radio button is selected in the Pattern section, step 1 in Group A will randomly be activated, with the Threshold parameter defining the likelihood:
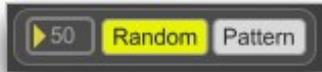

As you decrease the Threshold parameter (its range is 0 to 100), the likelihood that step 1 in Group A will be activated at each clock cycle decreases. A value of 0 means that it will never be activated. Similarly, as the threshold increases towards 100, the likelihood increases as well – at 100, step 1 of Group A will always be activated at each clock cycle.

The behavior of Group B when in Random mode depends on the setting of the 16 x 1 / 8 x 2 switch; when in 8 x 2 mode, Group B continues to cycle through its pattern just the same as when in pattern mode. But when in 16 x 1 mode, the random activity from the first eight Group A stages will continue to propagate through the next eight Group B stages. Said differently, when in random mode with 8 x 2 mode set, the first eight stages will be randomly activated, while the second eight stages will follow their pattern. When in 16 x 1 mode though, *all* 16 stages will be randomly activated.

External Load

External Load mode provides another way to Load the selected pattern into the Klee sequencer. When turned on, it allows an external MIDI or Audio trigger to Load the pattern.
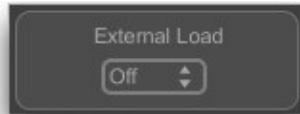
MIDI trigger mode

External load MIDI trigger mode allows you to specify the MIDI device, channel and specific note value, which when received by the Klee sequencer, will cause a Load event to occur, so that the selected pattern is loaded upon the next clock tick. Receipt of this note on event will cause the LED to light in the External Load section.

To start MIDI loading, choose MIDI in the drop down menu in the External Load section. To choose your desired MIDI device, channel and note value that will invoke the External Load, click the Edit button next to the drop down menu. This will display a drop down menu that allows for selection of your MIDI input device. Next to it, choose the desired MIDI channel

number from that device that you wish to monitor. Finally, select the desired note value that will trigger the Load event.
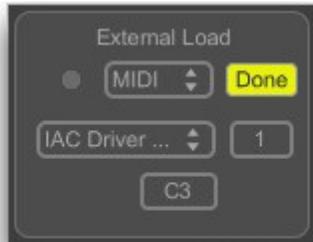
When done selecting these values, press the Done button.

Audio trigger mode

External load Audio trigger mode allows you to specify an audio input device and threshold input level, which when exceeded by the input signal, will cause a Load event to occur, so that the selected pattern is loaded upon the next clock tick. When the audio threshold is exceeded and the Load is triggered, it will cause the LED to light in the External Load section.
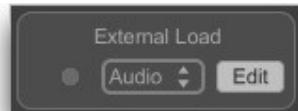
To start Audio loading, choose Audio in the drop down menu in the External Load section. The

Audio input device that will be monitored is the one selected in the Audio Settings section of the Setup screen (see Setup Screen, Audio Settings section). ***Note that Audio I/O needs to On for Audio-triggered External Load to work***. You can do this either by activating the Audio I/O button in the lower right of main Klee window, or by ensuring that Audio is on in the Audio Settings section of the Setup screen.
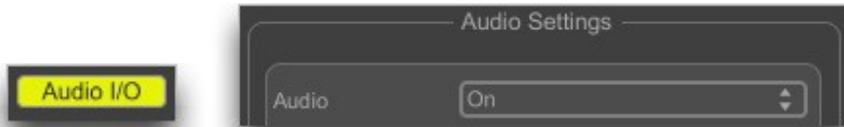
To choose your desired Audio input device threshold level, move the vertical white bar left or right across the level meter. The External Load trigger occurs when a transition occurs from audio signal being below the threshold, to above the threshold. If the signal level is constantly above the threshold level, triggers are not constantly created.
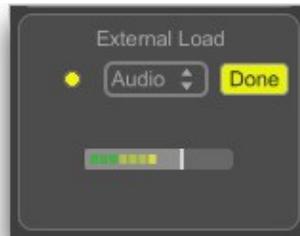
When done setting your threshold value, press the Done button.

Invert B Mode

One can think of the random mode described in a previous section as a way to introduce variation at the leftmost, "first" stage of the Klee. The Invert B mode works at the "other" end of the Klee's stages, after Step 8 of Group B (or Step 16 when in 16 x 1 mode). When activated, Invert B flips the status of the stage that is about to "wrap around" back to the beginning of Group B (in 8 x 2 mode) or to the beginning of Group A (in 16 x 1 mode).
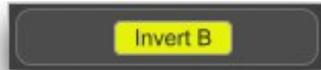
Back to a real example to help explain this. Let's assume that we are in 8 x 2 mode, normal pattern mode (not random), Invert B mode on, and with the following pattern loaded into Group B:

As the clock progresses one step, the active stage 1 shifts as before to stage 2, making it active. With Invert B mode off, the inactive stage 8 would normally wrap around to stage 1, making it inactive too. But when Invert B mode is *on*, the status of stage 8 "inverts" when wrapping around to stage 1, and so stage 1 turns *on* at this point:

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Let's move the clock forward one more step – active stages 1 and 2 shift over to stages 2 and 3, making them active. Inactive stage 8 gets inverted (activated) when it wraps around to stage 1, and so stage 1 is active again:

This pattern continues until we get to this state, with all stages active!

Now when stage 8 wraps around, its currently active state gets inverted, and *inactivated*, on its

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way to stage 1:

And for the next step:

This continues, until we get to the following state, with everything *inactivated*!

Hopefully you now understand how Invert B mode works. The same type of thing happens when in 16 x 1 mode with Invert B mode on, except that the inverted stages wrap around to

stage 1 of Group A, rather than Group B.

Gate Bus 1 Load Mode

Up until this point, we've described three ways to Load the selected pattern into the Klee sequencer: the Load button, which will load the selected pattern of switches into the Klee at the next clock cycle, the Load on Play mode, which when invoked will load the pattern each time the Klee's transport is started after having been stopped, and the External Load mode, which will allow an external MIDI or audio trigger to Load the pattern.

Gate Bus 1 Load mode represents another, fourth way of loading the selected pattern into the Klee. When this mode is activated, it will load the switch pattern each time the sequence encounters a transition from Bus 1 inactive to Bus 1 active. What?? Again, an illustrated example to help explain.
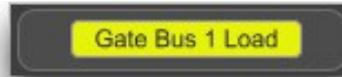
Assume we are in 8 x 2 mode, pattern mode, External Load off, Invert B off, and Gate Bus 1 Load *on*. The Klee has the initial pattern loaded as below:
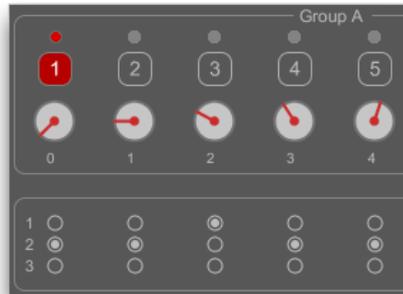
Stage 1 is active, and we can see that stage 1's Bus is set to 2 – so Bus 2 is active, but Bus 1 is not. We move the clock forward one step:
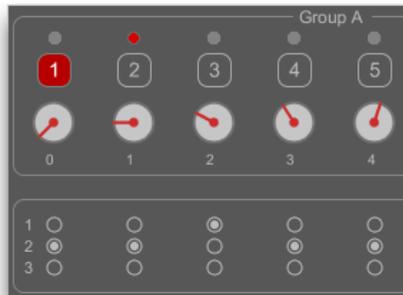
Now stage 2 is active, and its Bus is again Bus 2 – so Bus 2 is active, and again Bus 1 is not active.

But what happens at the next step? One would expect for stage 3 to become active; however we

see that if stage 3 were to be active, that its Bus, Bus 1, would also be active. Since in the prior step, Bus 1 was inactive, and now it is about to be activated, then the Gate Bus 1 Load function is invoked. Remember, the Gate Bus 1 Load function is invoked any time Gate Bus 1 goes from being inactive to active. So when the Gate Bus 1 Load function is invoked, it causes the selected pattern to be immediately reloaded. This results in the actual next step to be:
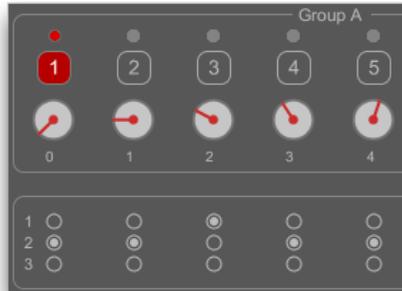
That's right; we're right back to where we started – basically we have a sequence that will repeat every two steps in this example.

You can use this mode to generate looping sequences of less than 8 (or 16) steps in duration; limit yourself to only using Busses 2 and 3 for your outputs, and then set Bus 1 on the stage one greater than the number of steps you're after. In the example above, if we wanted a two step sequence, we just set stage 3 to Bus 1 to do so.

Another great way to use Gate Bus 1 Load is in conjunction with the Random mode – lots of fun!

Clock Settings

The software Klee sequencer can be driven from either its internal clock, or via MIDI clock that can be routed to it from either a hardware or software synthesizer. When in MIDI clock mode, select the MIDI device using the drop down menu which will appear to select the MIDI clock source. You need to ensure that the device you have selected is properly configured to send MIDI clock:

Note that Audio I/O needs to on for MIDI clock mode to work. You can do this either by activating the Audio I/O icon in the lower right of main Klee window, or by ensuring that Audio is on in the Audio Settings section of the Setup screen.

When in internal clock mode, the **Play** button will start the clock as well as the Klee's transport. The blinking LED next to the Tempo text will indicate the clock's activity:

When in MIDI clock mode, starting the transport in your MIDI-clock generating application or

hardware should both start the Klee's clock as well as its transport (whether it starts the transport or not will depend on the specific application/hardware, and whether it sends MIDI transport information). Once the MIDI clock is running, you can stop the Klee's transport with the Play button, but the MIDI clock information will continue to be received by the Klee (as indicated by the blinking LED). This allows you to stop/start the Klee's sequence independently of your MIDI-clock generating device.

When in internal clock mode, you can adjust the speed of the clock using the **Tempo** parameter. It allows adjustment from 1 to 250 beats per minute (BPM).

When in MIDI clock mode, the tempo is set from the MIDI clock-generating device, and is not adjustable from within the Klee software. When the Klee's transport is initially started, it can take a second or so for the Klee to sync itself to the tempo of the MIDI clock-generating device.

In both internal and MIDI clock modes, you can divide the clock into subdivisions smaller than quarter notes, using the **Clock Divide** drop down menu:
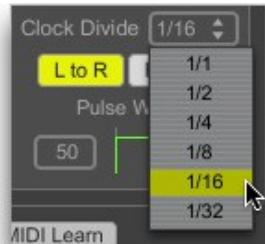
The Klee allows for whole, half, quarter, eighth, sixteenth, and thirty-second note subdivisions.

The **Direction** setting allows you to change the direction that the clock moves the Klee pattern: Left to Right (the default), or Right to Left:

The **Pulse Width** setting allows you to describe the "shape" of the clock pulses; in essence, it describes how long each note is sustained once triggered. Smaller pulse widths will generate notes of shorter duration, and larger pulse widths will generate notes of longer duration.

Small, medium and large pulse widths

Pulse width values are expressed as percentages of clock cycle durations. The allowable range for the pulse width parameter is 10 to 90 percent.

Merge Mode

Each of the three Busses has an associated **Merge** mode switch:

When Merge mode is on, the Klee creates single, long notes on a Bus instead of multiple shorter notes, *if and only if those notes are contiguous*. As always, an illustrated example - take the following three successive steps:
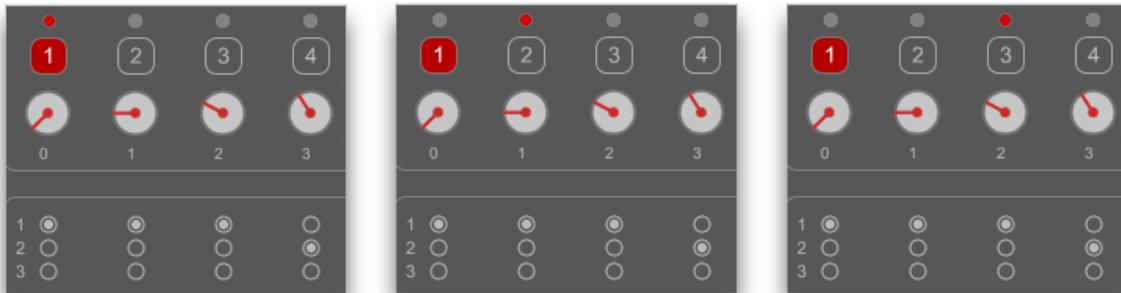
With Merge mode for Bus 1 *off*, this sequence of three steps will yield 3 distinct successive notes on Bus 1 (0 semitones + Baseline Note, 1 semitone + Baseline Note, and 2 semitones + Baseline Note). Each of these notes will have a duration of (clock cycle time * Pulse Width percentage).

If however we turn Bus 1 Merge mode *on*, the above three clock cycles will instead only yield one note (0 semitones + Baseline Note), and its duration will be three full clock cycles. Because the three notes were contiguous, we instead get one note whose pitch is that of the first note of the three, and whose duration is the number of contiguous notes * the clock cycle duration. When Merge mode is on for a Bus, the Pulse Width parameter has no effect on note durations for notes created on that Bus.

It should be pointed out that behavior described above is different from that of the hardware Klee's Merge mode. On a hardware Klee, although one note gate is generated in the example above, the control voltage value of that held note **does** change with each clock cycle, so the pitch changes at each step, unlike the software Klee. In the future I will explore MIDI legato mode to see if I can emulate this behavior on the software Klee as well. Even with this unique behavior on the software Klee, it makes for an interesting effect!

Scale Mode

Scale mode allows all outputted notes to be constrained to a user-selected scale. After enabling Scale mode by clicking its button, use the two drop down menus to select the root note and scale type desired. *Version 2.3 of the software adds the Pentatonic scale as a new option.*

This function uses VJ Manzo's Modal Object Library (http://www.vjmanzo.net) to intelligently modify the original notes to constrain the outputted notes to the selected scale.

Chord Mode

In its default state, the software Klee is monophonic for each Bus; a maximum of a single note is output for each step, for each Bus. **Chord** mode changes this default monophonic behavior, and allows for up to seven notes (1 root note plus up to 6 definable chord notes, relative to the root) per step, per Bus, to be output.

After enabling Chord mode by clicking its button, you define the relative pitches of the notes in your desired chord to the Group's baseline note. Say we want to play two notes for each active step, instead of the usual one, and say we want the two notes to be the Group root note and one octave (12 semitones) higher than the root note. We either type or mouse the number 12 into the leftmost box in the Chord section (actually it can be in any of the six boxes). You will see a graphic display of this note in the keyboard below, 12 semitones higher than the root note, represented by the small ^ indicator below the keyboard.

To insert chord notes lower than the root note, use negative values. The range of available offsets is -24 to 24 semitones. Each one of the chord notes you specify (any offset value other than 0) is represented on the virtual keyboard with a distinct color, to assist in visualizing the chord you have programmed.

Klee software sequencer

Range

The **Range** drop down menu in the Output section changes the range of notes that can be selected by the stage dials:
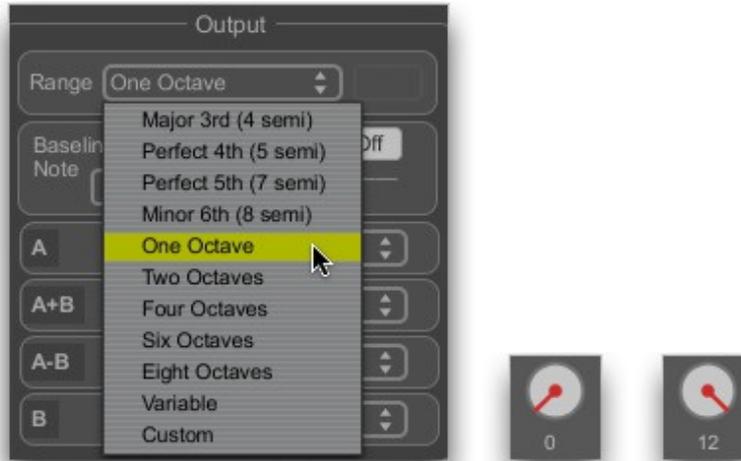
The first nine options in the Range drop down menu are for preset ranges. For example, when selecting the first option, "Major 3rd (4 semi)", this allows the stage dials to select any value from 0 semitones up to 4 semitones. "One Octave" represents 12 semitones, "Two Octaves" 24 semitones, etc...

When dialing in values for Range settings that correspond to large semitone ranges, you can be

more precise when choosing dial values by pressing the Shift key on your keyboard while moving the dial.

It is important to note that when changing selections from the Range menu, that the position of the dial does not change; in other words, if the dial was at the 12 o'clock position when the Range switch was set to One Octave, it will still be at the 12 o'clock position when the the Range switch is changed to Two Octaves. In the first instance, the dial will have a value of 6 semitones, while in the second, it will have a value of 12 semitones. This allows for the relative musical intervals between the dials to stay fixed as the dial Range is changed.

In addition to the fixed ranges specified in the Range drop down menu, there are two special modes as well: **Variable** and **Custom**.

When set to **Variable**, the Range parameter allows for dynamic alteration of the stage dials' range. The range is set using the parameter to the right of the drop down menu, which activates when the Variable option is selected:

The range of the Variable parameter is from 2 to 100; the parameter specifies the maximum position of the stage dials.

When set to **Custom**, the Range parameter allows for a custom, non-sequential set of semitone values to be selected by the stage dials. To edit these values, click the Edit button that appears

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next to the Range drop down menu when the Custom item is selected:
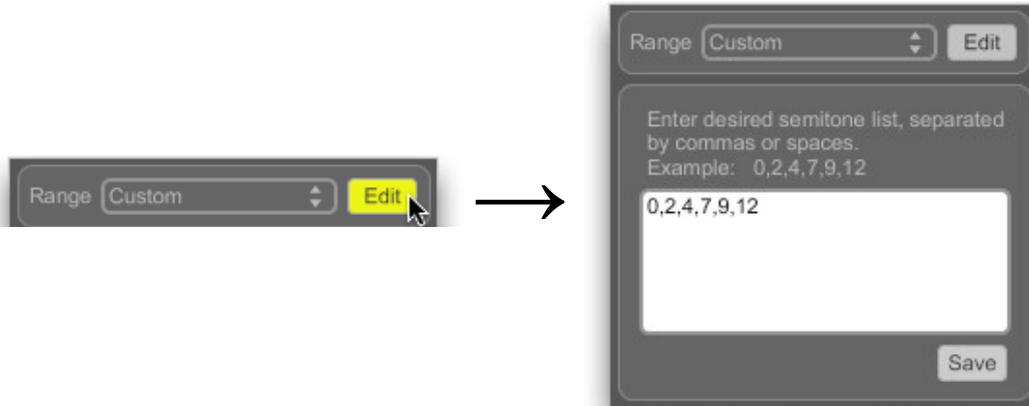
A new pane is displayed, in which you can specify the sequence of semitones that would you would like the dials to select from. These values need to be separated by spaces or commas, as shown in the example. The examples below show the dial positions if the custom list was set to 0, 2, 4, 7, 9, 12:

Once you have specified your desired custom semitone values, press the Save button to save

your values. Currently these values are not saved between sessions.

It should be noted that these custom values only represent the semitone values that the *dials* are constrained to; since a Group's note output often represents the *sum* of several dial values, the resultant sums may ***not*** be constrained to the custom note values. To constrain the final Group note that is output, use the **Scale** mode, described above.

Baseline Note MIDI Control

The Baseline Note setting represents the lowest MIDI note that will be transmitted by the Klee software sequencer.   As outlined in the Note Values section above, within each group (A and B) of eight stages, the note value for the group is the *sum* of the *active* stages' semitone values, plus the current Baseline Note.

The possible range of the Baseline Note is from to C0 to C7. It can be adjusted manually with the mouse, or alternatively using a MIDI keyboard as well, if the MIDI control mode is set to On:

When set to On, a drop down menu will appear that allows for selection of the controlling MIDI keyboard and its channel number (from 1 to 16). When a *note on* event is received from the controlling keyboard, the Baseline Note will update to reflect that same note.

Keyboard Control

The Klee software sequencer responds to certain key presses on your computer keyboard to control some of its functions.

Dial Fine Adjustment – As mentioned in the Range section above, press the Shift key to allow more precise control of what parameter the stage dials select. This is generally useful when using large semitone Ranges.

Start / Stop – As mentioned in the Setting and Loading the Pattern section above, each press of the Spacebar will toggle the transport (Play button) on and off.

Numeric values – Some numeric parameters can be controlled using the number keys and/or by the up and down arrows on the computer keyboard. After entering a desired value using the number keys, follow by pressing the Return/Enter key. The controllable parameters include:

- Random Threshold parameter
- Pulse Width parameter
- All MIDI Channel parameters
- Baseline Note parameter

Panic – If the sequencer gets into a state in which there are "hung" notes, or other situations in which you would like to send an "All Notes Off" command, press P (upper or lower case) on your keyboard. "P" stands for "panic."

Main / Setup – To easily toggle between the Main and Setup screens, press the "." (period)

key.

Presets

One of the nicest features that the software Klee sequencer has compared with the hardware Klee is its Presets system. On a hardware Klee, unless you write down the various settings of the pots, switches and connections, it's possible that you might never be able to reproduce an interesting pattern that you programmed. Furthermore, switching between settings is time-consuming, and often requires that one step through intermediary settings of switches to get to the desired one, which might adversely affect your desired audio output.

The software Klee sequencer allows you to store up to 18 presets in its memory at one time, each of which can be invoked with a single mouse click once stored. Furthermore, sets of presets can be named and stored to computer hard disk, and then recalled and loaded back in later.

Presets will store and recall almost all user adjustable parameters. They do *not* recall the state of the clock however; when presets are loaded, the clock continues at whatever step it was at just prior to when the preset was loaded. The exception to this is if Load on Play was On when the preset was saved; in this case, the clock will restart at step 1 when the preset is recalled. In addition, when Load on Play status of On is stored with a preset, the pattern stored by the preset will automatically be loaded when the preset is recalled. Also, new in version 2.3 is the Pat Load option, which when set will force Load when the preset is selected.

Finally, note that presets do *not* recall which MIDI receiving device is assigned to which Bus, which plugin is loaded to which plugin slot, and which plugin preset is selected for each plugin – these must be manually re-selected.

Storing and Recalling Presets

When a preset location is empty, it will be a grey color. When hovering your mouse over a preset location, the preset's number will be displayed.

To store a preset, simply press and hold the Shift key on your keyboard, and click the desired preset location you would like to store it in (Shift-Click). The preset location will then turn blue:

To recall a preset, simply click on one of the desired blue preset locations. The selected preset will then turn green:
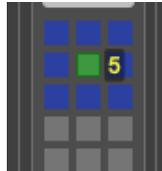
To clear all presets locations, press the Clear button.
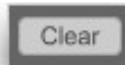
Saving and Loading Presets

Each collection of ten presets can be saved to disk for later recall. To save them, press the Save

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button, and specify your desired file name and location. The suffix ".json" will automatically appear at the end of the filename; it should not be removed from the filename, as the Klee cannot load preset files that do not end with an .json suffix.

Save

To load a preset set, press the Load button, and navigate to the location on your hard disk where the desired preset file is stored. As mentioned above, the filename must end in ".json". Loading presets will overwrite *all ten* preset locations, even if there is not a preset stored in the slot of the set that you are loading.

Load
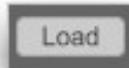
Please note that presets stored from version 1 of the software Klee will unfortunately not work properly in version 2.

MIDI Learn / Hardware and External Control

Most of the software Klee's functions can be controlled using MIDI continuous controller (CC) messages sent from a hardware-based MIDI device, or from another MIDI application. These are configured using either the MIDI Learn function, or by the manual mapping of MIDI CC value to user interface element.

Inbound CC messages are scaled from their full range of 0-127 to the range of the interface element in question. This allows for the full travel of a midi controller to be utilized, even if the target user interface element only has a few different settings. An example may be helpful: if the target user interface element is a switch, that has only two states (off and on), then the CC values 0-63 will set the UI element to off, and values 64-127 will turn it on.

The first step in enabling external MIDI control is to choose which MIDI input device you wish to monitor for CC information. This is done at the top of the MIDI Controller section on the Setup screen.

Map MIDI controllers via MIDI Learn

Once the MIDI controller device is selected, switch back to the Main screen, and enable MIDI Learn mode by clicking the MIDI Learn button at the lower left of the Klee's screen. It will pulse yellow to red, to indicate its active state.
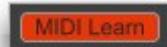
When MIDI Learn is active, mousing over various parts of the Klee's Main screen user interface will turn those user interface controls blue; this indicates that that control is "learnable" and in turn configurable for external control.

To link a user interface item with an external controller, simply click it; it will then turn orange, indicating that it is then actively "listening" for external MIDI controller information.

Now just move the desired controller on your hardware interface, or within another software application, to send the Klee a CC message. This will link that CC message to the selected user interface control. The controller will revert to its usual color, and you should see it move as you move your MIDI controller. You can also see the MIDI controller assignment on the Setup screen, in the MIDI Controller section.

Continue this same process for each Klee control that you would like to map to an external controller. When done, click the MIDI Learn button again to inactivate MIDI Learn mode.

Map MIDI controllers manually

If you prefer to map the MIDI CC controls to user interface elements manually (for example, if you will be sending CC messages from a Digital Audio Workstation (DAW) and not from a hardware MIDI controller), you can do so within the "Manual Add" part of the MIDI CC Control section, on the Setup screen.

Select the user interface control from the Control drop down menu, then select the CC number and MIDI channel that you would like to control it with. Then press the Manual Add button, and you will see a new entry in the Controller map table below.

Modifying, Saving and Loading Controller maps

Once you are done, you can modify and/or save your controller assignments on the Setup screen in the MIDI Controllers section. You can either delete one or all assignments, using the Delete Selected or Delete All buttons.

You can save your MIDI controller mapping by using the Save button. Save the mapping as a text file, using the .txt extension. Similarly, you can load a previously saved set of controller assignment by using the Load button, and browsing for your saved controller assignment .txt file.

Finally, you can set your currently loaded set of controller assignments and controller MIDI device to be automatically loaded by default each time you start the Klee application. To do so, just press the Use Current As Default button.
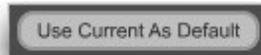
Differences With Hardware Klee

The software Klee sequencer was designed with the intent of including as many of the original features and functions of the hardware version as possible. Because of limitations that MIDI imposes compared with using a control voltage, gate and trigger-based system that the hardware version uses, some features were either left out or are implemented in a different way than the hardware Klee. These include:

- Merge mode behavior (see Merge Mode section above)
- No Glide mode

I hope to be able to address some of these issues in the future.

Although MIDI and software in general imposes some limitations, it also affords the ability to *enhance* the original hardware Klee design with several additional features:

- Preset slots for instant recall of parameters
- Presets can be saved to and loaded from disk
- MIDI output to any hardware or software synth, including hosted audio software plugins
- Internal or MIDI clock sync
- Clock divide capability
- MIDI control of Baseline Note
- Synchronous load – loading of patterns happens on clock pulses, and not in between
- Custom note range for stages, allowing for alternative scales and other effects
- Load on Play mode to allow for loading of pattern each time transport started

- Scale mode to constrain output notes for each Group to a specific scale
- Chord mode to make the Klee polyphonic for each Group, with user-definable chord patterns
- Right to Left step movement mode, in addition to standard Left to Right
- Addition of Group A – Group B mode
- External load via MIDI trigger
- Ability to convert currently active stages to loaded pattern, for Groups A, B, or both A and B
- Software or hardware-based control of parameters, using MIDI continuous controller messages

FAQ

Q: Can I use the Klee software sequencer with other audio applications on my computer?

A: Of course – all you have to do is route the MIDI output of the Klee to your audio application.

On Macintosh systems, use the built-in Inter Application Control (IAC) Driver Bus to route MIDI from one application to another. Using the Audio MIDI Setup application (located in the Applications/Utilities folder), first be sure that within the MIDI tab, that the IAC Driver device is "Online." Then, start your audio application and the Klee sequencer. Select the IAC Driver Bus as your MIDI output for the desired Bus(ses) within the Klee, and select the desired MIDI channel for it as well. Likewise, in your audio application, select the IAC Driver Bus and MIDI channel as the MIDI input.

On Windows systems, a similar approach is used, except that you'll need to use a third party MIDI routing application to get the MIDI information from the Klee to your audio application, rather than a built in utility as on the Mac. An example of such an application is the free "LoopBe1", available from http://www.nerds.de/en/loopbe1.html .

Q: Can I use the Klee as a "traditional" 16-step sequencer?

A: No problem – to emulate a standard 16 step sequencer, just enable 16 x 1 pattern mode, and

only activate a **single** stage (stage 1). Load the pattern, and then just use the dials to select your desired notes.

Q: What if I want to have a pattern that is shorter than 8 or 16 steps?

A: You can have a repeating pattern of shorter than 8 or 16 steps by using the Gate Bus 1 Load mode.   First turn Gate Bus 1 Load mode On.   Then set Gate Bus 1 for the stage *after* the number of steps you want your pattern to have. So for example if you want your pattern to be 4 steps long for, set stage 5's Gate Bus to 1. Be sure that none of the other stages have Gate Bus 1 set; they should all be set to either Bus 2 or Bus 3. Now when the sequencer is running, when it reaches the step that is set to Gate Bus 1, it loads the pattern again at that point, and resumes playing from the first step.

Q: Can I run more than one instance of the Klee software sequencer at the same time?

A: Yes – you have to duplicate the application and make a few changes to your duplicated application for this to work. Details on how to do this are below, for both Macintosh and Windows systems. It should be noted that when using the Internal clock within the duplicate applications, their respective clocks will not be in sync. If clock sync is desired between them, you should synchronize the applications to a MIDI clock source.

On the Macintosh, click once on the Klee application within your Applications folder to select it, and then duplicate it, using the File/Duplicate function:
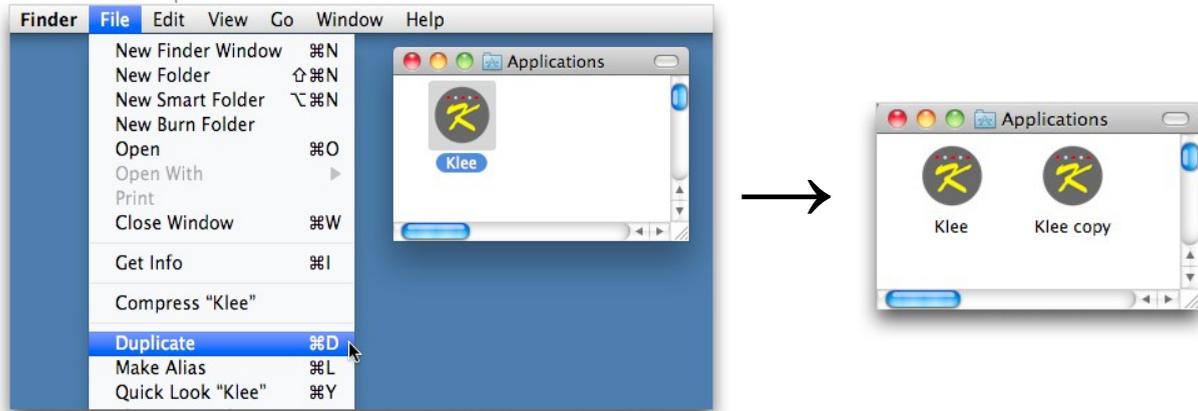
Now, Ctrl-click (or Right-click if you have a right button mouse) on the "Klee copy" application, and choose the "Show Package Contents" option:
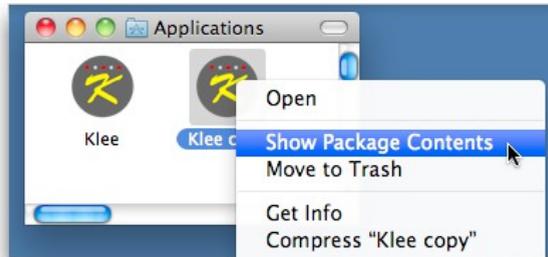
A new window with a folder called "Contents" will open – open that folder, and within it, rename the file "Klee.mxf" to "Klee copy.mxf" :

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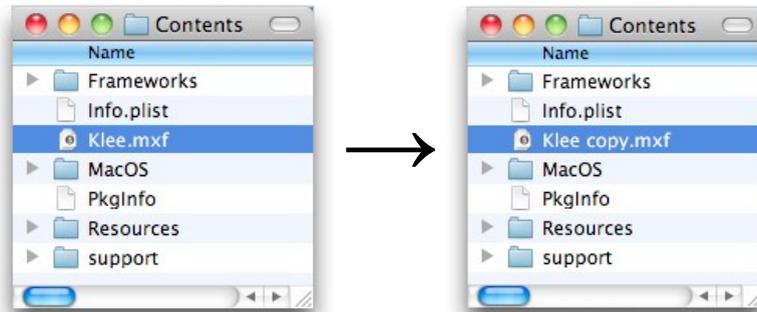
You can now close the window called "Contents"; double clicking the "Klee copy" application will now launch a separate copy of the application. You can rename the application anything you like (you don't have to leave it as "Klee copy"); just be sure that you rename the .mxf file the same way.

On Windows, the procedure is similar. First, copy the entire Klee folder, within your Program Files folder. Do this using the Copy and Paste commands within the Edit menu, while the Klee folder is selected:
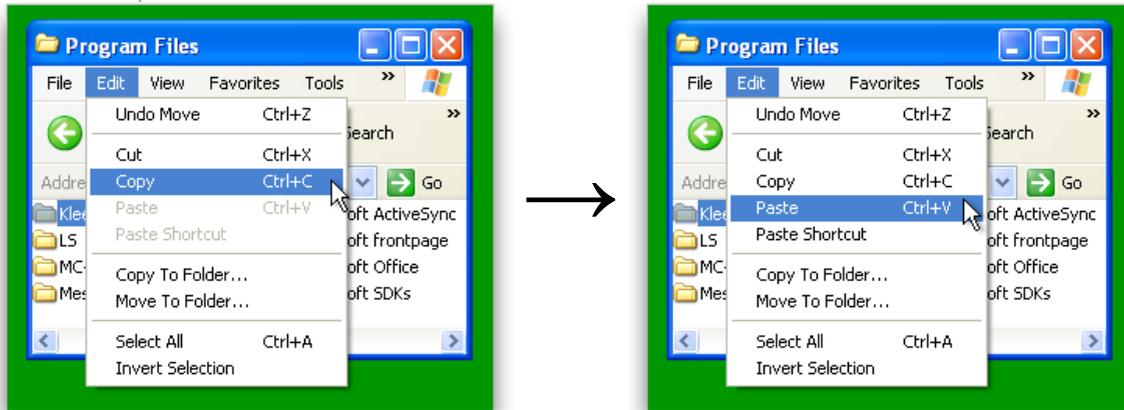
This operation will result in a new folder within your Program Files folder called "Copy of Klee" (you can rename it anything you'd like). Inside this folder, you must rename the "Klee.exe" and "Klee.mxf" files to something other than "Klee" - for whatever you choose, both files need to be named the same thing, and preserving their respective suffixes. In the example below, I've renamed them "Klee copy":
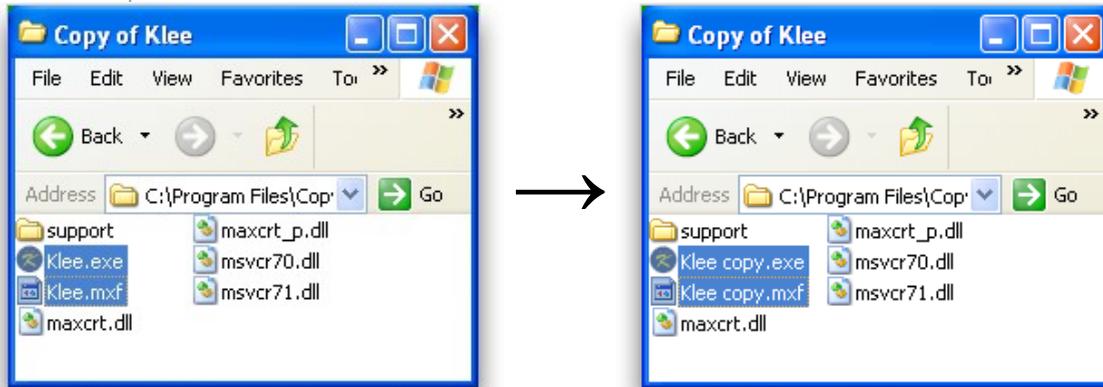
If you don't see any filename suffixes (.exe, .mxf, etc...), you must change your Folder options to display them. On Windows XP, go to Tools/Folder Options... , and then select the View tab. There, *uncheck* the option to "Hide extensions for known file types."   There is a similar preference on Vista and Windows 7 systems.

Now you should be able to launch the original Klee application at the same time as the "Klee copy" application.

Q: Can I use the Klee software sequencer with control voltage synths?

A: Although it's not been formally tested, there's no reason this shouldn't work. You'll have to use either MOTU's "Volta" or Expert Sleepers' "Silent Way" plugins, or current equivalents to

those. Route the MIDI note information from the Klee software sequencer to your plugin hosting application (as described above in the first FAQ entry), and from there use the plugin as you would normally.

Acknowledgments and Thanks

I would like to acknowledge Scott Stites for the incredible work that has gone into creating and perfecting the Klee sequencer. Scott is quick to himself acknowledge the help of many other people in bringing the Klee to the general public, including those who helped with the creation of printed circuit boards, part kit sourcing and distribution, front panel design, fabrication and distribution, etc... But the whole idea for the sequencer remains primarily his, and I'm indebted to him for it! Furthermore, Scott was incredibly gracious when I first approached him about creating a software version of his sequencer. To use his own words, it was "the natural progression of things" to do so. Read more about the "birth of the Klee" on Scott's site, http://www.birthofasynth.com/Scott_Stites/Pages/Klee_Birth.html .

Along with Scott, I had an incredible group of Klee "veterans", all from the Electro-music.com site, who helped me discuss implementation decisions and features, who beta tested and who encouraged me. These people include Paul Harriman, Bill Manganaro, Howard Moscovitz and Andrew Sharp. I'd also like to acknowledge Les Hall and Stéphane Letz, both of whom helped with beta testing in the late stages of the application's development.

I'd like to acknowledge "Adam-V" from the Electro-music forum, for inspiration for the software Klee's user interface. I used his hardware front panel design that he posted (http://www.electro-music.com/forum/viewtopic.php?t=21954&postorder=asc&start=25) as a starting point for my own design.

The Klee software sequencer was created using Cycling '74's Max software (http://www.cycling74.com). In addition, it uses, with permission, some 3rd party external objects – I'm indebted to their creators for them:

- min.environment (Mac, Windows) by Tim Place
- getpaths, creatfolder (Mac); getenv (Windows); stricmp, posit (Mac, Windows) by Jasch (http://www.jasch.ch/dl). Jasch's externals are LGPL licensed, http://www.gnu.org/licenses/lgpl.html
- Modal Object Library (Mac, Windows), by VJ Manzo (http://www.vjmanzo.com/clients/mol)

Thanks to everyone at the Electro-music.com, Muff Wiggler and Analogue Heaven online forums for their help and encouragement in building the software Klee.

Thanks to everyone at Cycling '74 and on the Cycling '74 forums () for their invaluable help with Max issues.http://www.cycling74.com/forums

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Version History

Version 2.4 (March 7, 2021)
- Now Mac OS 11.x (Big Sur) compatible (including Mac M1 machines via Rosetta2)
- Enabled hi resolution mode on Mac
- Minor user interface improvements
- Built with Max version 8.1.10 (f1acba9) (64 bit)

Version 2.3 (January 4, 2019)
New Features
- Now runs as 64-bit application, and only allows for 64-bit plugins
- Now supports VST, VST3 and AU instrument plugins (AU Mac-only)
- Entirely new plugin scanning process, should be more reliable and thorough, and avoids crashes.
- Plugin blacklisting, for plugins found to be problematic on app startup
- Added ReWire audio slave support
- Added "Pat Load" option – after choosing a Preset, user can specify whether to automatically Load bit pattern or not
- Added pentatonic scale constraint option
- Basic support for Dark Mode (menus and title bar only, Mac 10.14.x Mojave or greater)

- **Bug Fixes/Improvements**
- Fixed Load function so works properly even when transport is not on
- Fixes problem in starting up on certain newer Mac OS systems
- Increased number of preset slots available from 10 to 18
- Added individual plugin audio outputs

- Added more detailed audio driver sample rate and buffer size parameters, to allow for performance optimization
- Fixed Application Size setting so more reliable, and added ability to store default size
- Direct link to Klee support on About page
- Clicking Klee logo on Main or Setup screens now brings to About screen
- Defective Records Software and Electro-music text links to the respective websites

Version 2.2 (December 11, 2012)
- MIDI CC controllers now scaled to cover their full 0-127 range
- Can now add MIDI CC controller manually (in addition to MIDI learn)
- Can now save default MIDI controller device and controller map
- Application size now configurable
- On Macintosh, application signed with Apple Developer ID, so compliant with Mac OS Gatekeeper (10.7.x and 10.8.x) setting that allows identified Apple developer applications to be installed
- Built with Max version 6.08 (a0c1b20)

Version 2.1.2 (January 12, 2012)
- Fixed bug that caused additional active Stages after Load, when Group A and/or Group B had not been initialized yet
- Built with Max/MSP version 5.19

Version 2.1.1 (November 14, 2011) (Mac-specific release)
- Mac version now compatible with 10.7.x (Lion)
- Period (".") key now toggles between Main and Setup screens

Version 2.1 (April 27, 2011)

- Load button modified – now does a Load of the bit pattern on the next quarter note clock, not on any next clock signal
- Baseline Note is now stored in Presets
- Bus Devices and Channels now stored in Presets
- On Windows, clicking anywhere in application activates window, not just title bar
- Built with Max/MSP version 5.18

Version 2.0 (October 25, 2010)

New Features
- VST instrument hosting
- Constrain output to scale
- Chord output
- External pattern load via MIDI or audio input triggers
- External MIDI controller support (either hardware or software), via MIDI CC
- Group A – Group B output
- Convert active stages to switches
- Reverse sequence direction
- Additional clock divide options (1/1 and 1/2)

Improvements/Fixes
- Improved MIDI sync
- Improved internal timing
- Changed active preset color to green
- LEDs no longer activate inappropriately when clicked upon

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- Built with Max/MSP version 5.15

Version 2.0 Betas 1 - 3 (June 27, 2010 – October 11, 2010)
- Released semi-publicly, to version 1 registered users

Version 2.0 Beta 1 (May 6, 2010)
- Released to internal testers

Version 1.0 (November 16, 2009)
- First version released, including demo version.
- Built with Max/MSP version 5.08.

Version 1.0 Betas 1 through 4 (September 29 – October 12, 2009)
- Bug fixes and firming up of feature set.

Version 1.0 Alpha (September 24, 2009)
- First version released to testers.

Versions 0.1 – 0.9 (August – September, 2009)
- Internal development.