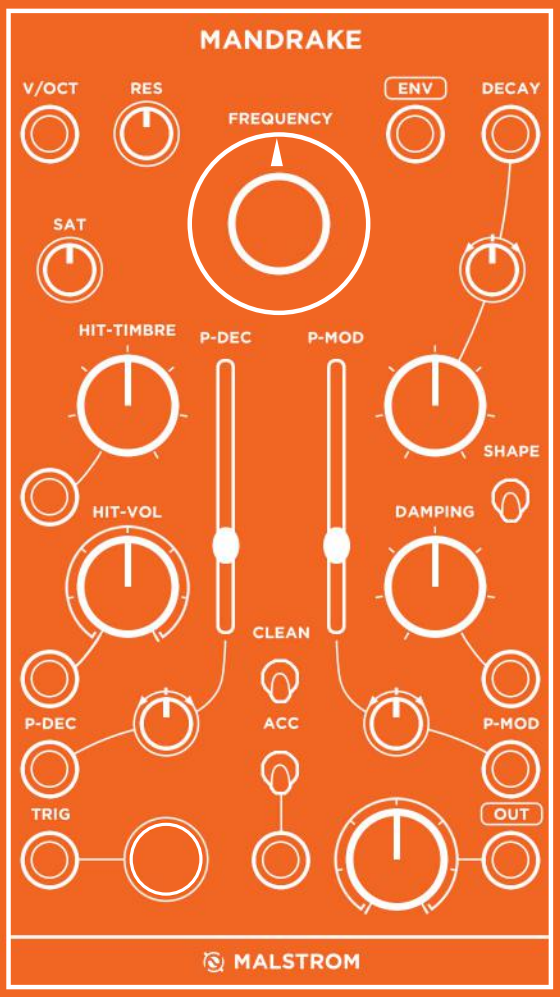
MALSTROM



MANDRAKE

USER MANUAL

VERSION 1.1

CONTENTS

DESCRIPTION

A kick drum lays down the foundation of your track, the root of your beat. You need the low end to create a pumping motion and the high end to cut through the mix. All this while maintaining spectral room for other sounds. So it can be quite an undertaking to get right.

Which is why we developed Mandrake. A kick drum synthesizer that targets kick drum styles for Dance, House and Techno music. Inspired by physical models, DAW drum synthesis and sound mixing techniques. It divides the sound into a "Hit" and "Body", with sound shaping possibilities for both sections.

Mandrake's "Hit" is a resonating filter which is saturated to have a square-like shape. It generates a short pulse that can be tuned and attenuated. Which results in a short click that will cut through the mix when and where you need it.

Mandrake's "Body" is made up from another resonating filter. Its wave is slightly saturated and filtered to resemble the harmonics of a drum. More saturation can be added in the form of uneven harmonics to create harsher tones. The result is then sent to a damping circuit that is used to tame the sound. Finally the body can resonate which leads to more liquid sounding drums, or specific frequency boosts. All of the body's parameters are connected which makes it super fun and playable!

A few more functions allow Mandrake to be adaptable to different situations. Two shapes with different harmonic content and volume decay shape. An envelope output to provide a normal or ducking envelope to further sculpt your sound, or to side chain other sounds. An accent or volume CV input to provide two volume control options. And a clean-up switch which adds a high-pass at 25Hz to remove the rumble, a spectral dip at 300Hz to make the kick sound less "boxy".

Not another 808 or 909 clone; its fully analog circuitry is entirely built from scratch to create an original sound. Also nothing more than a great kick; ranges to get into detail, and useful kick drum sounds throughout its settings!

FEATURES

- "Hit" and "Body" sections to sculpt the most important parts of a kick drum.
- Hit-timbre and Hit-volume controls to shape sound of the transient.
- Body saturation, resonance, decay and damping controls provide a varied sound palette.
- Clear pitch control section that is carefully scaled to match a kick drum.
- Two VCA shapes that provide different flavours.
- Ducking or normal envelope output to further sculpt and modulate.
- Accent or VCA CV input switch to match your sequencing method.
- Clean-up switch to remove rumble and decrease "boxiness".

SPECS

FORMAT	WIDTH	FRONT	BACK	WEIGHT
EURORACK	14HP	20MM	28MM	210GR

POWER @ +12V	POWER @ -12V
130mA	120mA

BOX CONTENT

1x Module
1x Ribbon power cable
4x Screws
4x Washers
2x Stickers

Note: All of our packaging is made from recycled materials and is 100% recyclable. We also choose to provide digital manuals only!

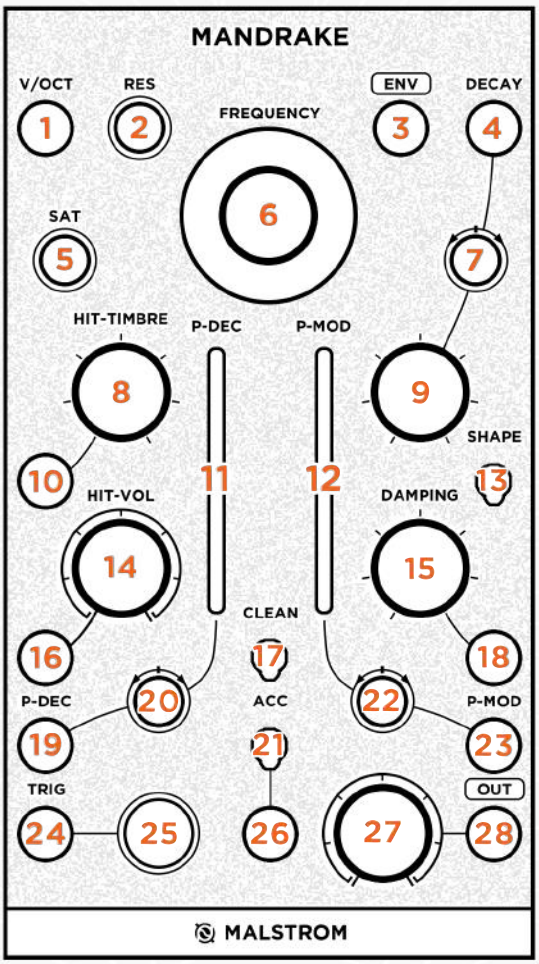
INSTALLATION

!!! WARNING !!! Be smart, turn power off before you start!

1. Check there is enough power available on the power supply.
2. Connect the 2x5 connector of the provided ribbon cable to the module.
3. Check if the red stripe on the ribbon cable is connected to the red stripe indicator on the module. The red stripe indicator is the -12V rail.
4. Connect the 2x8 connector of provided ribbon cable to the busboard.
5. Check if the red stripe on the ribbon cable is connected to the -12V position on the busboard.
6. Fasten the provided screws to lock the module onto the eurorack system rails.
7. Turn power on and enjoy!

Note: Malstrom modules have reverse polarity protection. Reversed power connection will not damage the module.

OVERVIEW



1. V/Oct Input
2. Resonance
3. Envelope Output
4. Decay CV Input
5. Saturation
6. Frequency
7. Decay CV Attenuverter
8. Hit-Timbre Knob
9. Decay Knob
10. Hit-Timbre CV Input
11. Pitch Decay Fader
12. Pitch Mod Fader
13. VCA Shape Switch
14. Hit-Volume Knob
15. Damping Knob
16. Hit-Volume CV Input
17. Clean-Up Switch
18. Damping CV Input
19. Pitch Decay CV Input
20. Pitch Decay CV Attenuverter
21. Accent / Volume CV Switch
22. Pitch Mod CV Attenuverter
23. Pitch Mod CV Input
24. Trigger Input
25. Trigger Push Button
26. Accent / Volume CV Input
27. Volume Knob
28. Output

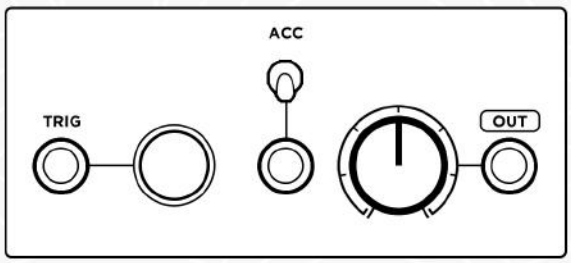
Mandrake can be divided into three main sections. The “I/O” section, the “Hit” section and the “Body” section.

The “I/O” section consists of trigger and output settings,

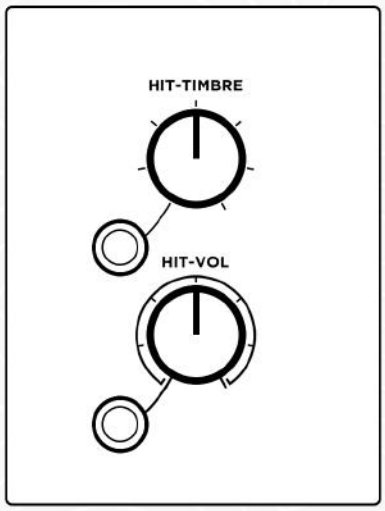
The “Hit” section consists of two transient controls.

The “Body” section consists of pitch and sound shaping controls.

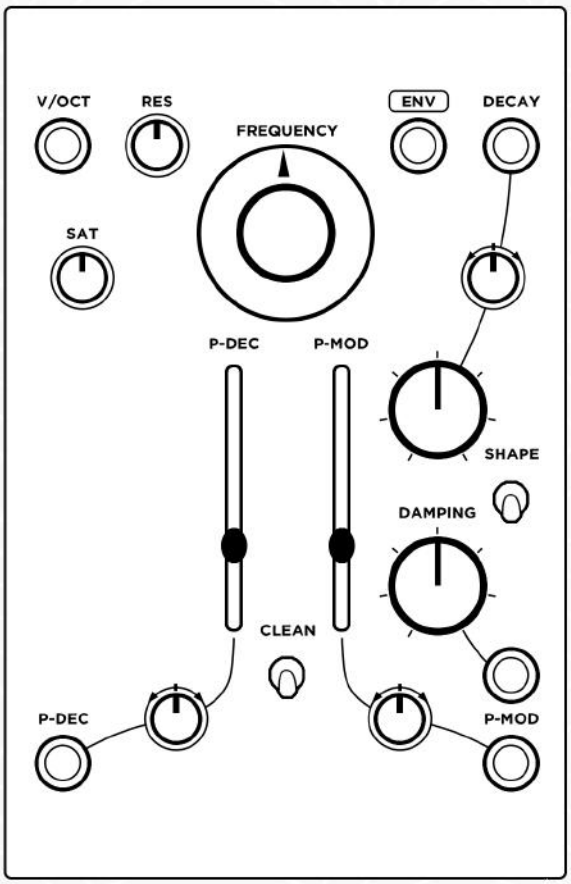
I/O



HIT



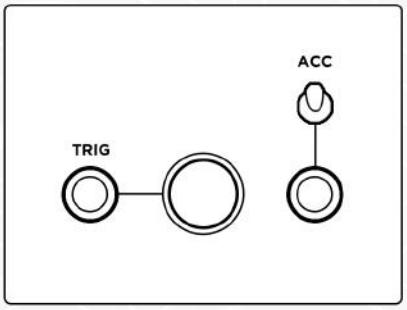
BODY



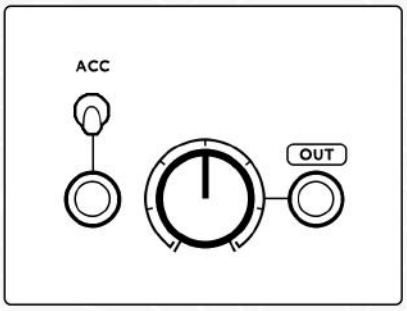
I/O

The best section to start with is the I/O section, as it is crucial to get sound out in the first place.

The pushbutton always triggers at accent level. While the trigger and accent inputs have different levels depending on the state of the Accent Switch.



If the Accent Switch is set up (pointing towards “ACC”); the Accent / CV Input is used to trigger accents and the Trigger Input to trigger non-accents *(see note).*



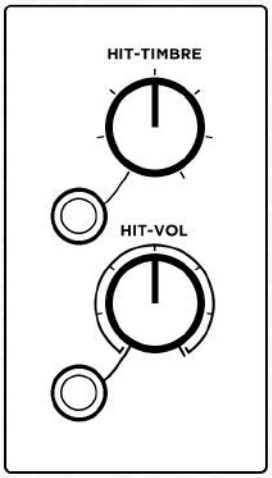
If the Accent Switch is set down; the Accent / CV Input is used to control the volume with CV. In which case the Trigger Input triggers at accent level.

The Volume Knob is used to control the volume level of the module.

Note: sending a trigger to the Accent Input does not require a trigger in the Trigger Input!

HIT

The Hit creates a short transient at the start of the kick drum. It is made from a resonating filter which is saturated to have a square-like shape.

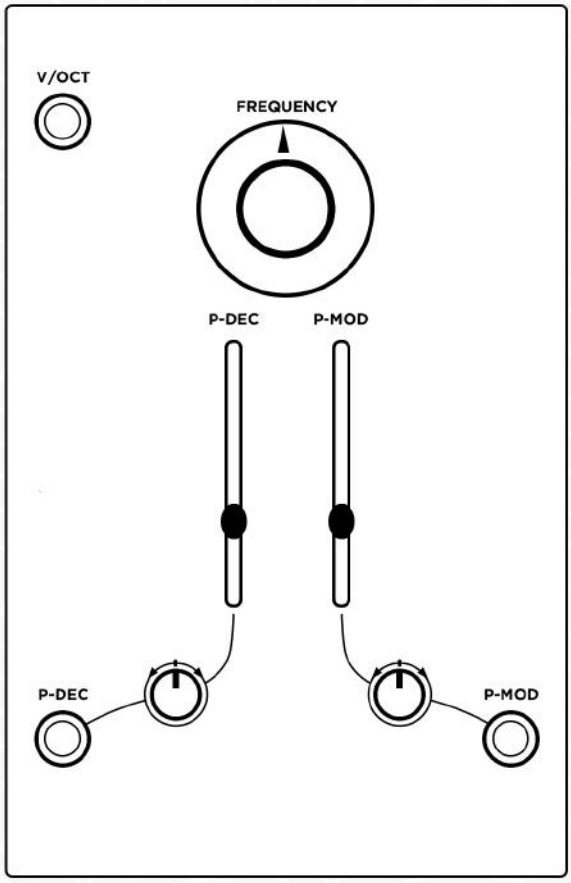


At lower Timbre settings it is a softer sounding click. As you turn it up it becomes more tonal. This allows it to be tuned to your track or even sit in the spectrum where it does not interfere with other instruments.

The Hit Volume knob controls the Hit’s volume.

BODY

Let's have a look at the Body's pitch controls:



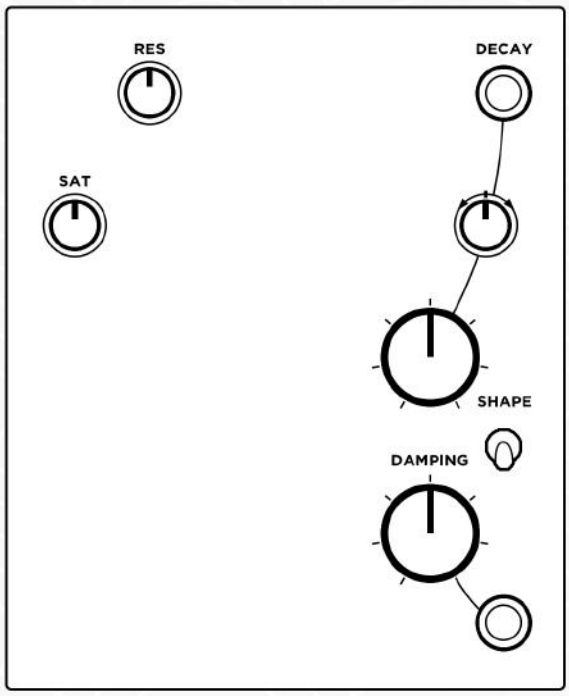
The V/oct Input allows the module to be pitched in v/oct scale. It can track up to at least four octaves and is temperature compensated.

The Frequency Knob sets the initial frequency before any pitch modulation is applied.

To create the kick drum sound the wave's pitch is modulated with an envelope. The Pitch Decay sets the duration of this envelope. It also has a CV Input and an attenuverter to adjust the amount of Pitch Decay CV modulation.

The amount of the pitch modulation is determined by the Pitch Mod, which also has a CV Input and an attenuverter to adjust the amount of Pitch Mod CV modulation.

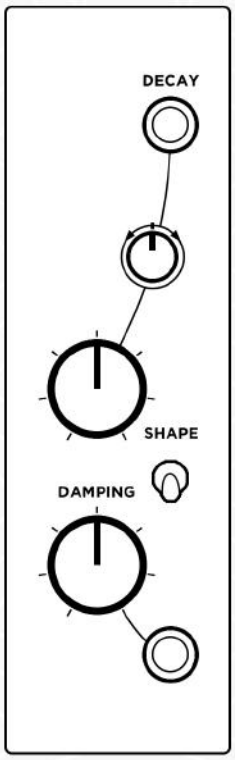
Mandrake's "Body" is made from a resonating filter. Its wave is slightly saturated and filtered to resemble the harmonics of a drum.



The sound is then sculpted by changing the Saturation, Resonance, Decay Knob, VCA Shape and Damping Knob.

These parameters are all linked to each other. Creating a great interplay of settings!

The Body's amplitude can be controlled with the Decay Knob. It also has a CV Input and an attenuverter to adjust the amount of Decay CV modulation.



The VCA that is used to adjust the amplitude of the Body can be set to two shapes. The first one (switch set to up position) responds in a slightly more linear way, as a result it retains its low end longer. And has more harmonic content. Useful if you want your kick to sound full and deep. The second one (switch set to down position) responds in a slightly more exponential way, as a result its low end is cut off quickly and it sounds cleaner. Useful if you want your kick to sound clean and tight.

The damping circuit is a low-pass filter that is controlled by the Decay. While the Decay Knob determines the time it takes to dampen the sound. The Damping Knob determines the amount of damping. Because the Decay also controls the amplitude, the result is similar to a Low Pass Gate.

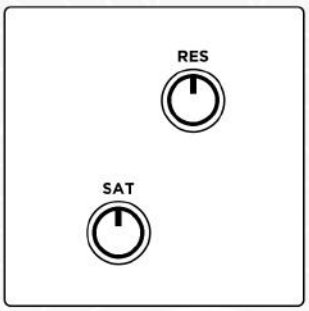
In general low Damping settings result in less Saturation and more Resonance. High Damping setting result in more Saturation and less Resonance.

The example on the right shows how the Damping knob passes more Saturation (orange) through as you open up the damping, and more Resonance (cyan) is generated as you close down the damping.

However other variations are possible with different Decay, Saturation and Resonance settings. As the Damping setting never really closes or opens up the harmonic content entirely.

Tip: The Decay can be used to create breakdowns in your set. Turning the Decay down has an effect similar to a high-pass filter!

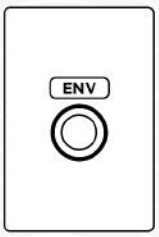
Now let's take a look at the Saturation and Resonance controls.



Saturation is how much the signal is Saturated before it is sent to the Damping circuit. Increasing the Saturation Knob adds uneven harmonics (Symmetrical Distortion) and is great for harsher tones.

Resonance is how much the Body will resonate once it is going through the Damping process. It can also be used to boost specific frequencies when the Damping is set to a low setting.

The Envelope Output sends out a ducking envelope *(see note 1).* Which can be used to sculpt your kick drum sound even more *(see note 2).* It can also be used to side-chain other sounds when sent to a VCA.



Finally Mandrake has a Clean-Up Switch. which (when set to the up position) adds a high-pass filter at 25Hz to remove the rumble, and a spectral dip *(see note 3)* at 300Hz to remove some of the boxiness. The signal is then slightly boosted to give the other frequencies more presence and provide equal gain to the Clean-Up off position.

The Clean-Up is especially useful in live situations where low frequencies can be problematic. Or when you notice the kick drum is missing some clarity.

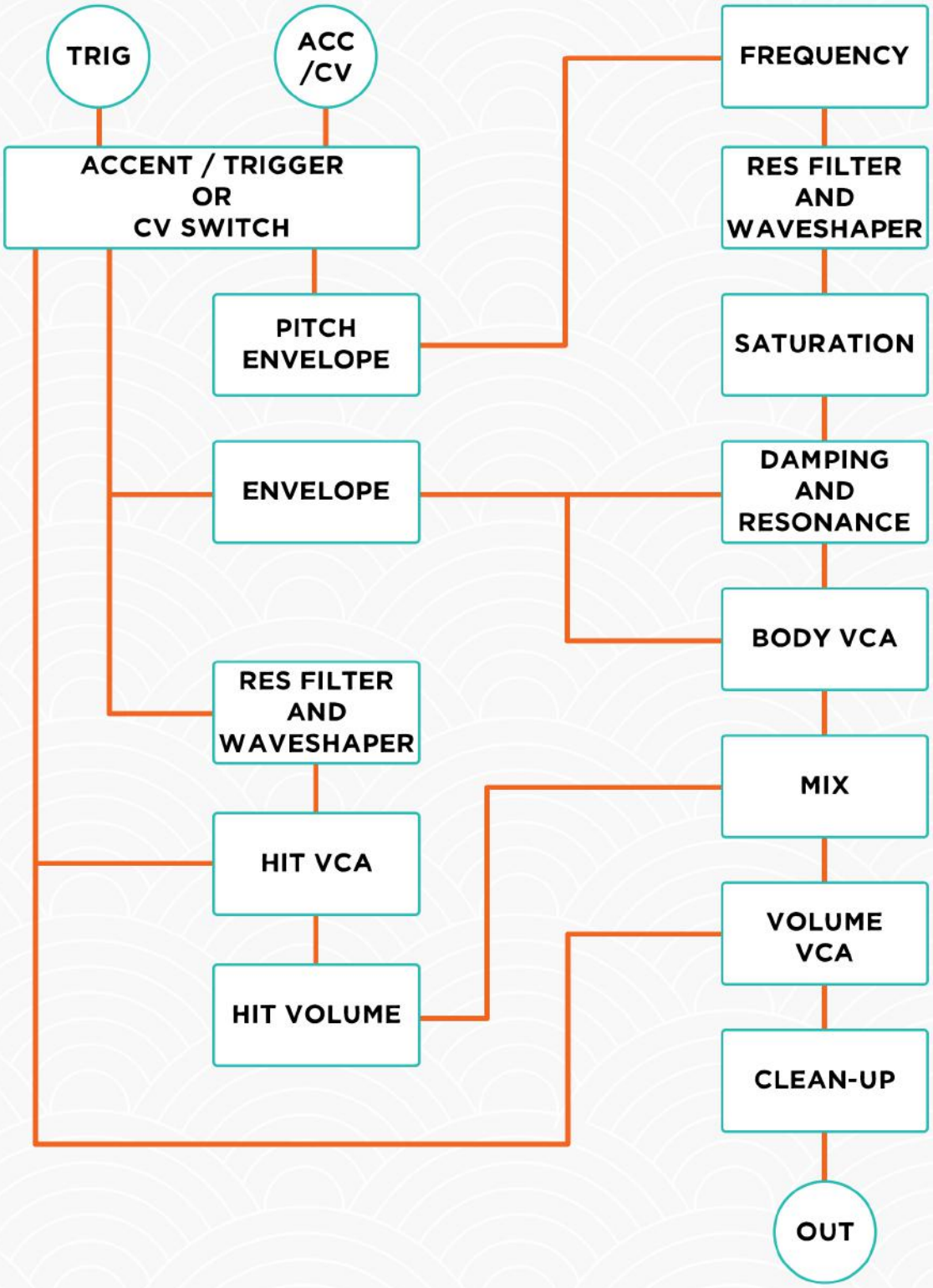
Note 1: The Envelope Output can be set to either send out a ducking envelope or a normal envelope. See page 21 to learn how to set it.

Note 2: See Example 2 on page 16 to see how the ducking envelope can help you sculpt the tail!

Note 3: The amount can be set via trimmer on the pcb. See page 21 to learn how.

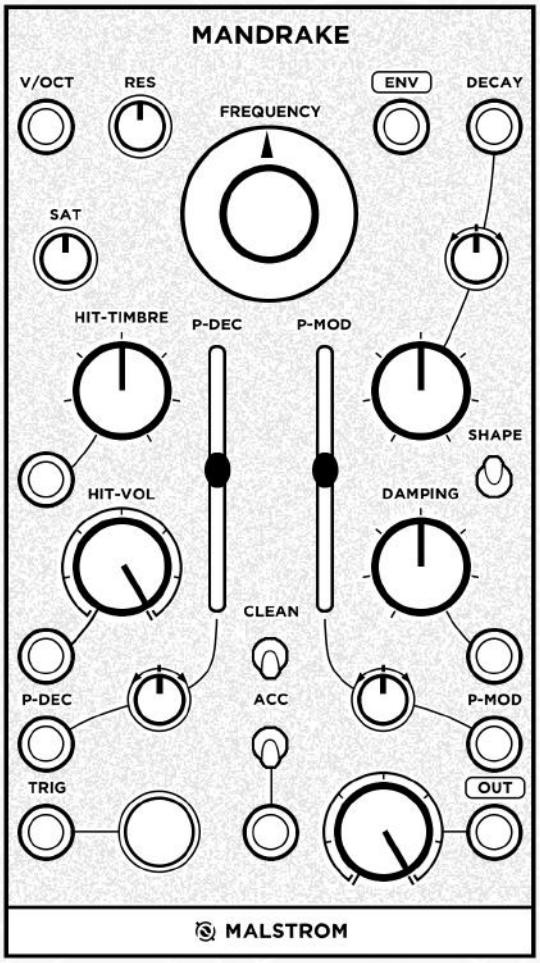
CIRCUIT DIAGRAM

The following diagram is a simplified version of how Mandrake is connected.



KICK REFERENCES

The following references are meant as a starting off point to sculpt your kick drum sound. They show different settings and kick drum styles that were inspired by specific genres. They may not be perfect for your track straight away. But they can help you start tweaking in the right direction, so use them accordingly!



CLICK AND ROUND BODY

Reminiscent of classic kicks and knob positions that are easy to remember. This is simply a great kick to fall back on and start your kick sound sculpt!

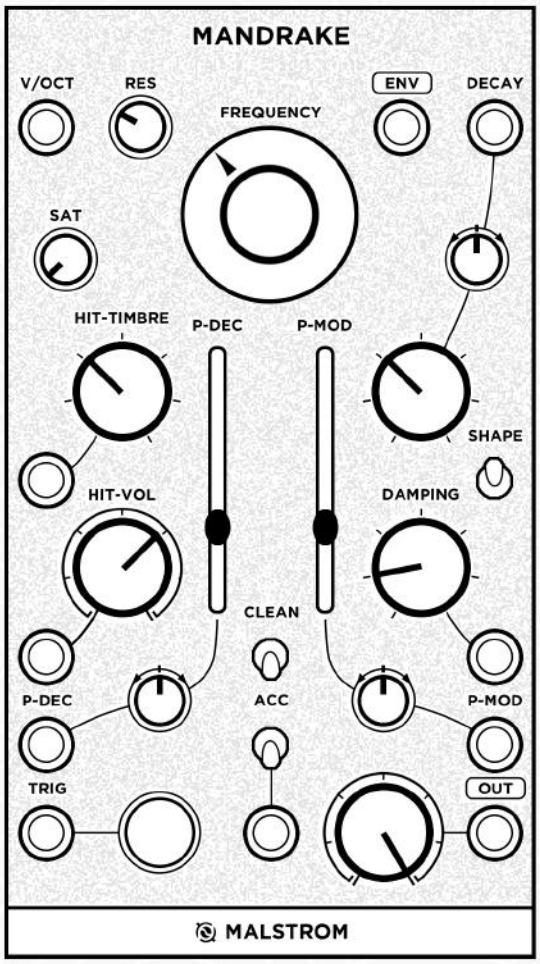
Tip: Increase Pitch Mod to add punch, and use Damping to remove or add harmonics.

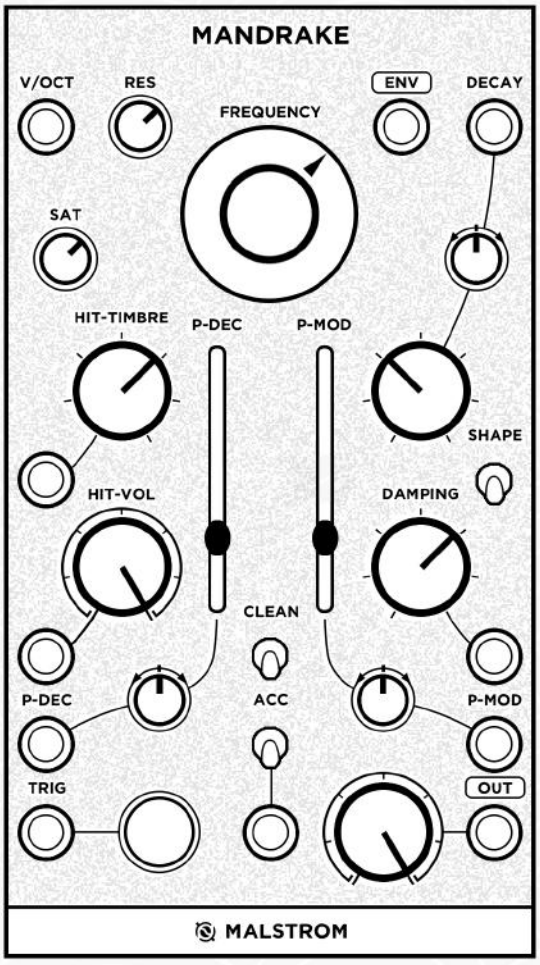
LOW AND THUMPY

The sound of this kick is characterized by its modest settings. It is all about getting that soft low thump.

Tip: Use the Shape switch to make it less low and more thumpy!

Tip: Increase the Decay to get an 808 style kick!





HIGH AND TIGHT

Most noticable with this kick is its higher frequency settings. And short Decay, which makes it sound really tight.

Tip: Use the Shape switch to add more body!

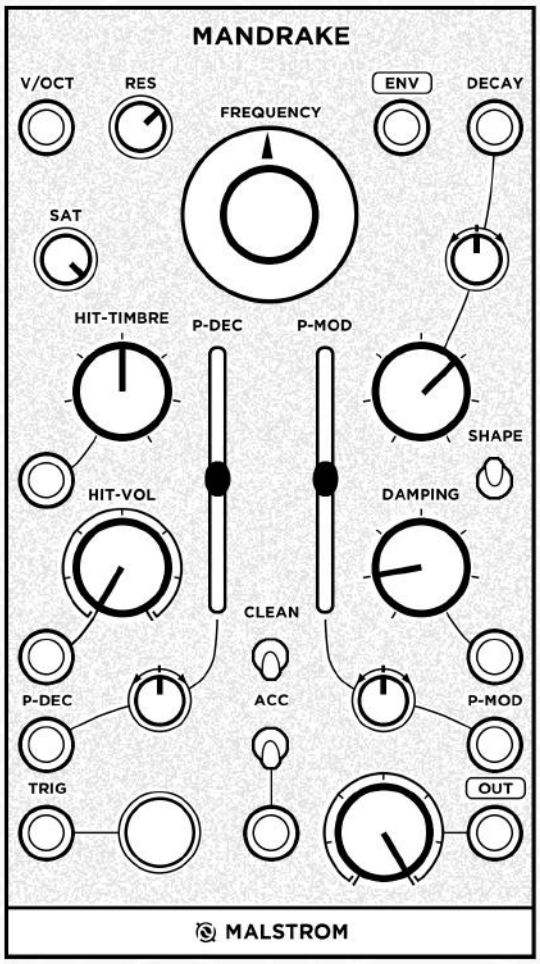
Tip: Increase Decay and Pitch Mod to get a nicely distorted kick drum!

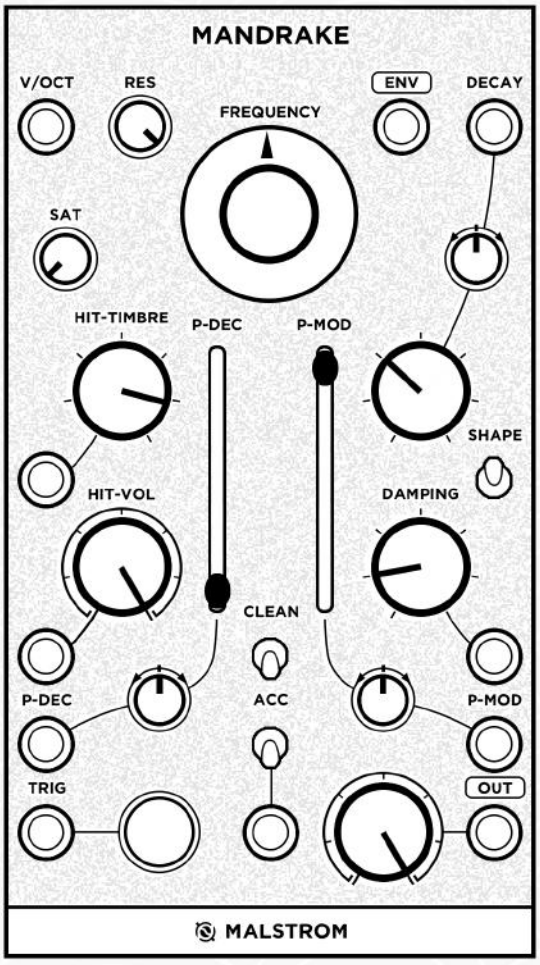
LONG AND MUFFLED

This sound does not make use of the “Hit” section and is meant to have long “muffled” sound.

Tip: Playing around with the Decay and Pitch Mod offer great variations during raves!

Tip: Combine this reference with Patch Example 2 on page 16 to shape the tail!





STOMPY AND TECHY

This kick shows that maximizing some parameters while minimizing others can create really nice kicks too! It also uses the Hit Timbre to create a “techy” sound!

Tip: Combine this reference with Patch Example 1 on page 15 to make it even more “techy”!

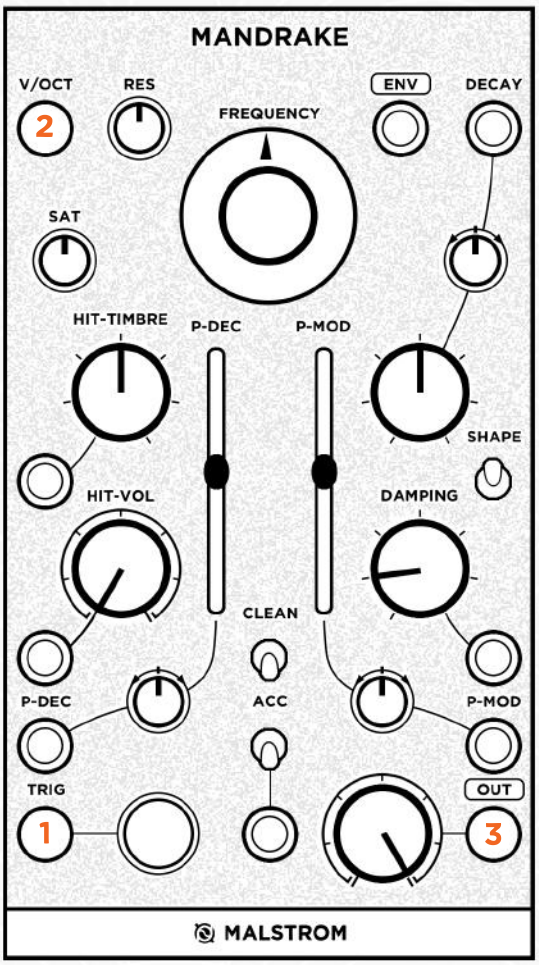
EXAMPLE 1: ADVANCED PITCH MODULATION

Mandrake's pitch parameters have been scaled to ensure detailed pitch sculpting, and sound preservation throughout its settings. Designing a Pitch Mod with wider range results in a lot of undetailed and unusable settings. However in some cases you may want to have snappier pitch modulation. Adding an envelope to the pitch modulation is a great solution to this. As mixing two envelopes offer sounds that are otherwise unattainable and it provides a lot of control! Preferably you would want to use an attenuator too!

Start off by copying the knob positions as shown in the example below. It is important that the envelope you use is short and snappy. Set all of the envelope's settings to zero.

PATCH

1. Patch the trigger to the envelope's trigger input using a mult.
2. Patch the envelope's output to Mandrake's V/Oct Input.
3. Patch the Output so you can listen.



NOTES

Start shaping by adding a bit of the envelope's sustain or gain. Then add some release/decay.

Because the envelope is short it is only affecting the start of the pitch modulation. While Mandrake's pitch controls shape the overall pitch modulation.

Tip: Continue by changing the envelope's attack to get even more complex results. Then increase Mandrake's Hit-Volume to add a first transient too!

EXAMPLE 2: SCULPTING THE KICK DRUM TAIL

This patch makes use of the Ducking Envelope Output to sculpt the kick drum tail. It does so by letting the Decay modulate itself in the form of a Ducking Envelope. Meaning that as the decay decreases; it gets boosted more and more (or less and less). Its effect is also similar to what can be done with a compressor. But in contrary to a compressor it does not mess with the transients. Making it more natural and easy to play around with. Standard settings are used here *(see page 21)*.

Start off by copying the knob positions as shown in the example below.

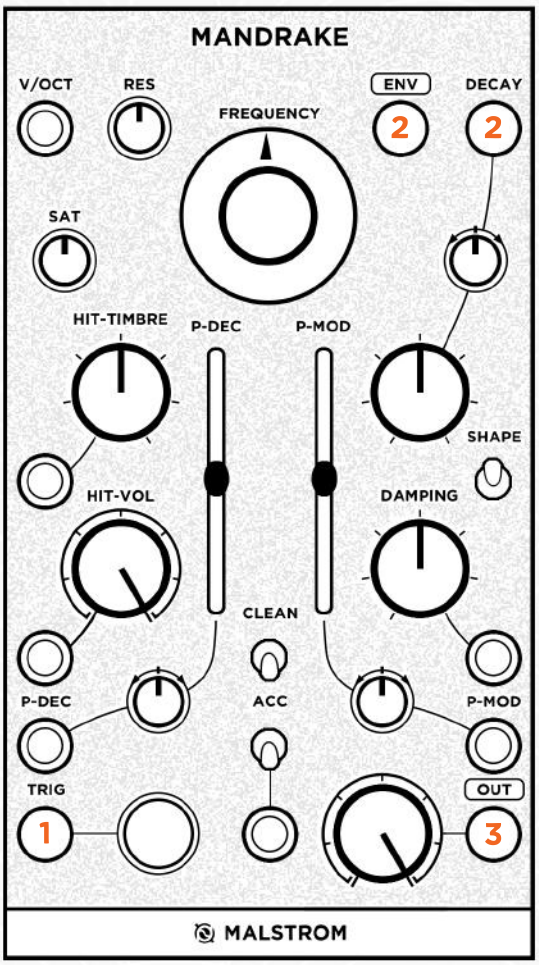
PATCH

1. Patch a trigger into the Trigger Input.
2. Patch the Envelope Output to the Decay CV Input
3. Patch the Output to listen.

NOTES

The Decay sets the initial decay while the Decay CV Attenuverter sets the tail amount.

Remember that as you increase the Decay, the tail will increase too.



Tip: Be careful though, set your tail too long and it can get in the way of your bassline!

Tip: Play around with different settings. Short Decay and high Decay CV Attenuverter settings create short kicks with long tails. Long Decay and low Decay CV Attenuverter settings create compressed kicks.

EXAMPLE 3: DISTORTED SAMPLE AND HOLD KICK DRUM

This patch shows a trick that uses the damping circuit to quickly move through frequencies. Which results in an effect that resembles a sample and hold with distortion and a filter.

Start off by copying the knob positions as shown in the example below. You will also need an audio rate oscillator, which you can optionally patch to an attenuator first.

PATCH

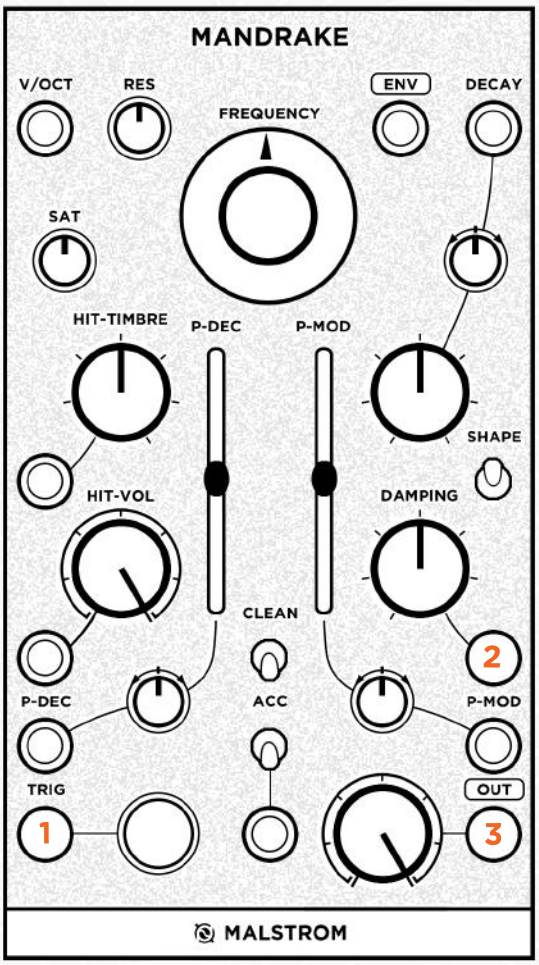
1. Patch a trigger into the Trigger Input.
2. Patch an oscillator at audio rate into the Damping CV Input.
3. Patch the Output to listen.

NOTES

The oscillator's frequency controls the sample and hold's sample rate.

The Damping Knob controls the timbre.

If you also patched an attenuator you can use the attenuator to control the amount of sample and hold effect.



Tip: Increase the Saturation to add more distortion. Increase the Resonance to get sharper tones.

Tip: Set the Resonance high and change the oscillator's frequency to get different vowel sounds!

Tip: Instead of using the Damping CV Input, try the Accent/CV Input for AM!

EXAMPLE 4: TOM TOMS

This patch shows how Mandrake can be used to make some tom toms. One element that may be counter intuitive is the use of the Pitch Decay to determine the pitch, instead of using the V/Oct Input. This is to make the Pitch Decay move slower as the pitch goes up, resulting in a more natural effect.

Start off by copying the knob positions as shown in the example below.

PATCH

1. Patch a trigger in the Trigger Input
2. Patch a voltage source (from a sequencer) in the Pitch Decay Input. And patch the same voltage source in the Decay Input with a stackable.
3. Patch the Output so you can listen.

NOTES

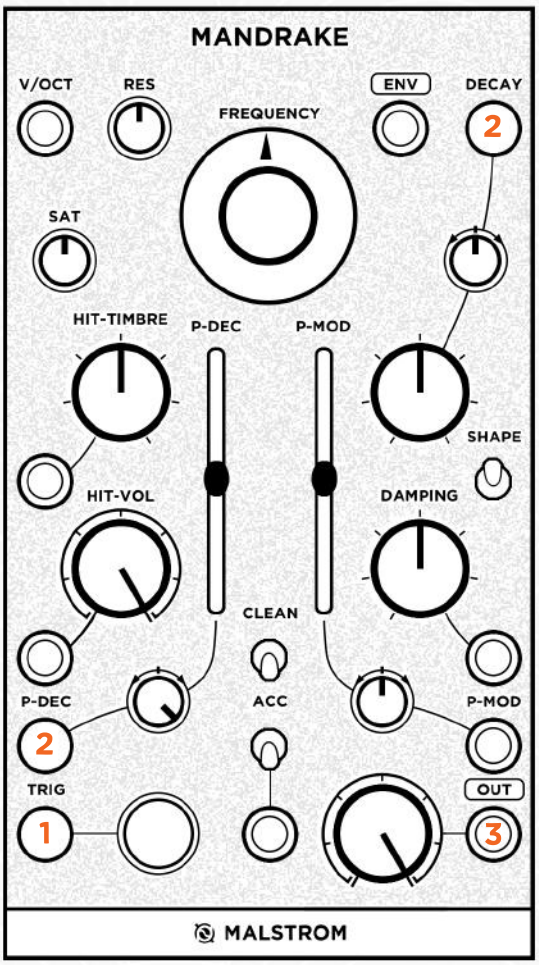
Make sure the voltage source sends a high voltage and start with the highest tom. Set its pitch with the Frequency knob.

Then add more toms by changing the voltage source output voltage.

Adjust the Pitch Decay CV Attenuverter to set the global pitch scale. The Frequency to set the main pitch.

Decrease the Decay CV Attenuverter to decrease the Decay when the high toms are hit.

Tip: Mix up the Pitch Decay and Pitch Decay CV Attenuverter settings to get new rhythms!



Tip: Patch the available stackable connection to the Pitch Mod Input. And increase the Pitch Mod CV Attenuverter a bit. Adding more punch when the high toms are hit!

EXAMPLE 5: BASS-SYNTH

Although not designed as such. Mandrake does make an excellent bass synth! This patch shows how to do so.

Start off by copying the knob positions as shown in the example below.

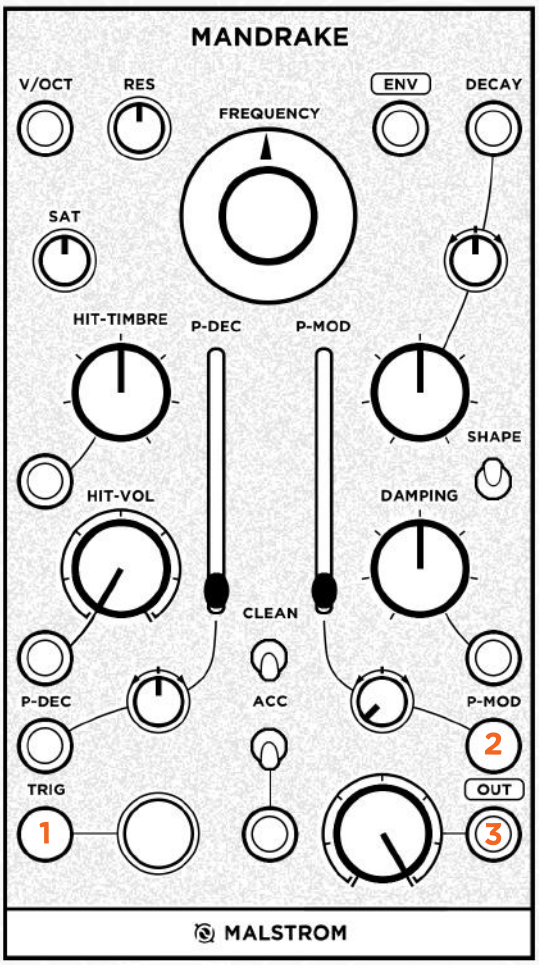
PATCH

1. Patch a trigger in the Trigger Input
2. Patch a voltage source (either +5V or -5V) in the Pitch Mod CV Input.
3. Patch the Output so you can listen.

NOTES

First we need to make sure that there is no pitch modulation. We do so by inserting a +5V voltage source in the Pitch Mod CV Input and decreasing the Pitch Mod CV Attenuverter.

Tip: Add v/oct to create a sequence and play around with increasing and decreasing the Pitch Mod!



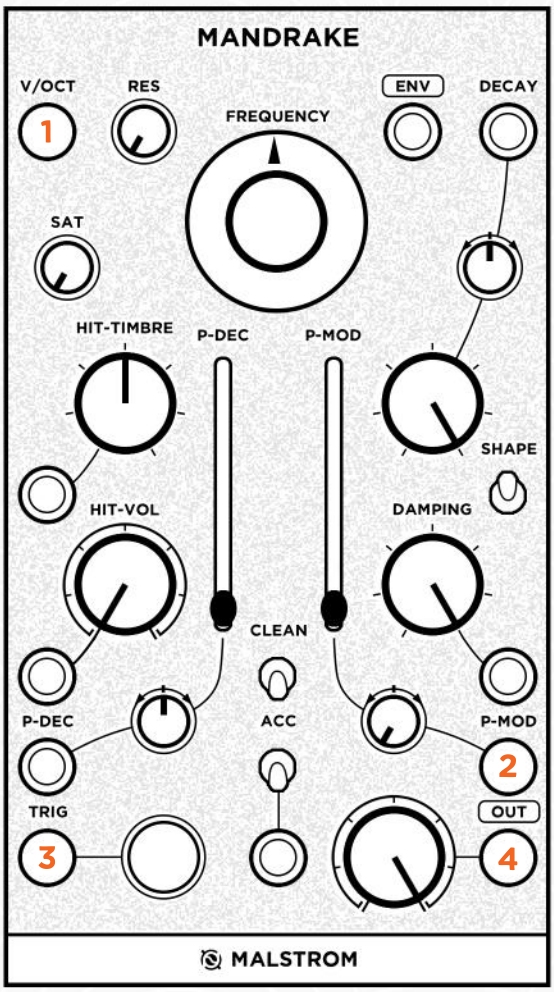
V/OCT CALIBRATION

The following instructions are needed to calibrate the v/oct scaling. However Mandrake comes calibrated, so only do this if you have the right tools and consider it necessary!

To calibrate you will need a +5V voltage source, a calibrated v/oct source, an oscillator, a digital tuner and a flathead screwdriver.

Locate the trimmer on the pcb indicated with V/OCT. Make sure you have access to it. Turn the power on and let the module warm up for approximately 20 minutes.

Go ahead and copy the knob positions in the example on the right. Make sure you have the P-Mod trimmer too!



1. Patch the v/oct source in the V/Oct Input.
2. Patch the +5V source in the P-Mod Input.
3. Patch the oscillator source in the trigger input.
4. Patch the Output to your digital tuner.

First adjust the external oscillator's frequency so you get a nice clean oscillation from Mandrake's output.

Set the pcb trimmer to about 3 o'clock, set v/oct source to D0 and tune the Frequency knob to A0.

Create a sequence going back and forth between D2 and D3. Mandrake should give A2 and A3 as output. Make sure that there is perfect tuning between them by adjusting the pcb trimmer. Go back to D0 on the v/oct source, if the A0 output is flat: the pcb trimmer needs to go higher. If the A0 is sharp: the pcb trimmer needs to go lower. Tune Frequency knob to A0 again and repeat these instructions.

CLEAN UP ADJUST

It is possible to increase or decrease the dip at 300Hz with a trimmer on the pcb. You can do this by locating the trimmer indicated as “CLEAN UP AMOUNT”. The middle position leaves the sound unaffected, CCW rotation increases the dip. CW rotation from the middle position boosts at 300Hz and is not recommended! Remember that adjusting this pcb trimmer only affects the 300Hz dip, the high-pass filter at 25Hz remains the same in every setting.

ENVELOPE OUTPUT

The envelope output can send either a normal envelope or a ducking envelope. You can change this by locating the switch indicated as “ENV TYPE”.

STANDARD SETTINGS

Standard factory settings are:

1. “V/OCT”: Calibrated starting from 03:00 position.
2. “CLEAN UP AMOUNT”: Small dip at approximately 04:00 position.
3. “ENV TYPE”: Ducking envelope.

I/O SPECS

- All inputs DC coupled.
- All inputs handle audio signals.
- All inputs have 100k input impedance.
- All inputs have +-10V Input range.
- All inputs are overvoltage protected.
- Trigger inputs trigger at 3.3V.
- Temperature compensated V/Oct Input.
- V/oct tracking of at least 4 octaves.
- Volume CV inputs expect 0-5V voltage range.
- Envelope Output 0-5V voltage range.
- Audio Output +-5V voltage range.
- Keyed power header and reverse power protection.

WARRANTY & SUPPORT

WARRANTY

We guarantee that all of our products are tested before shipping. However it may be that you are experiencing problems with a product. Do not worry we are here to help! Within one year after purchase, any damaged or malfunctioning products will be repaired, serviced and calibrated on a return-to-factory basis. However this service is only guaranteed if the damages are not caused during shipping, installation, incorrect usage or user inflicted damages.

Even after the one year warranty, or if the damages are caused by the before mentioned causes; we want to help you. Products will still be repaired but we reserve the right to charge you for labor, parts and transit expenses.

In any case we advise you to contact us about any issues!

SUPPORT

For any support head over to our support page: malstromaudio.com/support.

Or send us a mail at info@malstromaudio.com and we will get back to you as soon as possible.

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