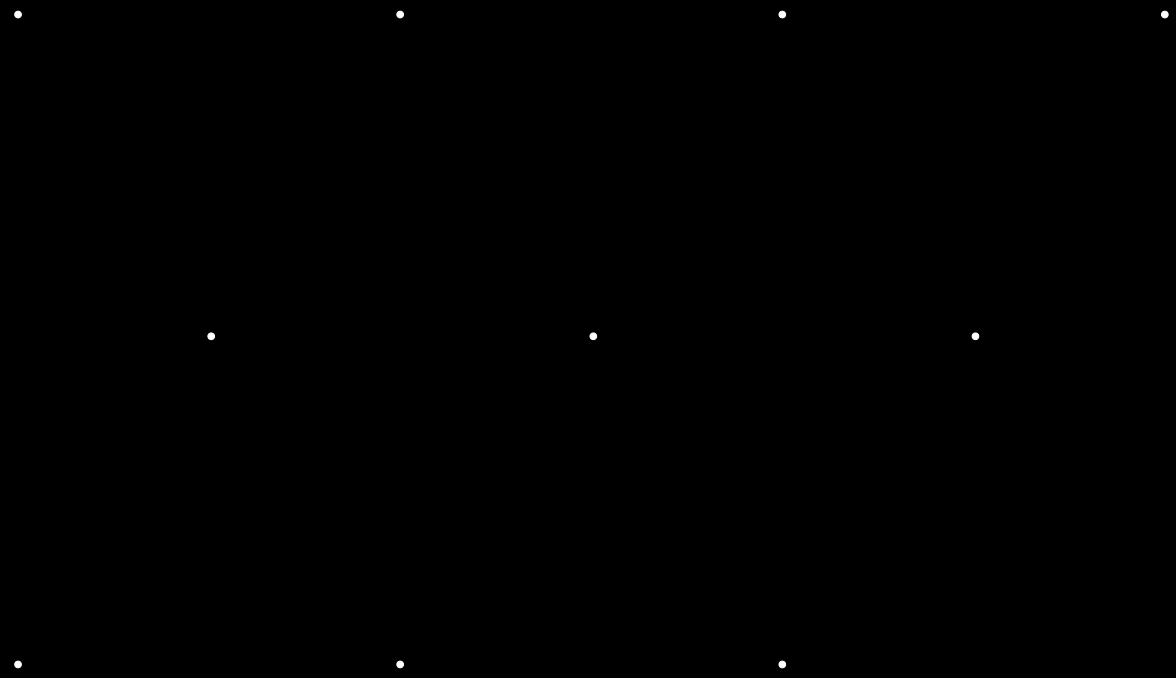

# chromaplane user manual

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+
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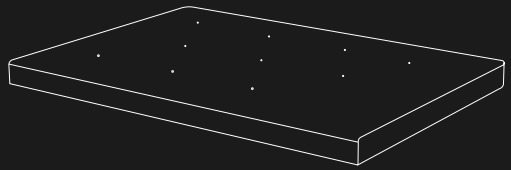
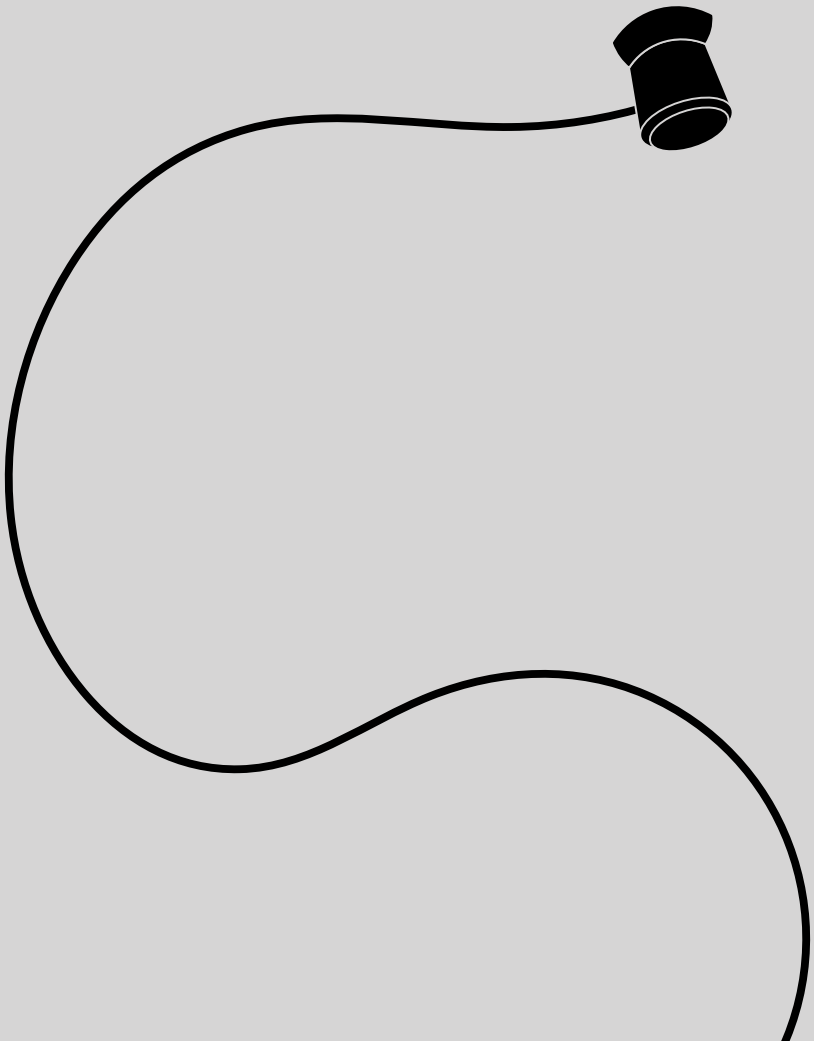
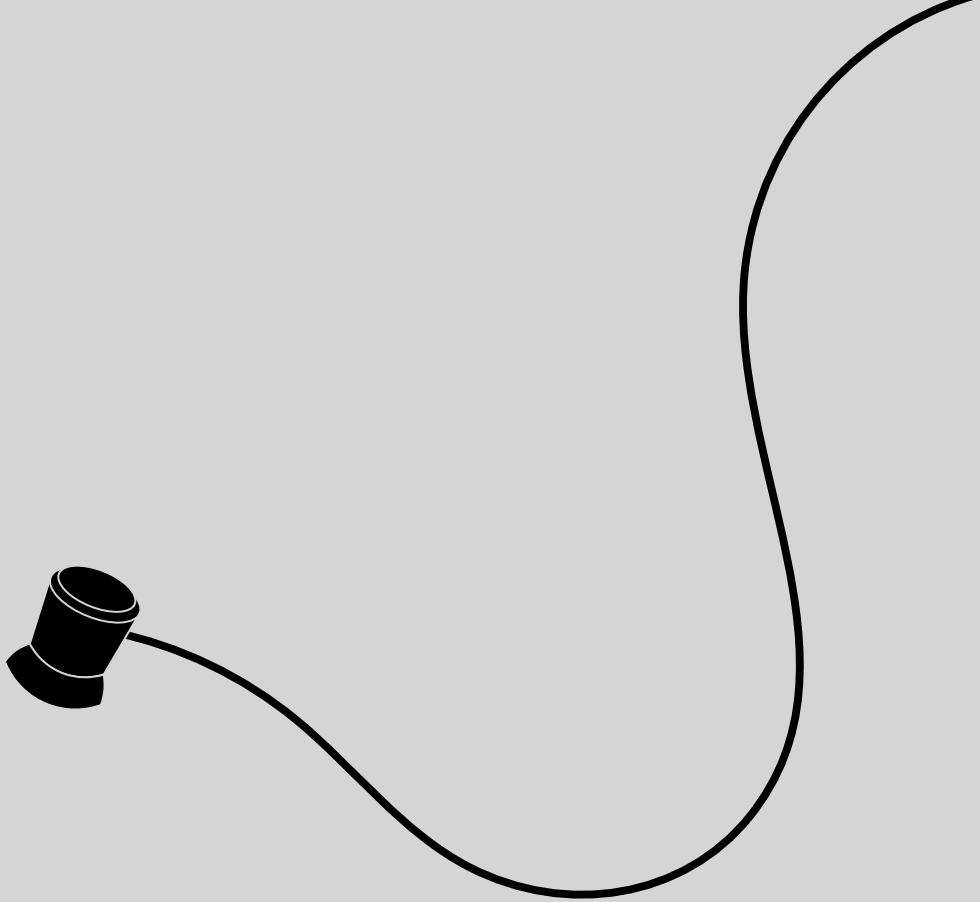


# Table of Contents







overview

## Unpacking the Chromaplane

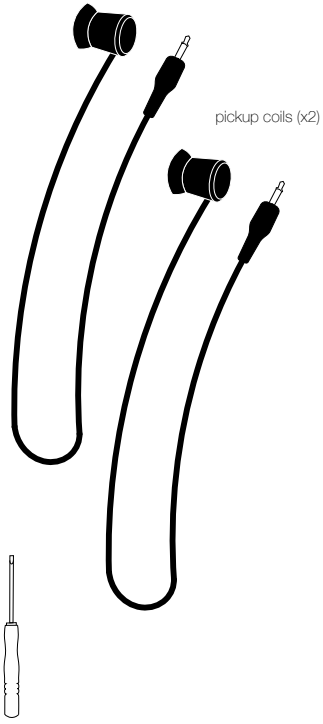
Be careful when unpacking the Chromaplane so that nothing is lost or damaged. In case you need to ship or transport the instrument in the future, we recommend saving the included box with all its packaging materials.

Your Chromaplane's box should include the following items:

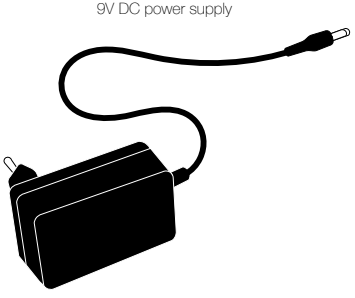
1. Chromaplane
2. Power adapter
3. Two pickup coils
4. Owner's manual
5. Small flathead screwdriver

These are the minimum additional items required in order to play the Chromaplane:

1. Properly wired AC wall outlet
2. A powered speaker *or* headphones with a 3.5mm connection



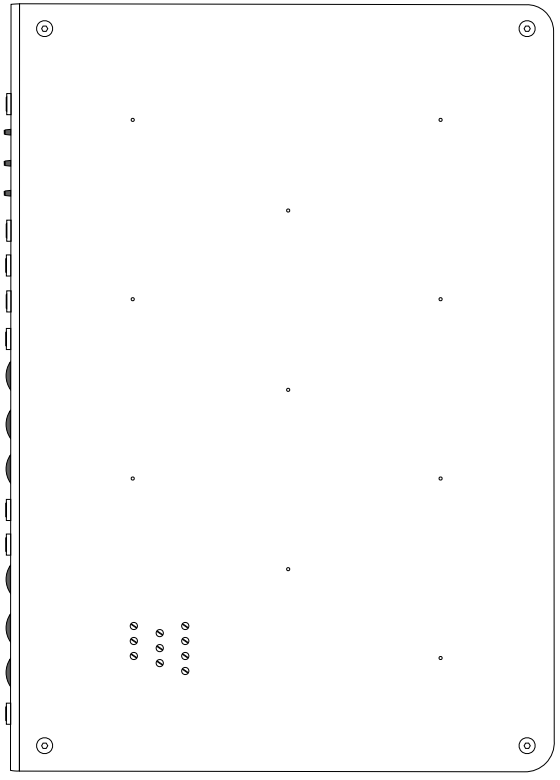
pickup coils (x2)



9V DC power supply



screwdriver



Chromaplane

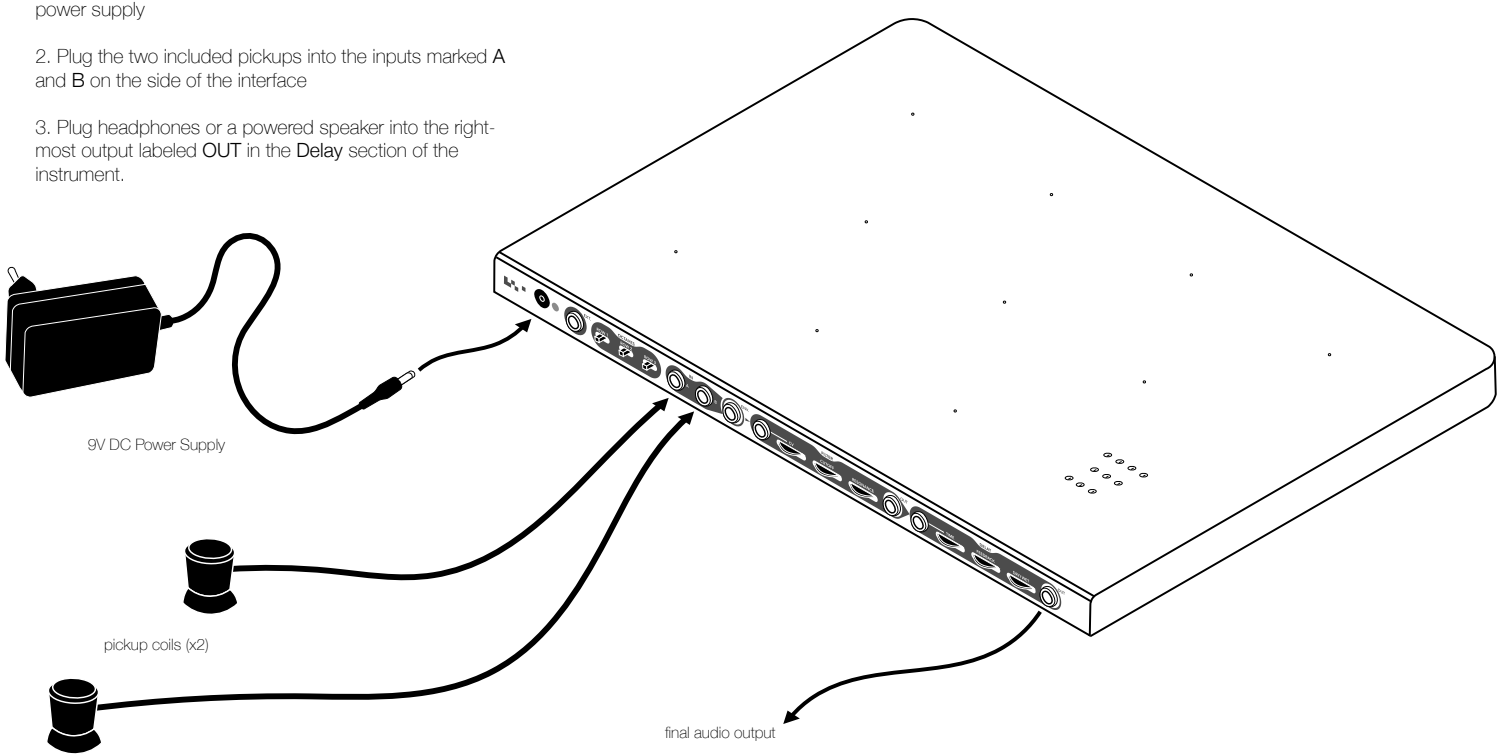
*Note: the included power supply is specified at 9V DC center negative, 2.0 amps.*

## BASIC SETUP

1. Power on the Chromaplane by connecting the included power supply

2. Plug the two included pickups into the inputs marked A and B on the side of the interface

3. Plug headphones or a powered speaker into the right-most output labeled OUT in the Delay section of the instrument.



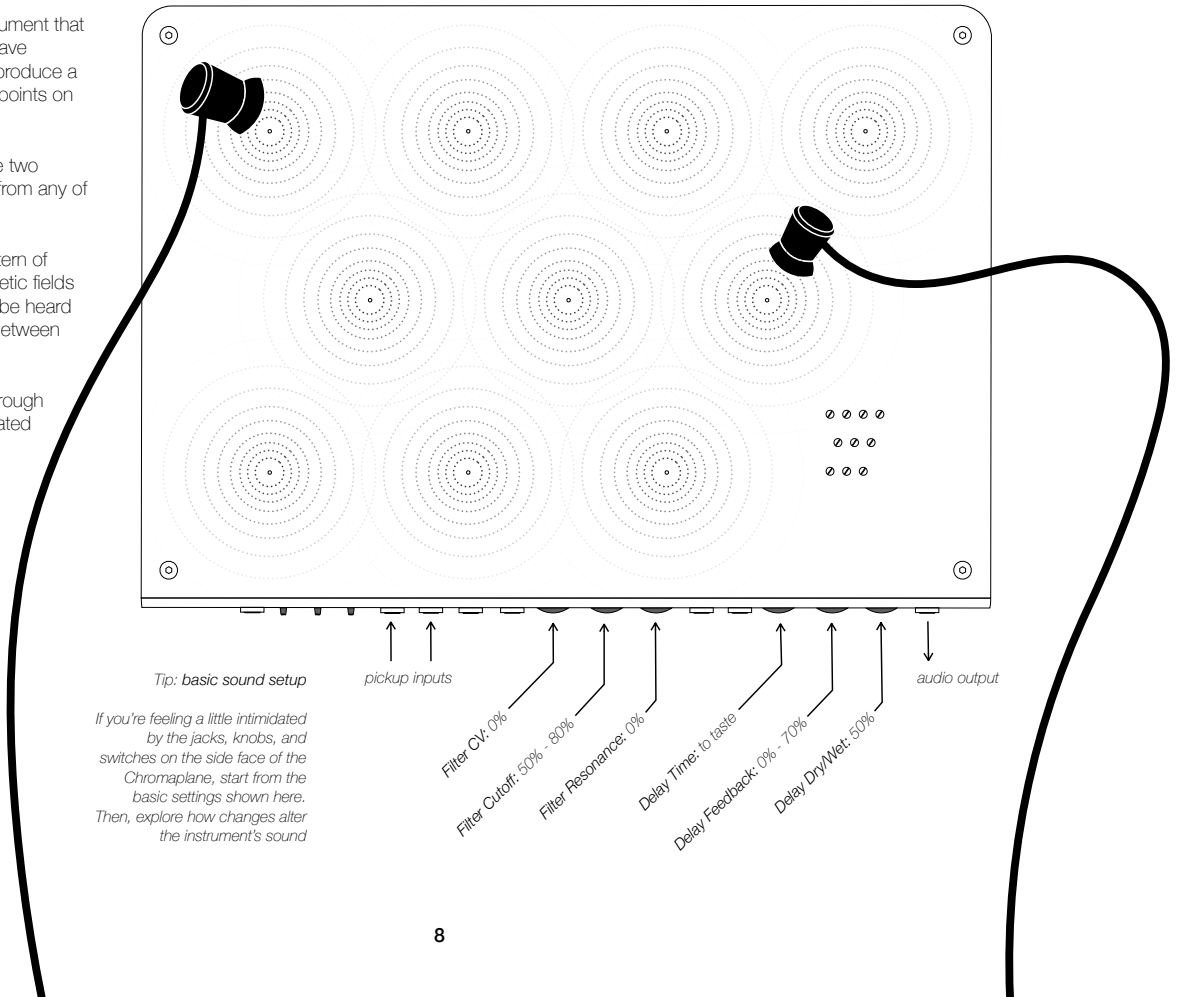
The Chromaplane is an electronic instrument that produces sound through ten square wave oscillators. These ten oscillators each produce a small electromagnetic field around ten points on the instrument's surface.

The instrument is played by moving the two included pickup coils nearer or farther from any of the oscillators' electromagnetic fields.

The oscillators are organized into a pattern of three rows. Because their electromagnetic fields overlap, clusters of different notes can be heard when the player's pickup is placed in between multiple oscillators' center points.

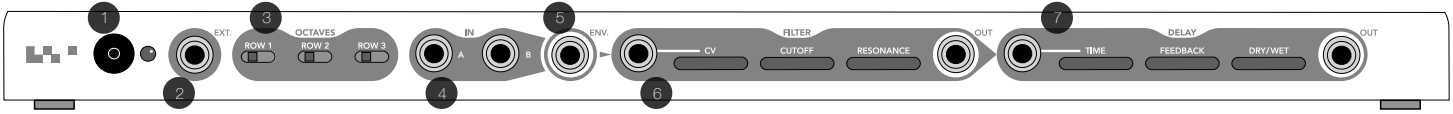
Each of the oscillators can be tuned through a corresponding adjustment screw located in the lower right-hand corner of the instrument's surface.

The sound of the instrument can be further altered using the octave switches, filter, and delay.




*Tip:* **basic sound setup**

*If you're feeling a little intimidated by the jacks, knobs, and switches on the side face of the Chromaplane, start from the basic settings shown here. Then, explore how changes alter the instrument's sound*




## 1 POWER

Power the Chromaplane using the included 9V DC (center negative) power supply. The LED indicates the instrument is powered on.

## 2 EXTERNAL INPUT

An external signal can be directly connected to the instrument's surface through the external input. The input signal is playable using the pickup coils via the bottom-left-most electromagnetic field.

## 3 OCTAVE SWITCHES

Three octave switches on the side of the instrument control the octave of each row of oscillators. These octave switches lower the corresponding row's pitches by one octave when switched in the left position.

## 4 FIELD PICKUP INPUTS

Plug the two included pickups into inputs A and B of this section to play the instrument. The pickups' signals are amplified and summed via a mixer. That mixed signal is then sent for further processing in the envelope follower, filter, and delay stages. The mixed signal of the pickups is also internally normalled to the filter's CV input, allowing for self-modulation effects.

## 5 ENVELOPE FOLLOWER

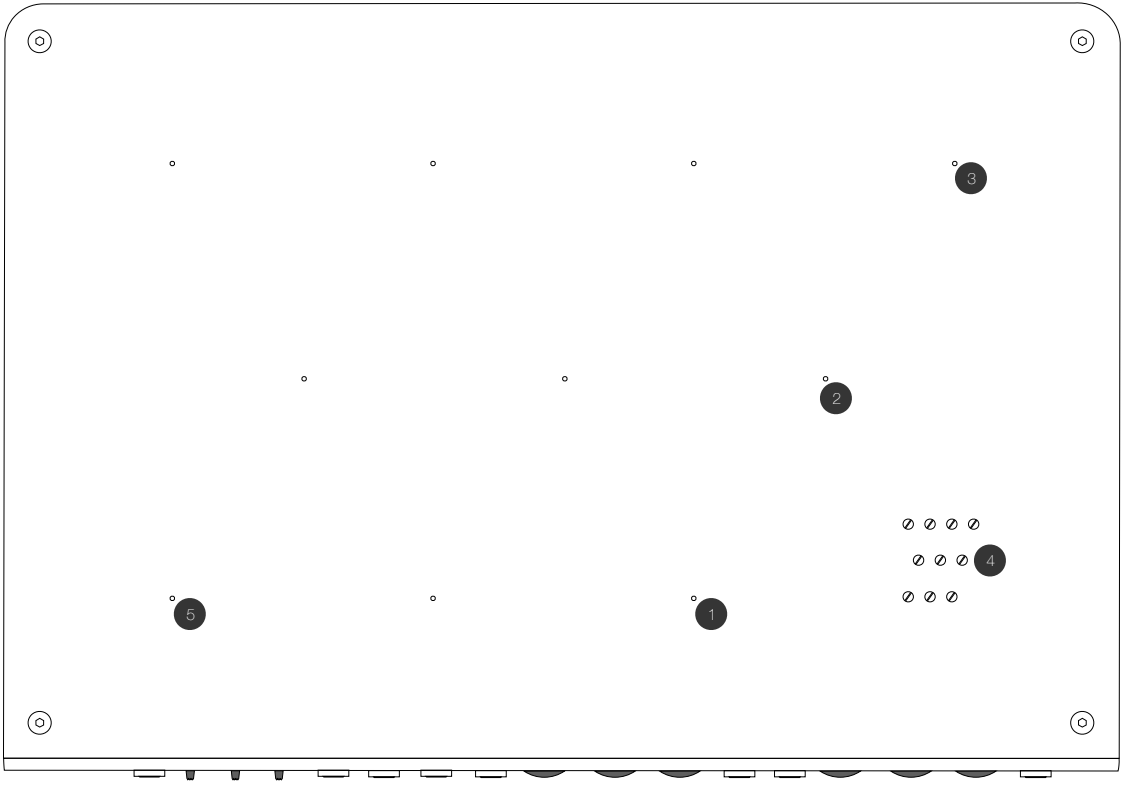
The envelope follower converts the pickups' audio output into a CV signal that can be used to modulate/vary parameters on the instrument based on the pickups' volume (proximity to the instrument's surface). This CV output can be externally patched to the filter CV or delay CV via a patch cable.

## 6 FILTER

The filter modifies the pickups' sound. The filter can be used to darken or brighten the raw sound of the instrument. The pickups' signals are normalled to the filter's control voltage input, meaning that when nothing is plugged in, the audio signal of the instrument will modulate the filter. This effect is controlled through the CV control knob by default and adds a kind of distortion or FM effect to the sound.

## 7 DELAY

The delay effect reproduces the original sound after a short time interval, creating a series of repetitions. The delay can add a sense of spaciousness, texture, and rhythmicity to the Chromaplane's default sound. The delay's output can be considered the final output of the instrument.

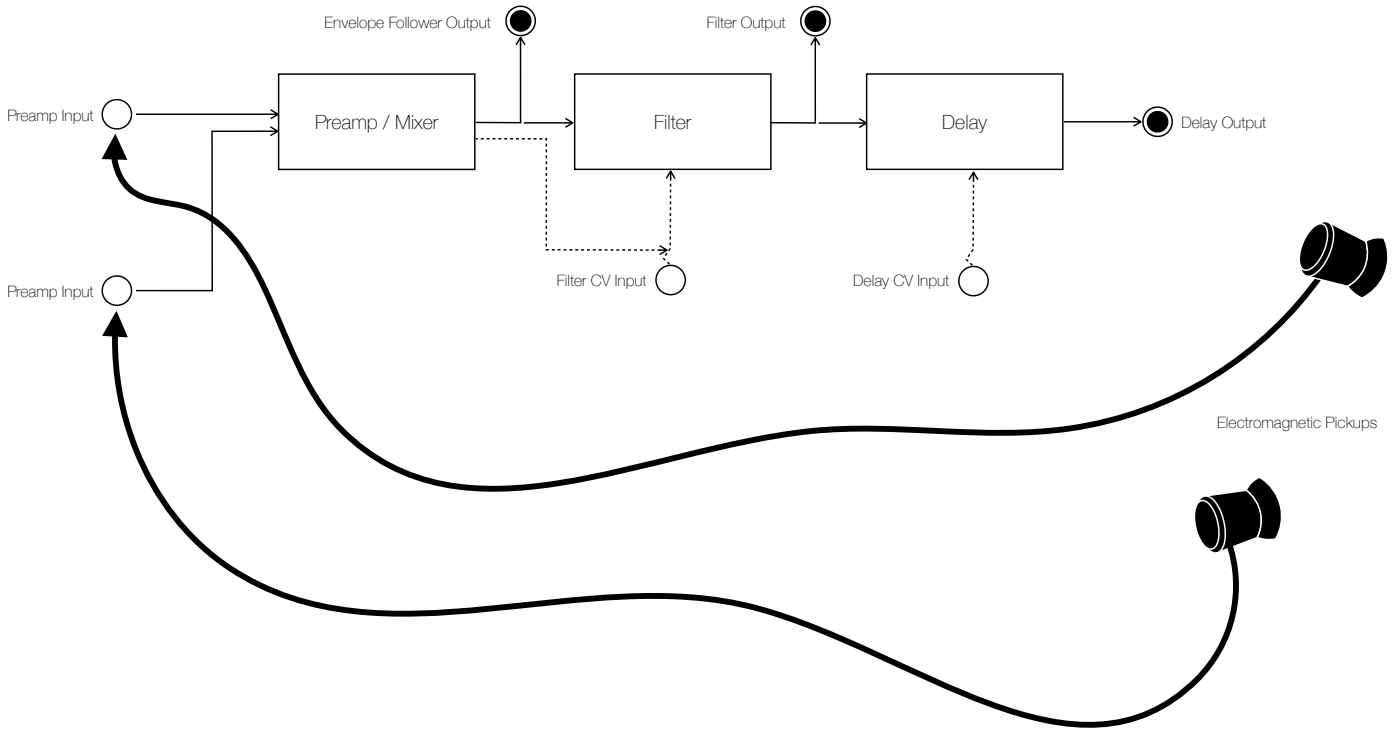


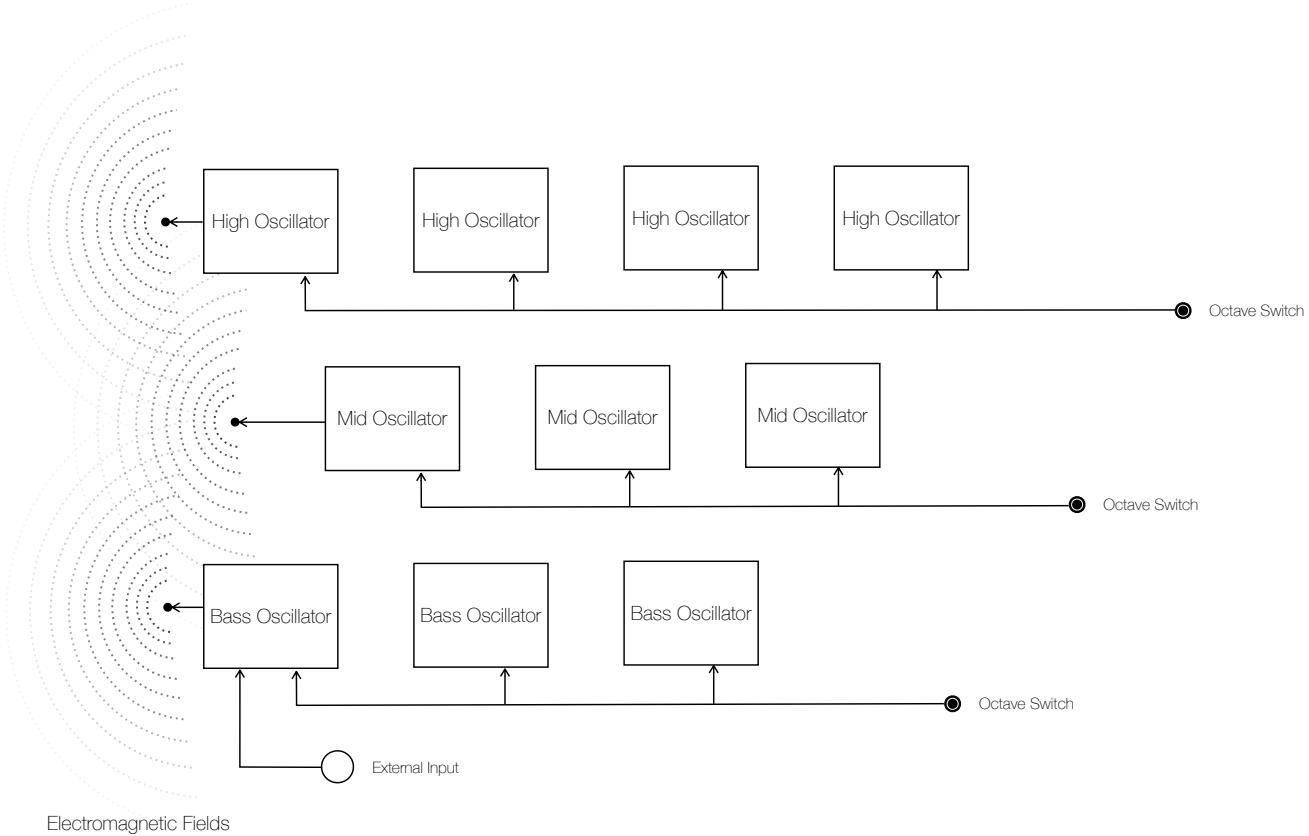

## PLAYING SURFACE

1. Row 1 (3 bass oscillators)
2. Row 2 (3 mid oscillators)
3. Row 3 (4 high oscillators)
4. Tuning adjustment screws
5. External input field (bass oscillator when no external signal is connected)

*Note: don't be concerned if the surface of the Chromaplane gets* **warm to the touch**. *This is part of the normal operation of the instrument and the way in which it creates electromagnetic fields.*

## Block Diagram




High Oscillator
High Oscillator
High Oscillator
High Oscillator
Octave Switch
Mid Oscillator
Mid Oscillator
Mid Oscillator
Octave Switch
Bass Oscillator
Bass Oscillator
Bass Oscillator
Octave Switch
External Input
Electromagnetic Fields

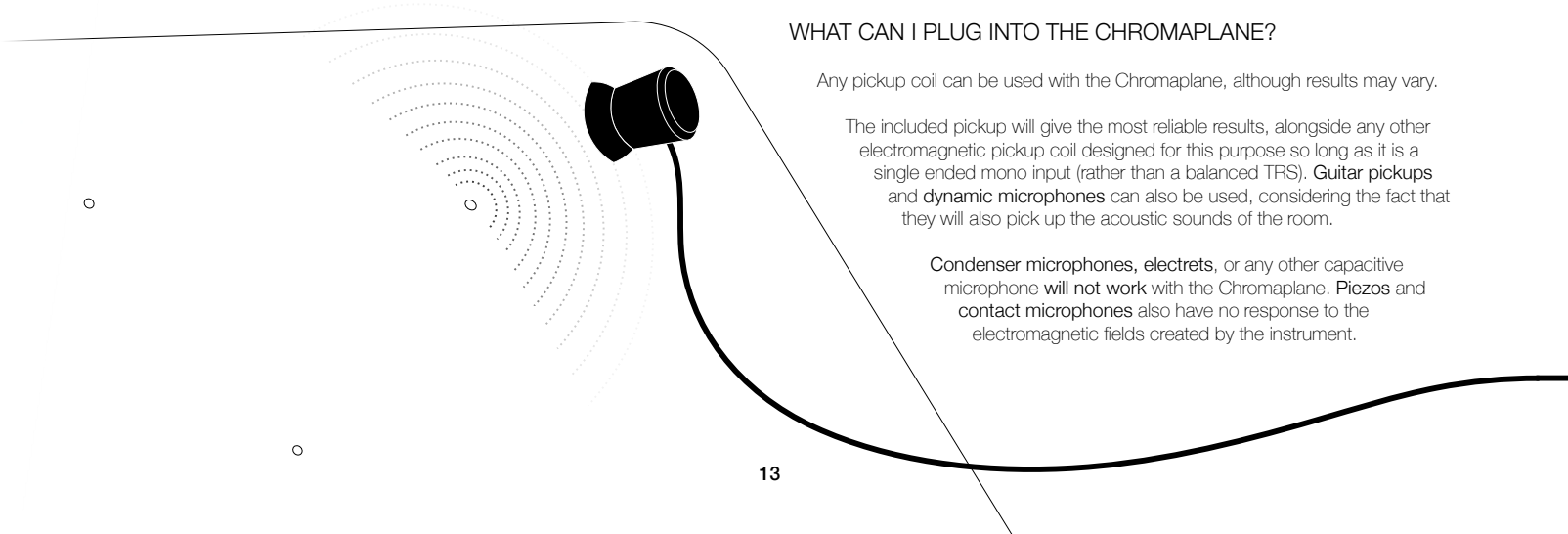
## MAKING A SOUND

Sound on the Chromaplane is heard when the instruments pickup coils are near to any of the ten oscillator's center points. Each hole on the instrument's surface emits an electromagnetic field that can be listened to by the pickup coils when connected to the Chromaplane.

## PICKUP COILS

The pickup coils included with the Chromplane are essentially microphones that can detect electromagnetic fields. Holding and manoeuvring these pickups is the main way that the instrument is played, and so these coils are analogous to a drummer's drumsticks, a violinist's bow, or a guitarist's pick. Just like with these instrumentalists' implements, the way that the pickups are used by the player changes the resulting sound.

The pickup coil contains, as the name suggests, a coil of wire. That coil responds to changes in the electromagnetic field which can be listened to as an audio signal. This same principle is used in both dynamic microphones and guitar pickups, with the addition of a permanent magnetic element responsible for translating physical vibrations into electromagnetic signals. For this reason, placing a  neodymium magnet directly above an oscillator on the Chromaplane's surface will reveal an acoustic hum at that oscillator's frequency. The Chromaplane can also be played *acoustically* using this technique.



## WHAT CAN I PLUG INTO THE CHROMAPLANE?

Any pickup coil can be used with the Chromaplane, although results may vary.

The included pickup will give the most reliable results, alongside any other electromagnetic pickup coil designed for this purpose so long as it is a single ended mono input (rather than a balanced TRS). Guitar pickups and dynamic microphones can also be used, considering the fact that they will also pick up the acoustic sounds of the room.

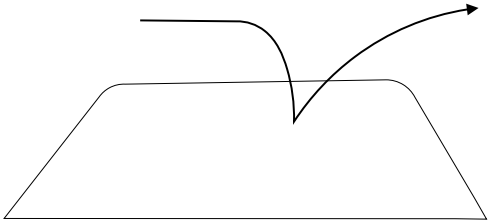
Condenser microphones, electrets, or any other capacitive microphone will not work with the Chromaplane. Piezos and contact microphones also have no response to the electromagnetic fields created by the instrument.

## AMPLITUDE

Proximity to the instrument's surface determines amplitude. The closer your pickup coil is to the surface, the louder its detected sound will be. In other words, the volume of the instrument is determined by drawing on the Z axis.

Another way to conceptualize this is as an amplitude envelope.

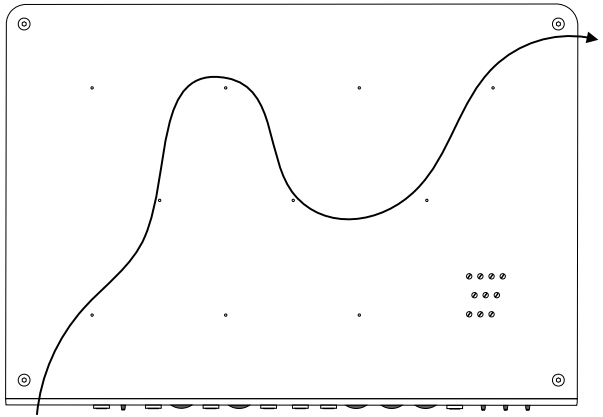
A motion above the surface of the Chromaplane like this:



Will result in an amplitude envelope like this:

## FREQUENCY

Proximity to each oscillator on the instrument's surface determines which pitch will be heard. You can play lines and melodies on the instrument by moving through its geography.



A shape, as shown here, will result in a melody containing the six pitches that each of these passing oscillators happen to be tuned to.

In other words, frequency on the instrument is determined by drawing on the X and Y axis.

features

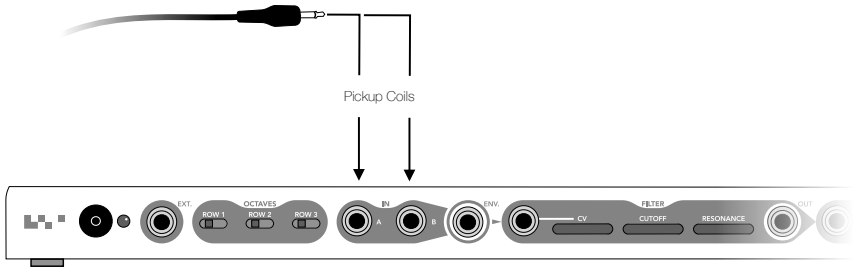
## PICKUP INPUTS

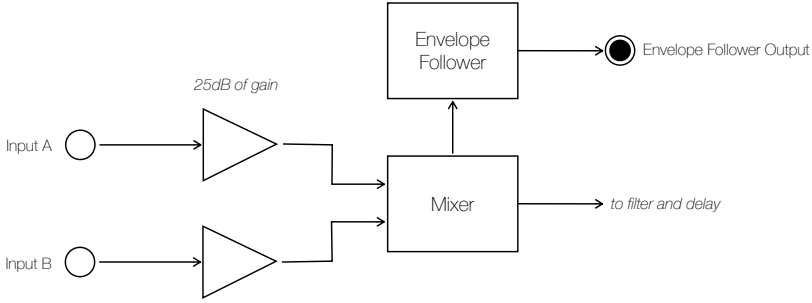
The Chromaplane includes two electromagnetic pickup coils that can be plugged into two dedicated input jacks marked A and B.

The two pickups are constantly listening for any and all changing electromagnetic fields, and therefore will detect every noise of every electronic device placed near the pickup, not just those produced by the Chromaplane itself.

The pickup coils are the main way in which the instrument is played. Once connected, moving the pickups across the surface of the instrument will allow the player to hear the sounds of the ten internal oscillators. The small holes on the instrument's surface indicate the center point of each of the oscillators' electromagnetic fields.

The audio output of the two pickups is then passed through the instrument's envelope follower, filter, and delay.




*Tip:* ***audio signal as input***

*The pickup inputs can also serve as general inputs for the effects chain of the instrument, bearing in mind that any input signal will receive 25dB of gain. Because of the analog nature of all of the input circuitry, this can produce a variety of pleasant distortion effects used in tandem with the filter and delay. Attenuating the input signal can also produce clean results.*

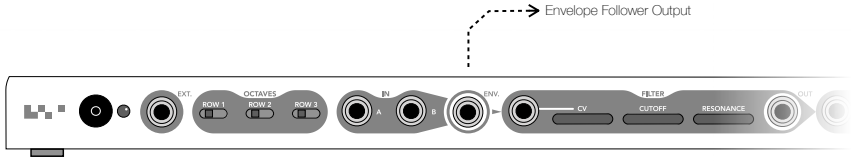
## ENVELOPE FOLLOWER

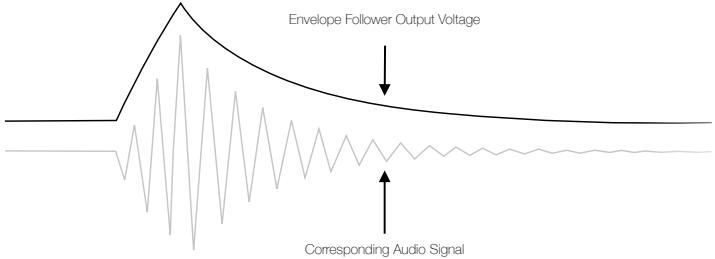
An envelope follower is a dynamic processor that tracks the volume or amplitude envelope of an input signal. It generates a control signal based on the shape of the input waveform.

In the case of the Chromalpane, the output marked ENV. outputs a changing voltage based on the signals detected by the two pickup coils. In other words, the control voltage output marked ENV. correlates with the pickups' proximity to the surface of the Chromaplane.

This control signal can then be routed through a patch cable to modulate other parameters on the instrument, offering creative possibilities like dynamic filtering and delay modulation.

The output voltage range of the envelope follower output is 0-6V.



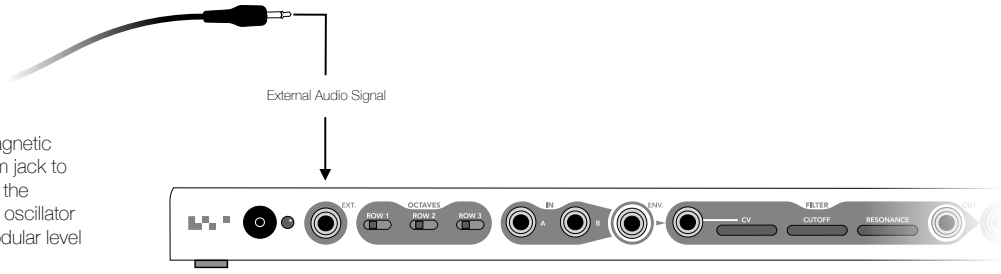



# External Input

## CONNECTION

An external signal can be sent to one of the electromagnetic fields of the Chromaplane. Connecting a mono 3.5mm jack to the external input marked EXT. automatically switches the bottom-left-most electromagnetic field from its internal oscillator to the newly connected external signal. Any line or modular level audio source can be connected here.

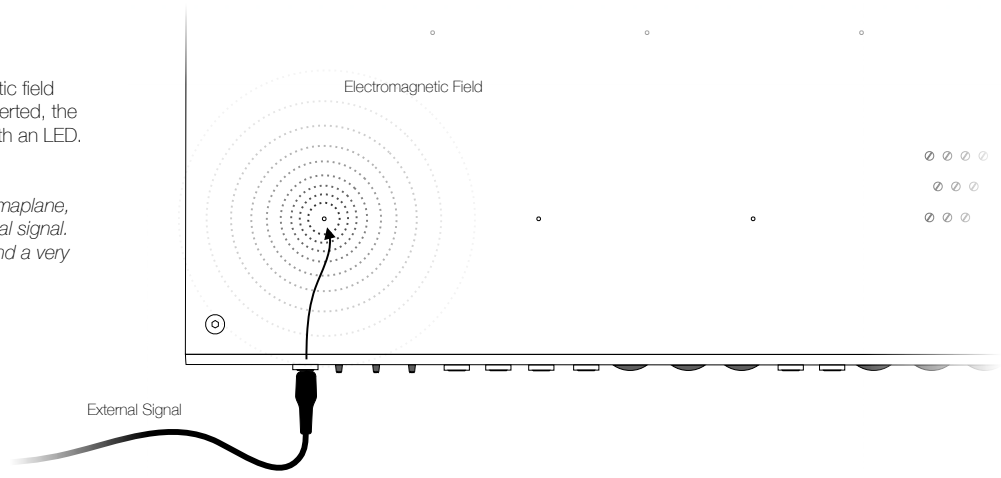
It is also possible to patch the filter or delay outputs into the external input to create feedback. More details about this are available in the example patches section.

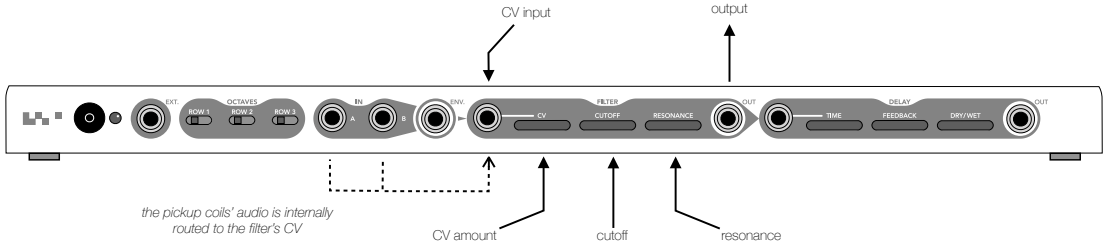



## OUTPUT / ELECTROMAGNETIC FIELD

The illustration to the right shows which electromagnetic field corresponds to the external input. Once a cable is inserted, the indication hole for the bottom left field will illuminate with an LED.

*Note: due to the internal amplifier circuitry of the Chromaplane, some additional character will be present in the external signal. You can expect a subtle roll-off of high frequencies, and a very small amount of distortion.*






## FILTER CUTOFF AND RESONANCE

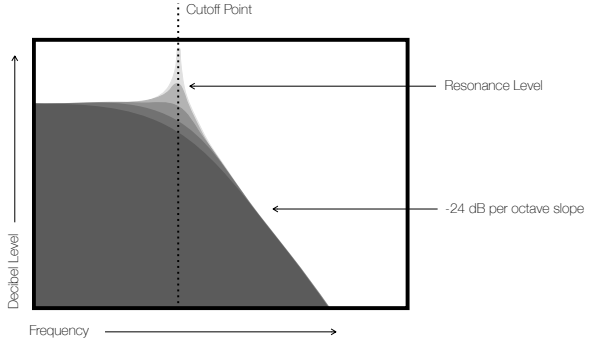
The mixed sound of the pickups also passes through a resonant 4-pole voltage controlled low pass filter. The filter attenuates frequencies above a certain cutoff point while allowing lower frequencies to pass through. The resonance control emphasizes frequencies near the cutoff point, imparting a distinct gritty character and boosting the filter's self-oscillation potential. The Chromaplane's filter is your main tool for sculpting the instrument's timbre, creating warmth, and adding dynamic movement through CV control. The filter's output contains a stereo signal with two identical channels, so the output is suitable for headphones, powered speakers, or further audio effects and gear.

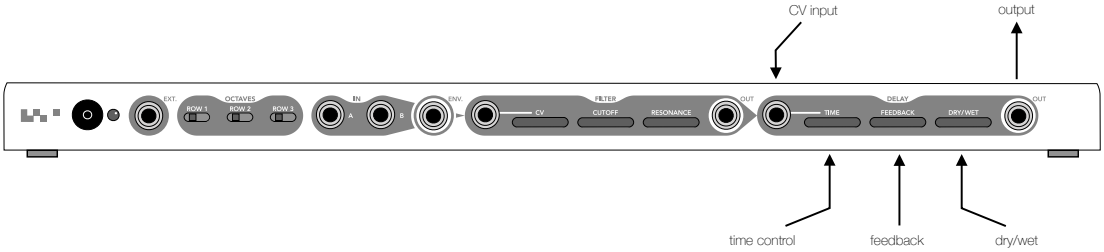
The Chromaplane's filter is also capable of self-oscillation, meaning that when the resonance is turned above 80%, feedback generates a sine wave at the cutoff point of the filter.

## FILTER CV

The filter cutoff can be adjusted through the cutoff knob, or by sending a voltage to the CV input. The CV input knob adjusts how much the voltage at the CV input affects the filter's cutoff.

When nothing is plugged in, the Chromaplane's pickups' signal is automatically routed to the CV input, so audio rate modulation will be present when turning the CV knob up unless an external CV source is connected. The resulting effect of this default modulation is more harmonic content and grittiness present in the sound, as well as beating and other interference while playing multiple notes.






## TIME, FEEDBACK, AND DRY/WET

The delay effect reproduces the original sound after a short time interval, creating a series of repetitions. The delay can add a sense of spaciousness, texture, and rhythmicity to the Chromaplane's default sound.

Adjusting the time parameter changes the amount of time before a repetition of the input signal. The time parameter can vary between 40ms and 400ms.

The feedback parameter changes the number of repetitions of the input signal. Above a certain level, the delay will spiral into oscillation with the same periodicity of the time parameter.

The dry/wet knob alters the balance between the unaltered dry input signal and the delayed signal. When the knob is fully left, the delay effect won't be audible at all. When the knob is fully right, only the delayed signal can be heard.

The delay features a lo-fi character, distorting and adding noise to the delayed output with a more dramatic effect present on each repetition. These lo-fi characteristics are most prevalent with longer delay times.

## DELAY CV

The delay time can be adjusted through the time knob, or by sending a voltage to the CV input. A more positive voltage will result in a faster delay time, while a more negative voltage will result in a slower delay time. The operating voltage for this input is 0 - 9V. To use this input without other equipment, try patching the envelope follower output to the delay CV input.

# Polarity and Phase

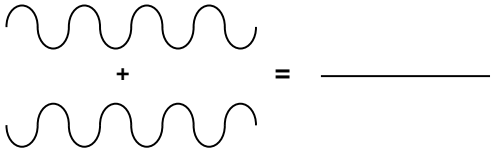
## POLARITY

Just like any other magnet, all the electromagnetic sources on the instrument have a positive and negative pole. On the Chromaplane, the negative pole faces the ground, while the positive faces the ceiling. Similarly, the pickups themselves have polarity too. When the suction cup side of the pickup faces the instrument, the polarity of the detected field is *inverted*.

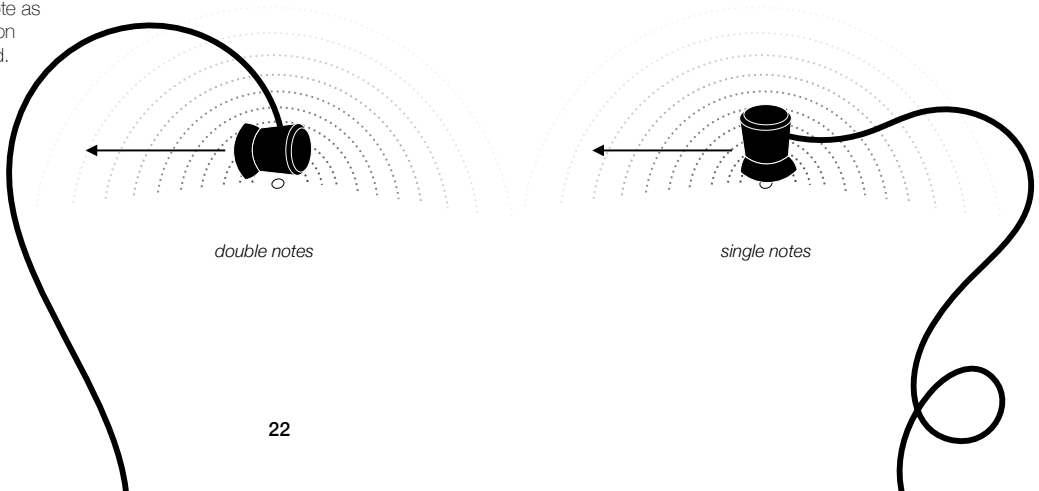
It is not possible to hear the difference in phase of a single wave - therefore, it makes no difference which side of the pickup is used, as long as it remains consistent. Instead, when using two pickups of opposite polarity, changing phase introduces destructive interference.

## DESTRUCTIVE INTERFERENCE

When two waves of opposite polarity are added together, they cancel each other out. When using two pickups of opposite polarity (one pickup is flipped upside-down), you will notice that if the same magnetic field is approached it's volume is decreased instead of increased.



This effect can be used to our advantage to create "doubles" as we pass over the instrument. To try the effect, first try drawing a shape above the instrument's surface with a pickup facing perpendicularly; then, try drawing the same shape with the pickup parallel instead. You will hear that when the pickup is parallel to the surface the notes are "doubled" - in other words, you will hear two iterations of the note as you pass over. This is because of phase cancellation that occurs exactly when over the center of the field.



*double notes*

*single notes*

## PLAYING WITH FEEDBACK

It is possible to feedback patch on the Chromaplane. You can connect the filter output or delay output back into the external input to generate feedback. When feedback patching, it's important that the input and output phases match - this ensures that a feedback loop will start. If you're feedback patching and don't hear anything - trying flipping the pickup upside-down.

## WAVEFORM

The waveform of the Chromaplane begins as a square wave. However, because it is transmitted as an electromagnetic field, and picked up again by a pickup coil, the wave is transformed multiple times. The aluminum enclosure first reduces the high frequency content originally present in the sound, and the pickup instead reduces some of the low frequencies.

The resulting waveform changes slightly based on the frequency.

The lowest notes look like this:

Middle ones look like this:

And high ones look like this:

## OUTPUT VOLTAGE AND INFORMATION

The maximum output voltage of the Chromaplane is 6 volts peak to peak. This means the instrument can interface fairly well with both line level and modular gear.

Both the instrument's outputs are stereo signals with two identical channels. This makes using headphones with the instrument easy. However, if using a TRS cable with a balanced input, the two channels will cancel and you won't hear any audio. For this reason, it is recommended to use a single-ended mono cable when interfacing with other audio gear to avoid any issues.

tuning

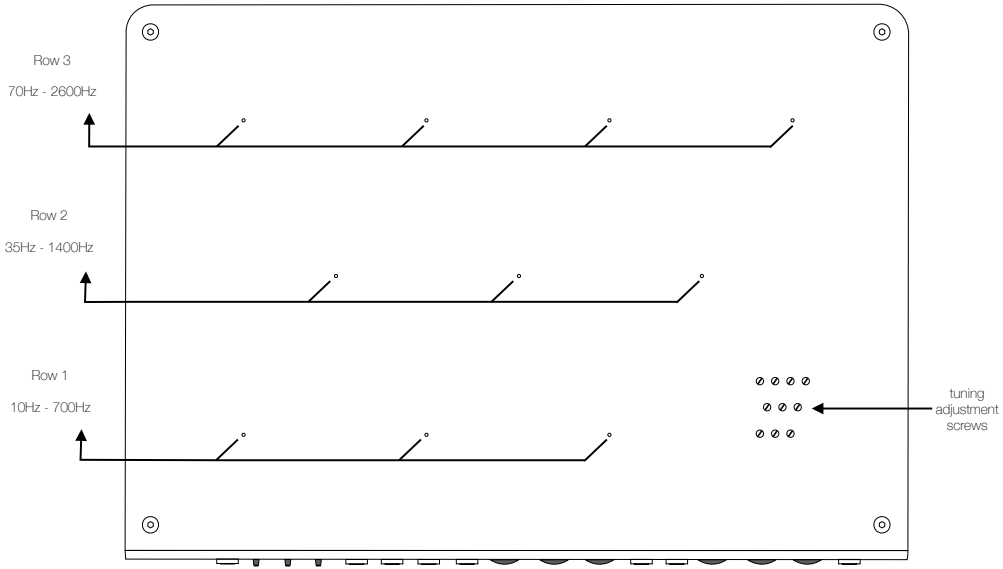
## TUNING THE INSTRUMENT

The ten tuning adjustment screws each correspond to one oscillator. A pattern of ten small holes cover the surface of the instrument. Each of those ten holes represents the center point of each of the ten oscillators' electromagnetic field. The closer the pickup coil is to each point, the louder the sound of that point's oscillator will be. Placing the pickup coil on the surface in between two points results in a mix of the different nearby oscillators' signals.

The pattern of the tuning adjustment screws and the note indication holes match one another. To tune the instrument, place the pickup coil on one of the indication holes and turn its corresponding adjustment screw with the included flathead screwdriver. You should hear the pitch move up as the screw is turned clockwise and down as it is turned counterclockwise.

The oscillators are further organized into three rows. Each row features a different oscillator range.

Three switches on the side of the instrument adjust the octave of each row as a unit. In the left position the oscillators in the corresponding row will be one octave lower, in the right position they will be in their normal octave.



*Note: being "in tune" is completely subjective. The following ideas are meant as tips for people who play music which is conventionally in tune, perhaps playing with other instrumentalists or quantized electronics. If you play music where being conventionally in tune doesn't matter, you don't have to worry too much about this.*

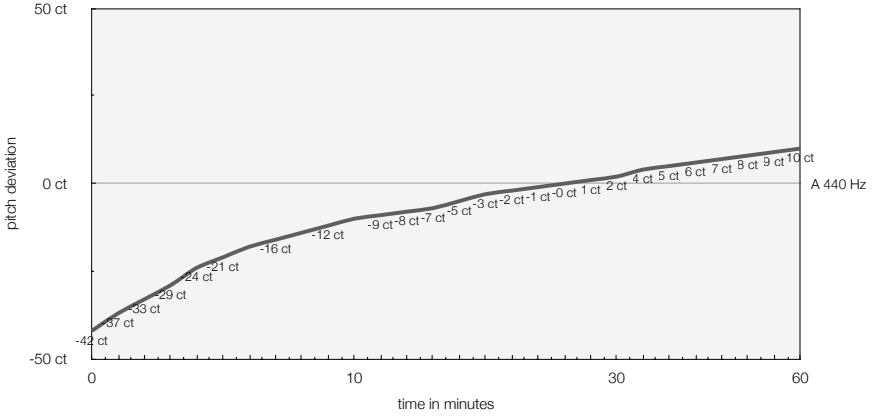
## WARM UP

Just like traditional non-electronic instruments, the Chromaplane subtly reacts to its environment, changing pitch with temperature. Every analog synthesizer requires some warm up period for an in tune performance. Electronic components' properties depend on the ambient temperature, and while efforts can be made to internally compensate for changing temperatures, no analog machine is perfect, including the Chromaplane. When the instrument first turns on, it is cold and the oscillators are flat. Over the course of 10 to 15 minutes, the instrument will slowly heat up, and reach its normal operating temperature.

## PITCH OVER TIME

The chart below shows the change in a tuned oscillator's pitch over time: the pitch begins flat, but as the instrument warms up and reaches its regular ambient temperature, the pitch begins to stabilize.

The chart encompasses a 60 minute warm up time in a room with a normal ambient temperature. The oscillator had previously been tuned to A 440, so the chart displays the deviation in cents from that A as the instrument warms up.




When the instrument is first powered on, there is a raise in pitch of around 20 cents within just the first few minutes. After about minute 10, a linear increase of about 0.5 cents per minute begins. From minute 30 to 60 the pitch increases at just 0.2 cents per minute.

For this reason, it is very reasonable to perform with the Chromaplane worry-free any time after a 15 minute warm up period.

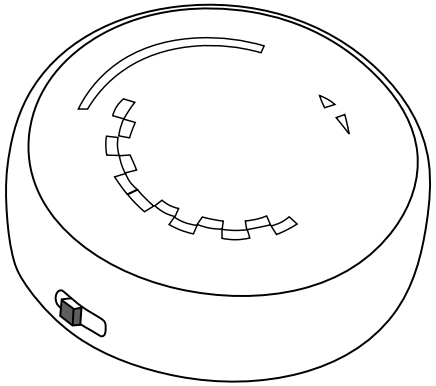
# Electromagnetic Tuner

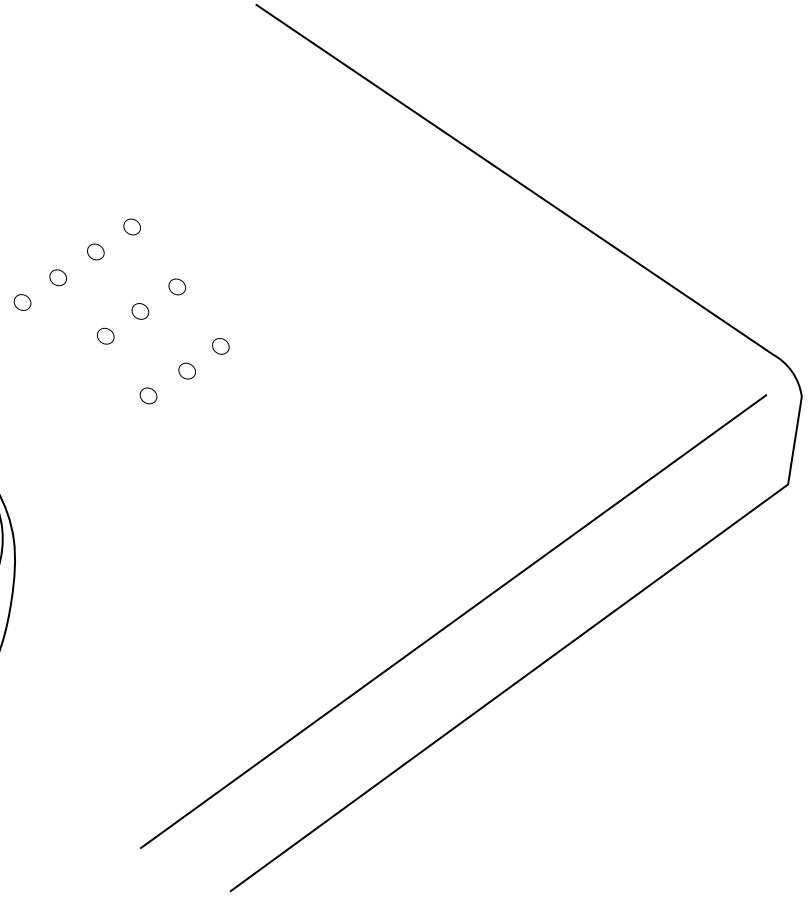
Your Chromaplane may have included a separate electromagnetic tuner. This section contains information on how to operate and use it with the Chromaplane.

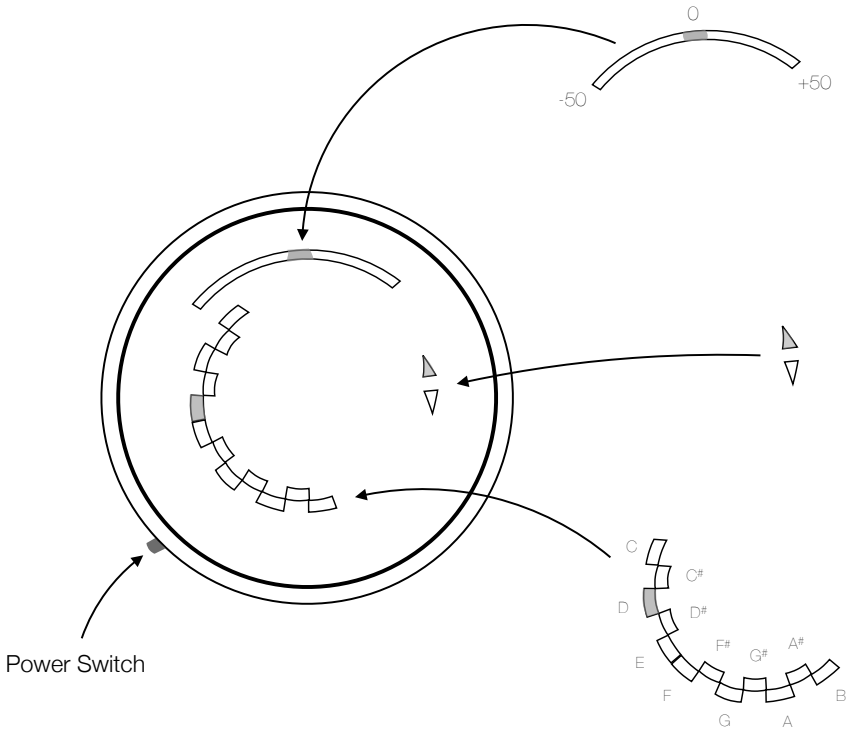
Switch the tuner on (LEDs will illuminate), and place it directly on top of one of the points on the Chromaplane's surface. It will display information about the detected note including the closest note, cents off, and octave.

Using the tuner and screwdriver, it's possible to retune the instrument without playing it or listening to its sound.

The tuner runs off a single CR2032 coin cell battery. To replace the battery, turn the device over and unscrew the battery door using a coin. You can then remove and replace the battery. Take care to place the positive side of the battery up (facing you as you replace it.)








## INTONATION METER

This displays the deviation in cents from the nearest detected note. When the note is in tune, the green light in the center of the meter will be lit.

The reference pitch for the tuner is A = 440Hz.

## OCTAVE

These two arrows indicate the current octave. When both are off the middle octave (octave 4) is detected. Deviations from the middle octave are indicated through the blinking of one of the lights.

| | |
|---|---|
| ● ● ● | 3 Blinks: Oct. 7 (C7 - B7) |
| ● ● | 2 Blinks: Oct. 6 |
| ● | 1 Blinks: Oct. 5 |
| ○ | Off: Oct. 4 (Middle C4 - B4) |
| ● | 1 Blinks: Oct. 3 |
| ● ● | 2 Blinks: Oct. 2 |
| ● ● ● | 3 Blinks: Oct. 1 (C1 - B1) |

## NEAREST NOTE

These red lights indicate the nearest detected note. They represent the piano keyboard with the white keys present on the outside and the black keys on the inside.

## Some Basic Tips

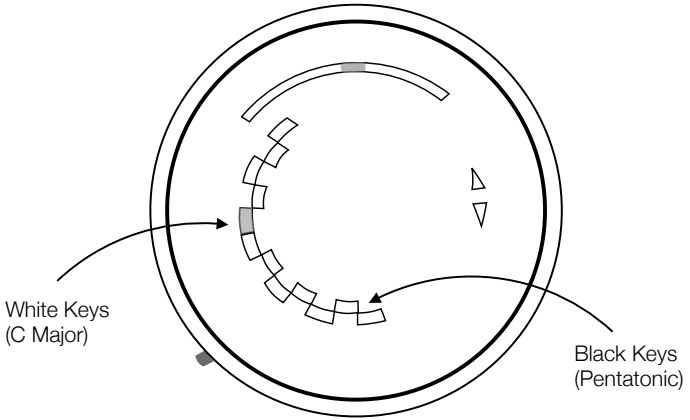
If you're finding yourself a little lost tuning up your Chromaplane, try out some of these basic tips.

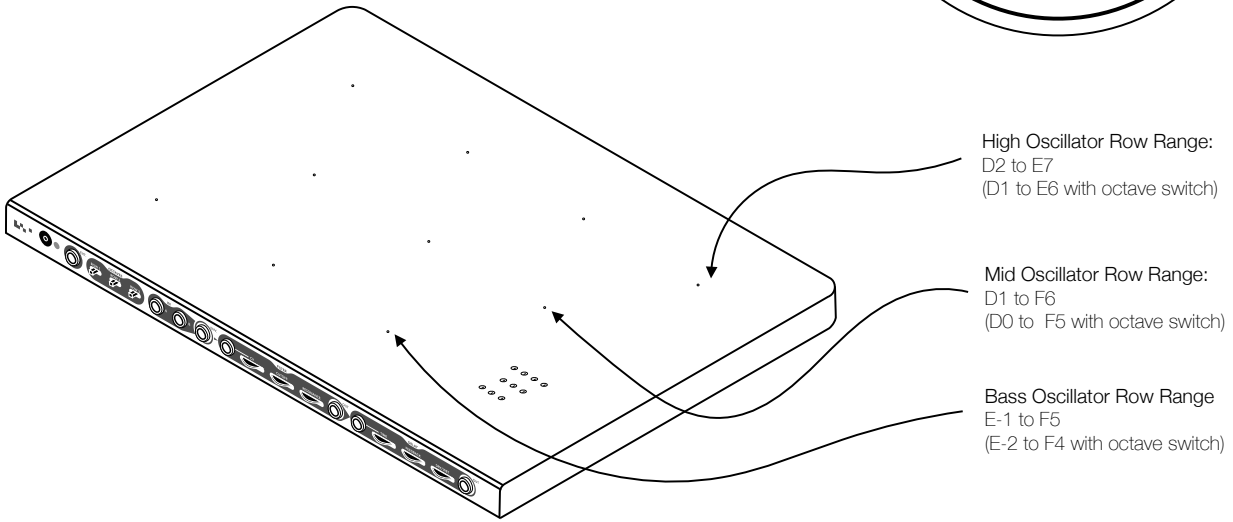
### KEEP IT SIMPLE, FIRST

The outer ring of the keyboard-like display represents all the white keys, and the inner ring represents the black keys. Try to start by sticking to either just white or just black keys.

### MIND THE OCTAVE

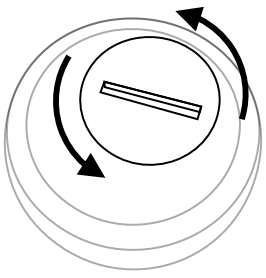
The Chromaplane has three rows of notes (bass, middle, and high). Each row has it's own range available. Try sticking to notes that fit well within the range of that row.



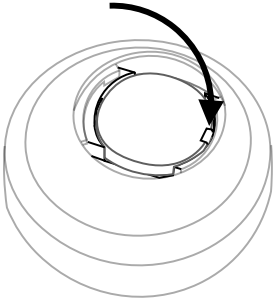



## Changing the Battery

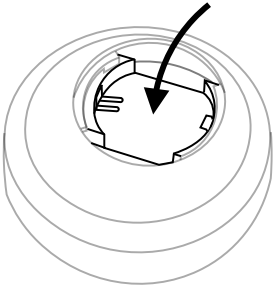
1. Use a coin to rotate the battery cover, and remove it to reveal the dead battery in its holder.



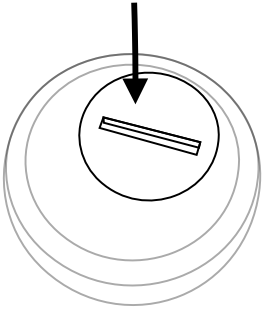
2. Press a small flathead screwdriver in the gap near the metal tab to release the battery from its holder.

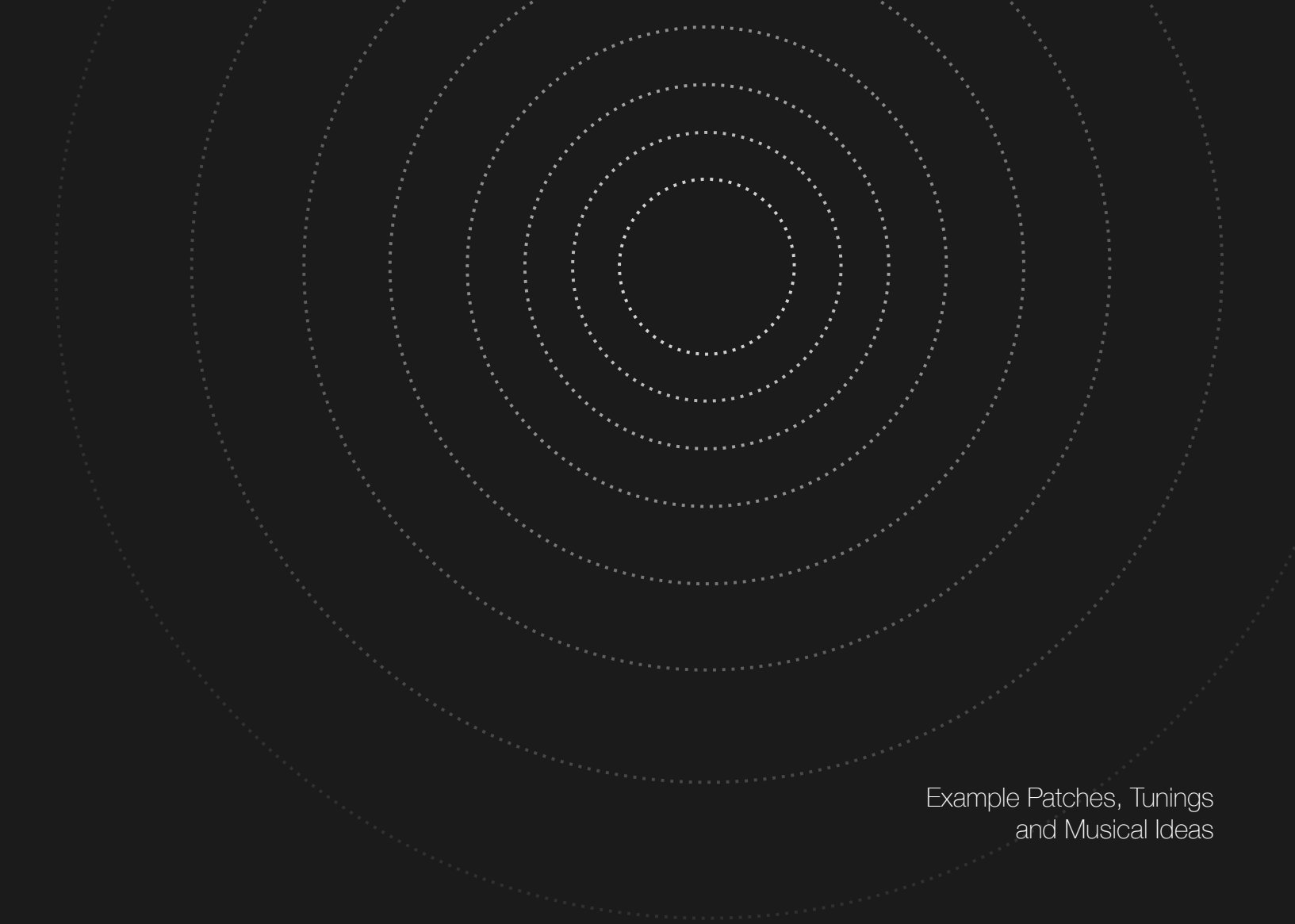


3. Place a fresh CR2032 battery in (+ side up) so that the top side rests beneath the metal tab.



4. Place back the cover and screw it in clock-wise with a coin.





# Example Patches, Tunings and Musical Ideas

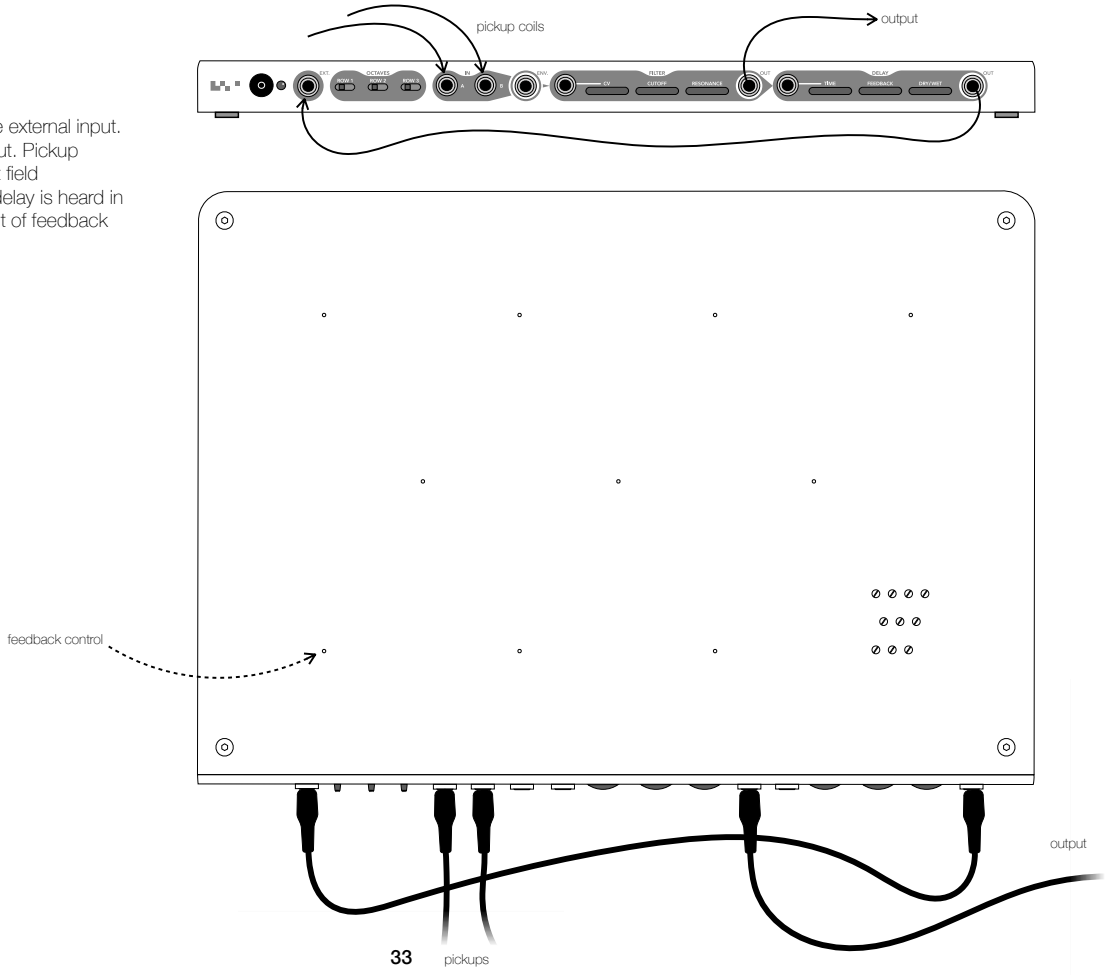
# Example Patches

## 1. Delay Feedback

Connect the delay output into the external input. The filter's output is the final output. Pickup placement over the external input field determines both how much the delay is heard in the output signal, and the amount of feedback present in the delay.

Parameters:

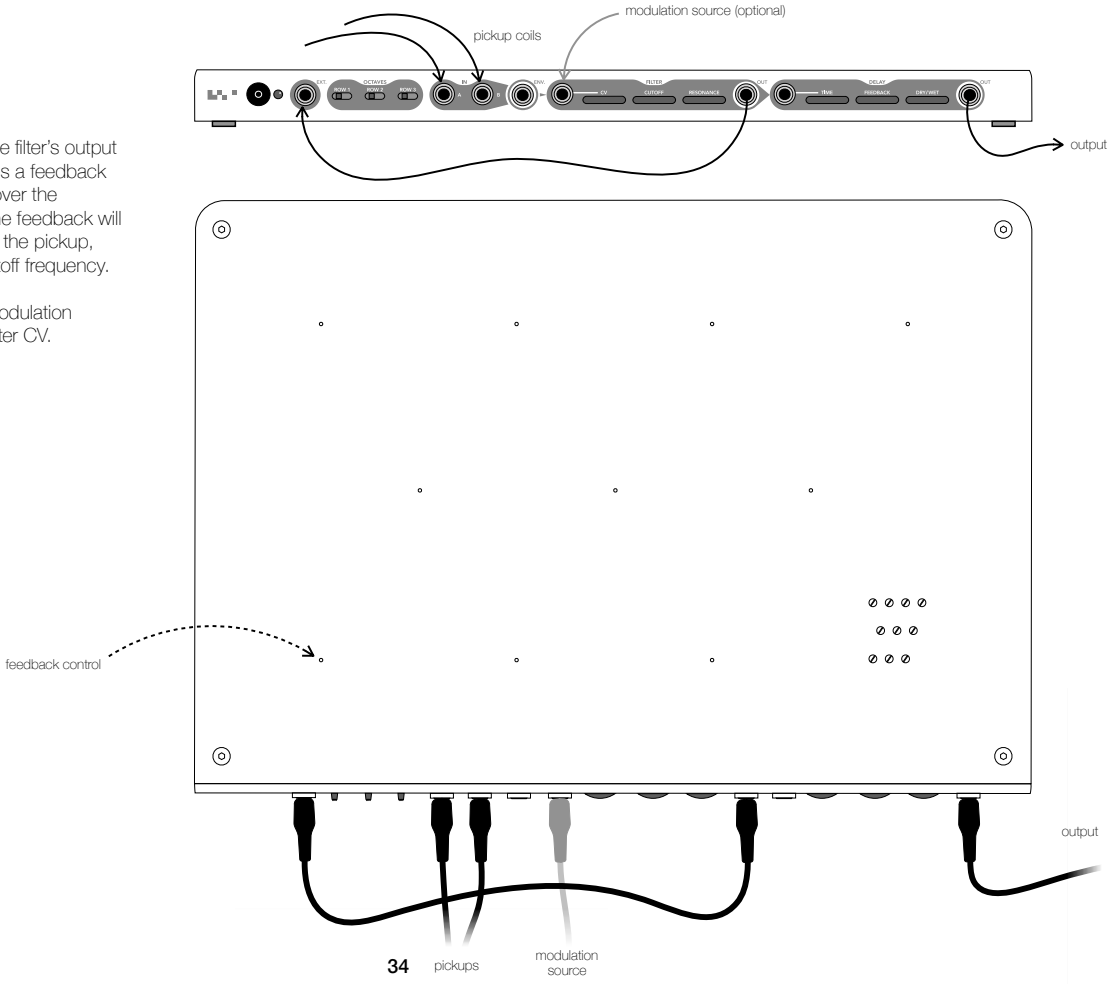
Time: Adjustable
Feedback: 0%
Dry/Wet: 100%



## 2. Filter Feedback

In this patch, a cable connects the filter's output into the external input. This causes a feedback loop anytime a pickup is placed over the external input field. The pitch of the feedback will be determined by the distance of the pickup, polarity of the pickup, and the cutoff frequency.

For further effects, try adding a modulation source, such as an LFO, to the filter CV.

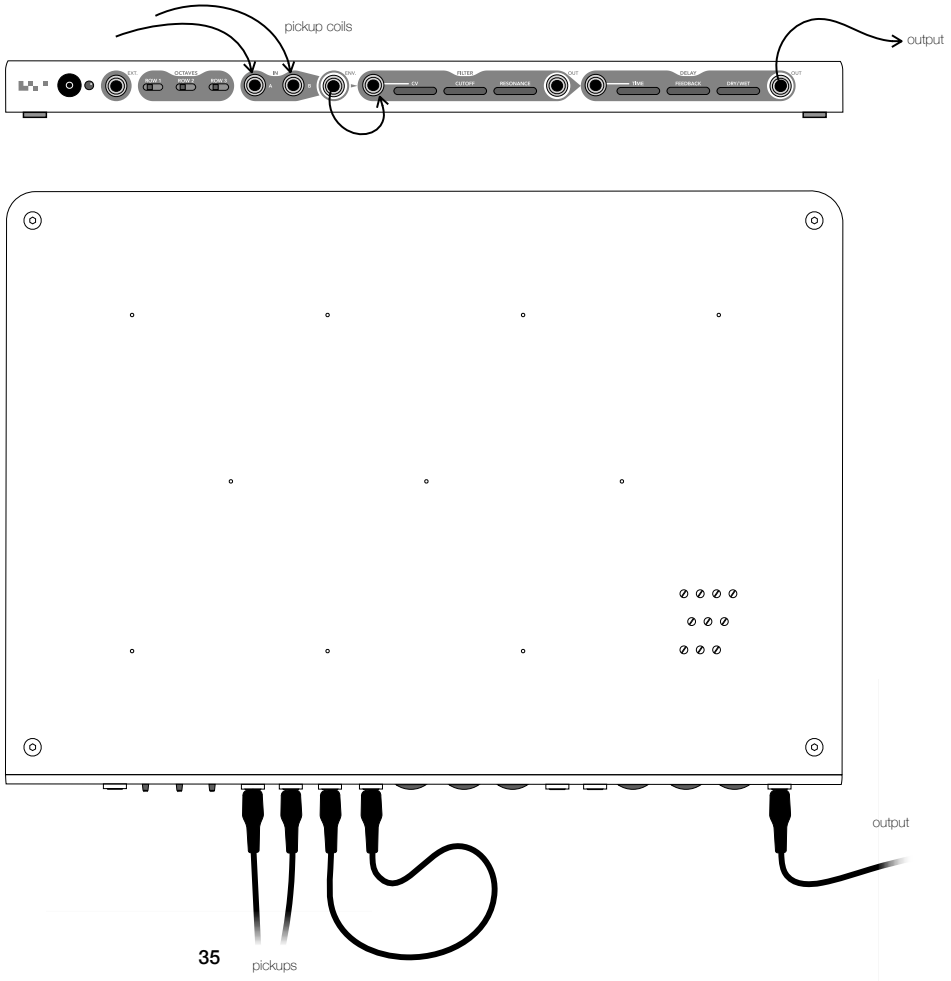


## 3. Auto-Wah

Connect the envelope follower output into the filter CV. The filter's cutoff will be modulated based on the volume of the input signal. By using two pickups, you can have dynamic control over filter cutoff by moving the position of one pickup while the other is left in place. The higher the resonance setting is, the more noticeable the effect will be.

Parameters:

Filter CV: 100%
Filter Cutoff: 50%
Resonance: Adjustable



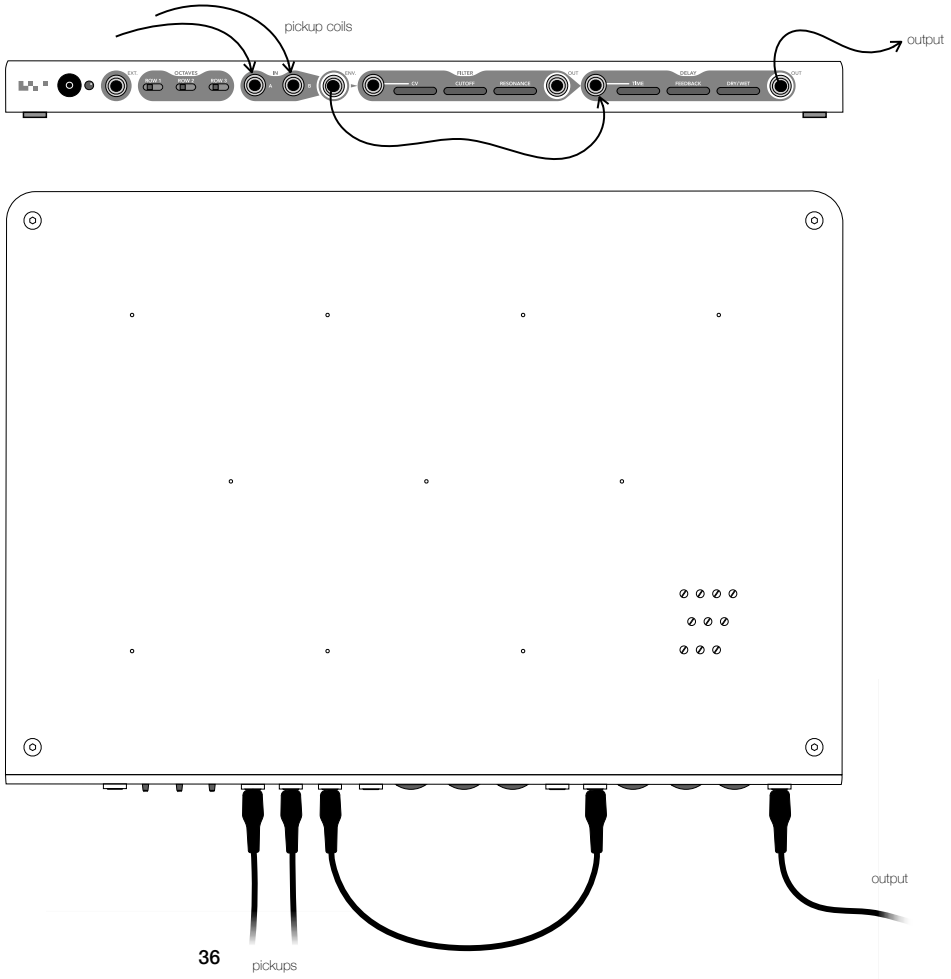
## 4. Sighing Delays

Connect the envelope follower output into the delay CV. The delay time parameter will be modulated based on the volume of the input signal. The pitch variation heard when the time parameter changes is more intense during sudden changes than it is during slow ones, therefore dynamic control is given to the player based on the speed of their movements.

Putting the time parameter at 100% will yield the most dramatic results, with a smaller variation happening as the time parameter is set faster.

Parameters:

Time: Adjustable
Feedback: Adjustable
Dry/Wet: > 0%



# Example Tuning

## 1. Pentatonic

There's no better place to start then here. Because it's very common to hear the overlapping of adjacent notes on the Chromaplane, it's good to consider the relationship between adjacent notes harmonically. Of course, something pentatonic will give us a nice a result.

Setting this tuning with the octave switches in their low positions is recommended, so that the range can be expanded upwards while playing.

## 2. Miyako-bushi

This tuning can be perceived as a minor alternative to the pentatonic, offering a darker and more nostalgic ambience.

Like the pentatonic, the scale can be quite ambiguous in terms of its tonal center, despite the emphasis of A in three different octaves.

Octave doublings on E, F, B, and A, also allow for textural beatings between notes, especially when playing with the built-in CV functionality of the filter.

Setting this tuning with the octave switches in their high positions is recommended, so that the range can be expanded downwards while playing.

# Example Tuning

## 3. Mode Mixing

This tuning highlights ideas from both A major and A minor. The sweetness of the flat six (F), the vagueness of the diminished triad in the top row (C#, E, G), alongside strong octaves on foundational notes (A, B, E), all work together to make some beautiful melodic and harmonic ideas possible.

## 4. Quintal Harmony

Quintal harmony is all based on fifths, just like the name suggests.

Different patterns will emerge depending on which geometries you choose to trace, and different harmonies emerge from different areas of the instrument.

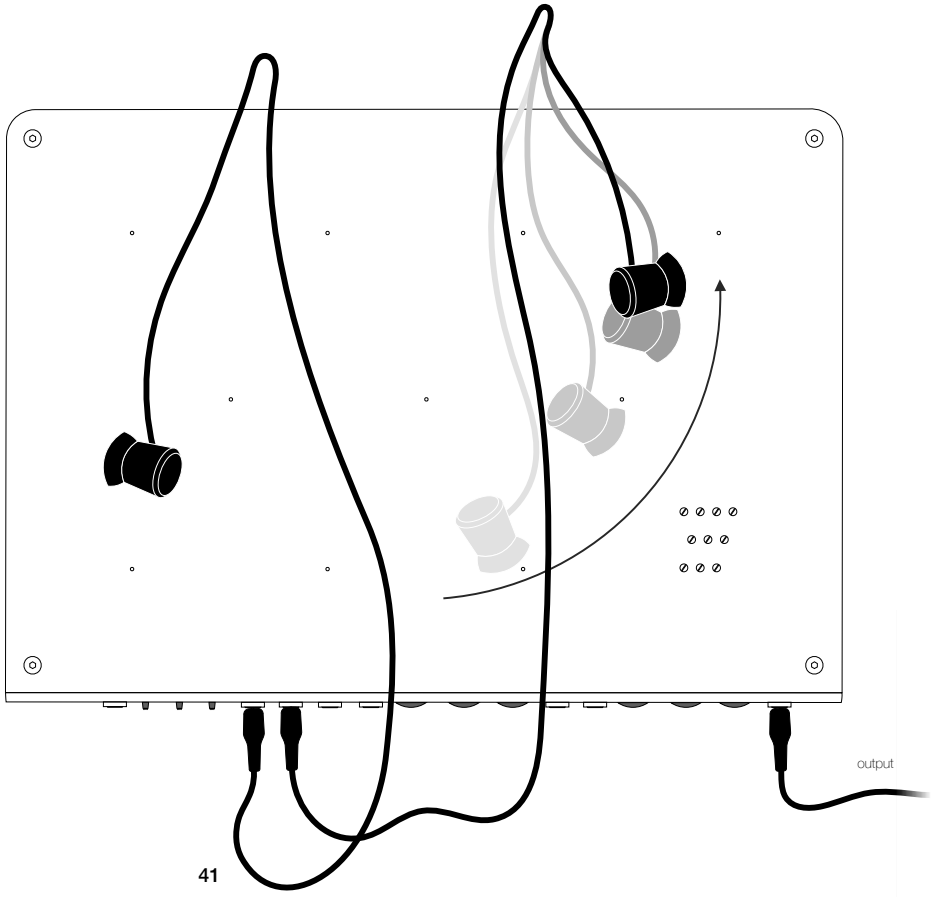
This is one arrangement which turns out to be quite chromatic, since it features 10 of the 12 chromatic notes; however, dissonant intervals are spaced out so they aren't heard simultaneously. Instead, harmonically related notes are adjacent, like the F# minor triad in the top left corner.

This way of organizing notes can also be found on other instruments, like the steel pan or the accordion (Stradella bass).

# Musical Idea

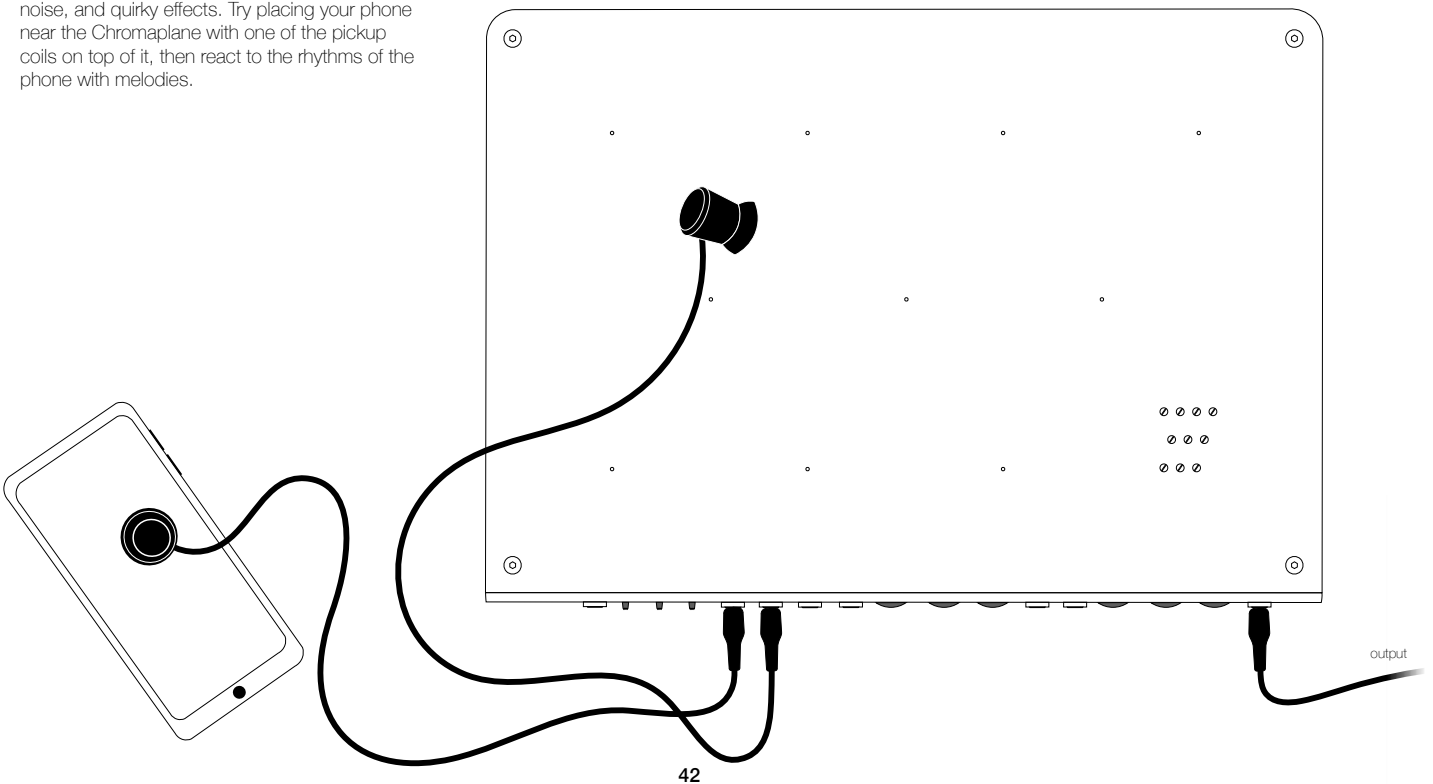
## 1. Pendulum Music

Hold a pickup coil in each hand, and let them dangle above the instrument. As they swing back and forth, different rhythmic patterns will form in counterpoint with one another. As their momentum slows, they begin to rest above a single diad.



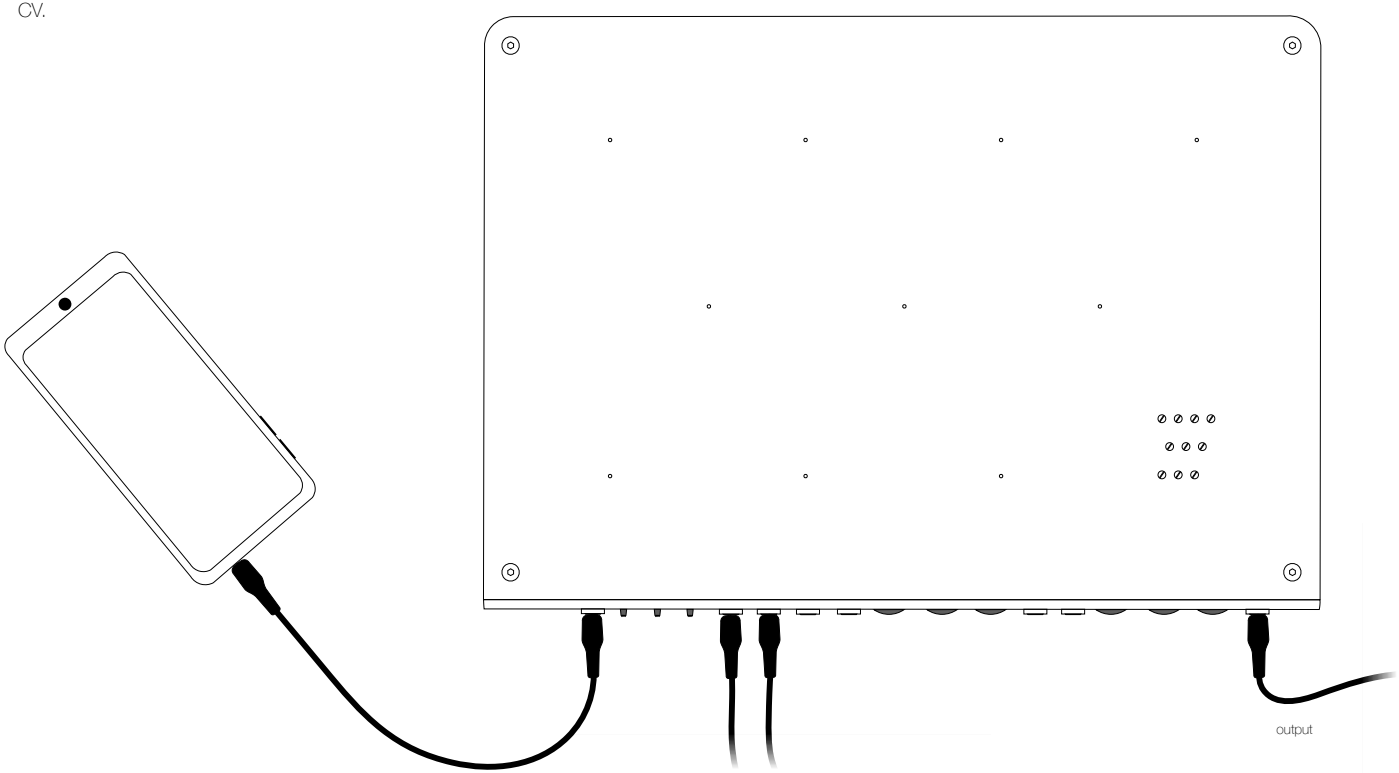
## 2. Cell Phone Drum Beat

Every electronic device buzzes with its own hidden electromagnetic field. Our cellphones are a great source for glitchy rhythms, background noise, and quirky effects. Try placing your phone near the Chromaplane with one of the pickup coils on top of it, then react to the rhythms of the phone with melodies.



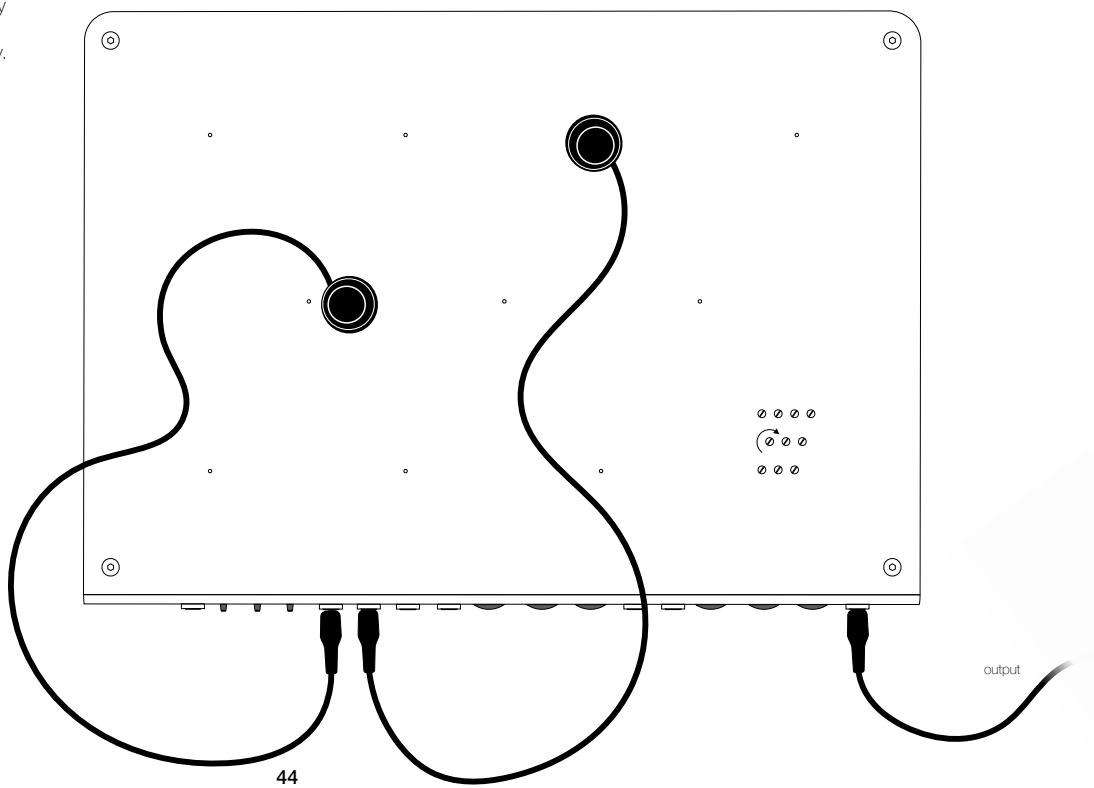
## 3. Karaoke

Play along to a pre-composed track, or other audio. Maybe even let it modulate and be modulated by other signals by raising the filter CV.



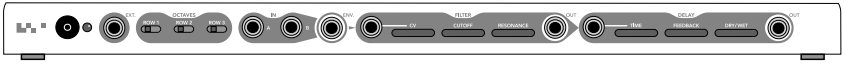
## 4. Metastaseis

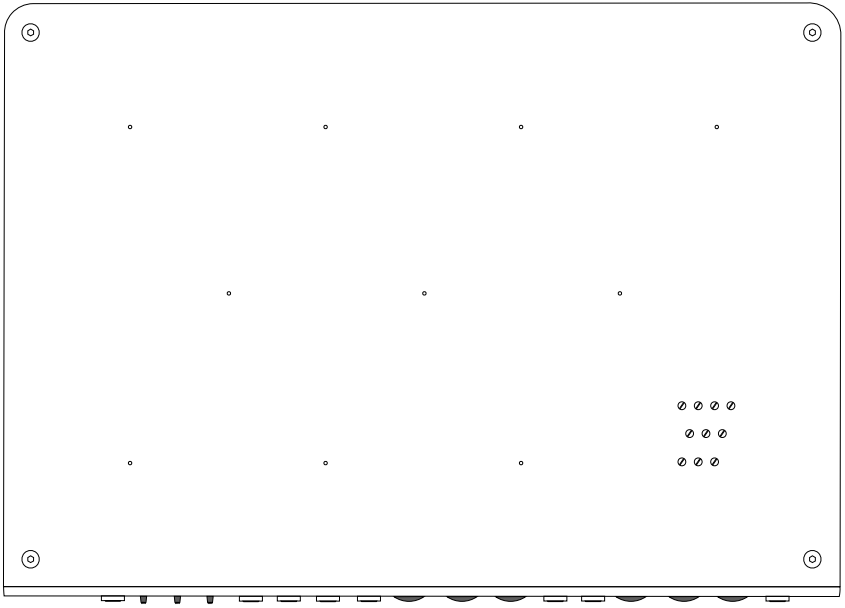
Tune the instrument while playing multiple notes. Tune until you reach almost the same frequency between the two sounding oscillators, then switch oscillators and proceed in the same way. If all the oscillators converge on the same note, detune one away from the others.

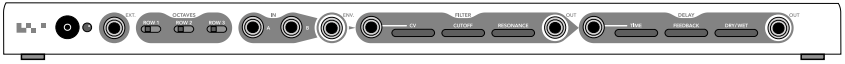


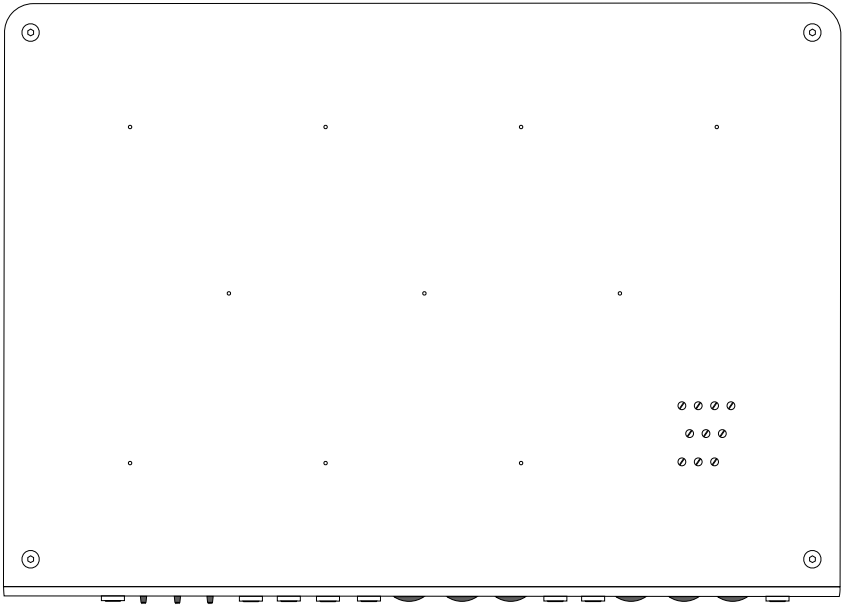
# Note to Self

You can make a copy of the following page to keep track of your own tuning and patching ideas on the Chromaplane.




EXT
OCTAVES
DOWN
NONE
UP
IN
A
B
DIN
FILTER
CV
CUTOFF
RESONANCE
OUT
DELAY
TIME
FEEDBACK
DRY/WET
OUT



## Instructions on Safe Use

THESE DIRECTIONS SHOULD BE FOLLOWED WHEN USING ANY ELECTRONIC DEVICE.

1. Always read the user manual and follow the instructions carefully before using the device.
2. Keep the device away from water and moisture to avoid electrical hazards. Care should be taken to avoid any liquids spilling into the device's openings.
3. This product, when used with headphones or speakers, can produce sound that can cause hearing loss.
4. Keep this device away from extreme temperatures (open flames and other sources of heat), which can damage the device or cause a fire hazard.
5. Avoid dropping the device or subjecting it to rough handling, which can damage the device and cause it to malfunction.
6. This device should only be connected to a power supply with the exact specifications described in this manual.
7. Use a surge protector to protect the device from power surges and voltage spikes. This product should be unplugged from the outlet during thunderstorms.
8. This product is not intended to be left on indefinitely, and should be unplugged from the outlet when not in use.
9. Use the device in a well-ventilated area to prevent overheating.
10. Keep the device away from children to prevent accidental injury or damage.
11. This device does not contain any user serviceable parts. Do not attempt to repair the device yourself; always have it serviced by a qualified technician.
12. Disconnect the device from the power source before cleaning or performing any maintenance.
13. Strong electromagnetic fields and neodymium magnets may cause interference with cardiac pacemakers and ICDs.

# Technical Specifications

Synthesis Type: Analog

Polyphony: Fully polyphonic (ten voices)

Dimensions: 30 cm x 21 cm x 2 cm (L x W x H)

Net Weight: 1050g

Included Power Supply: 9V DC (center negative)

Audio ConnectionType: 3.5mm

Audio Output Voltage: 6 volts peak to peak

Current Consumption: 620mA

# Service and Support

## WARRANTY

KOMA Elektronik warrants its products to be free of defects in materials / workmanship and conforming to the specifications at the time of shipment for a period of two years from the date of purchase. During the warranty period any defective products will be repaired or replaced at KOMA Elektronik's option on a return-to-factory basis. This warranty covers defects that KOMA Elektronik determines are no fault of the user.

## PRODUCT RETURNS

Before you send in your unit, you must obtain prior approval in the form of an RMA (Return Material Authorization) number from KOMA Elektronik before returning any product. Get in touch with us at support@koma-elektronik.com to request the RMA number. The warranty will not be honored if the product is not properly packed. Once you have received the RMA number, write it on a sheet of paper or a note on the inside of the package and carefully pack and ship the product to KOMA Elektronik with transportation and insurance charges paid, and include your return shipping address.

## OTHER CONCERNS

It's important to us that you keep enjoying your KOMA products. When you have any questions not answered above, please get in touch at support@koma-elektronik.com

# Credits

## ABOUT KOMA ELEKTRONIK

KOMA Elektronik was founded in 2011 by a group of artists, engineers and synth enthusiasts. KOMA is interested in selling instruments that challenge you to experiment, to try out new things, and to explore. Gear that is fun to play together with friends, and that pushes your music forward.

## ABOUT PASSEPARTOUT DUO

Passepartout Duo is a music group formed by Christopher Salvito and Nicoletta Favari. Since 2015, they have been on a continuous journey around the world, sharing their music and constantly discovering new ways to do so. The instruments they build have become a companion to their own travels and music, and sometimes take on a life of their own.

# Imprint

KOMA Elektronik GmbH is a subsidiary company of KOMA Elektronik B.V.
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Court of Registration: Amtsgericht Berlin-Charlottenburg
Registration Number: HRB 145453
VAT ID: DE285522050
WEEE-Reg. Nr: DE97459400

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