

MAGIC ANALOG DEVICES



MADSOUNDFACTORY.COM



DROP by Mad Sound Factory

DROP by Mad Sound Factory

User manual, version 1.2D

Viacheslav Grigoryev

Lark Audio

Art Tadevosyan

Zvukofo

Translation by Daniel Tsalik

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You're not supposed to design instruments the way we made DROP—with a complete disregard for electrical design norms and traditions. But honestly, there are a lot of things you're not supposed to do, and life would be boring otherwise.

We let the natural properties of the components guide the design, shaping DROP into something that works despite, rather than because of, conventional engineering logic.

In doing so, DROP taps into experimental roots of electronic music—raw, organic, and live. it's not a sequencer, not a drum machine (at least in the modern sense), but a proper musical instrument: easy to grasp, hard to master.

Trying to pin DROP down with a single definition doesn't quite work. Is it a semi-modular groovebox? A drum module? A noise machine? A deranged electric orchestra trapped in a box? Yes. And also, no. It can go from pounding techno to lush ambient, shifting with every user's vision.

So—what will it become in your hands?

1. Box contents

- MSF DROP synthesizer – 1 pc.
- Patch cable set (25 cm) – 10 pcs.
- Patch cable (60 cm) – 1 pc.
- USB Type-A to USB Type-C power cable – 1 pc.
- Mounting screws pack – 1 pc.
- MSF DROP Poster & patch map – 1 pc.
- Sticker – 1 pc.



2. First steps

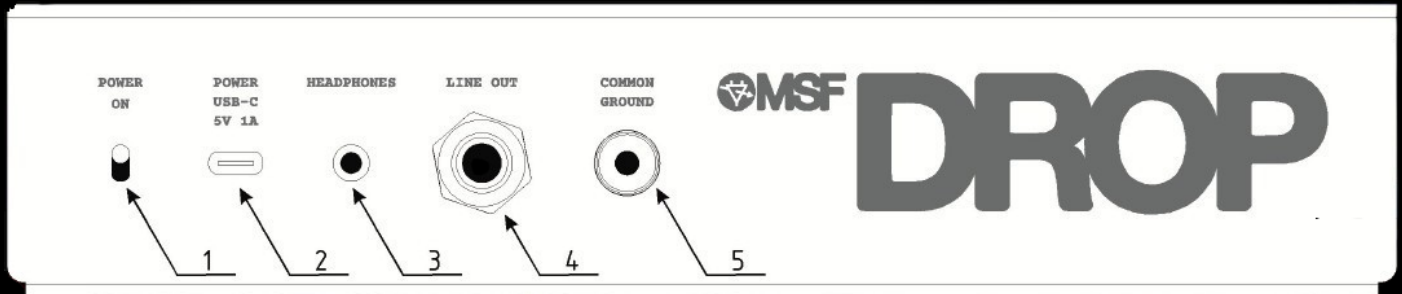
Check the following:

- Packaging integrity
- Completeness of the kit
- Synthesizer functionality



We recommend reading this manual before using the MSF DROP—you'll learn how the instrument works and get familiar with its interface.

3. Connection



1. **POWER ON** – Power switch
2. **POWER USB-C** – 5V 1A power input
3. **HEADPHONES** – 1/8" (3.5mm) headphone output
4. **LINE OUT** – 1/4" (6.35mm) line output
5. **COMMON GROUND** – Ground connection for use with modular systems

Important: MSF DROP features a headphone amplifier built with germanium transistors. To prevent overheating or damage, **do not** connect anything other than TRS-equipped headphones to the **HEADPHONES** output.

Powering DROP

DROP can be powered from any USB source:

- A 5V 1A USB power adapter (e.g., a phone charger)
- A computer or laptop USB port
- A power bank

Make sure the power source provides sufficient current for stable operation.



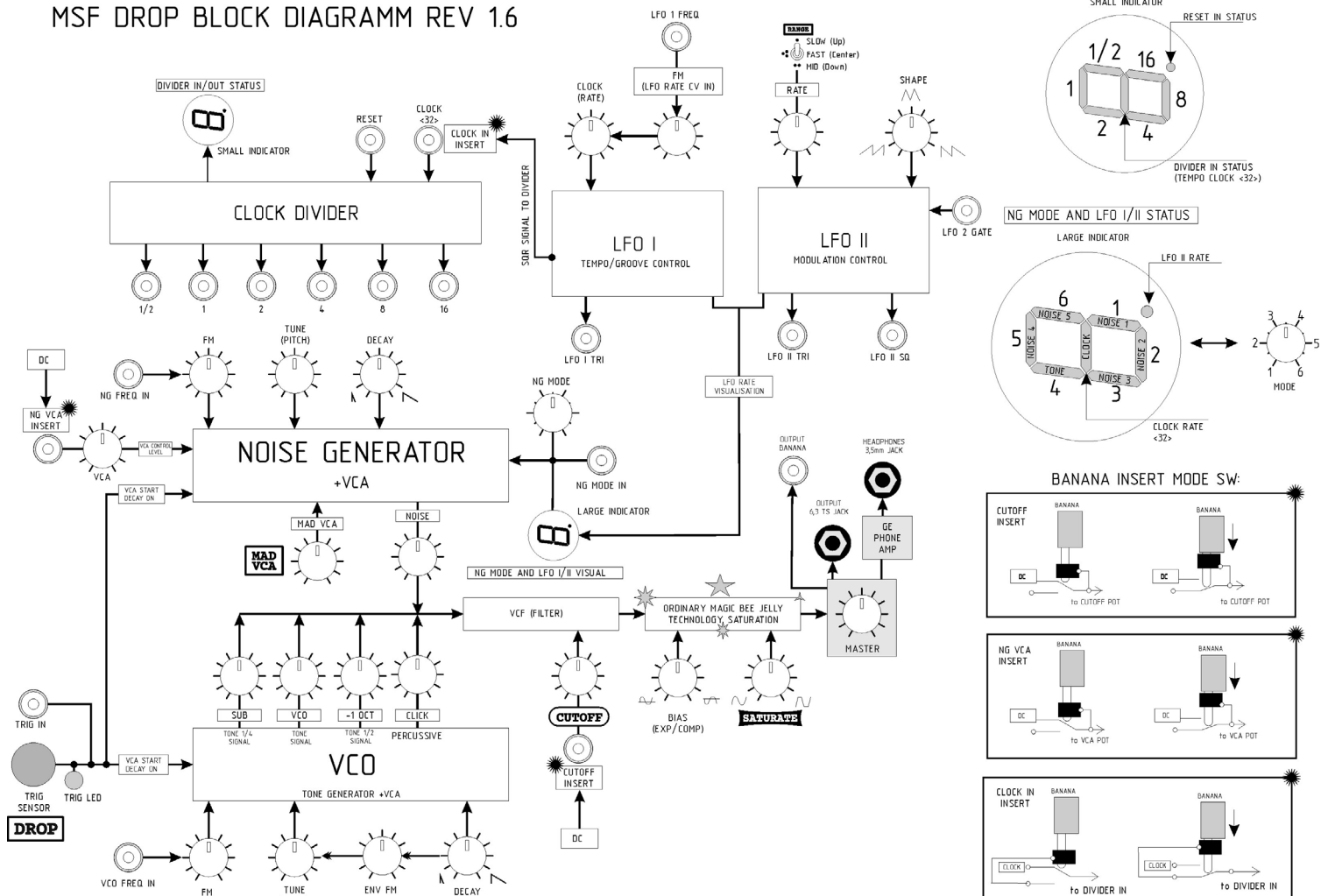
4. Architecture

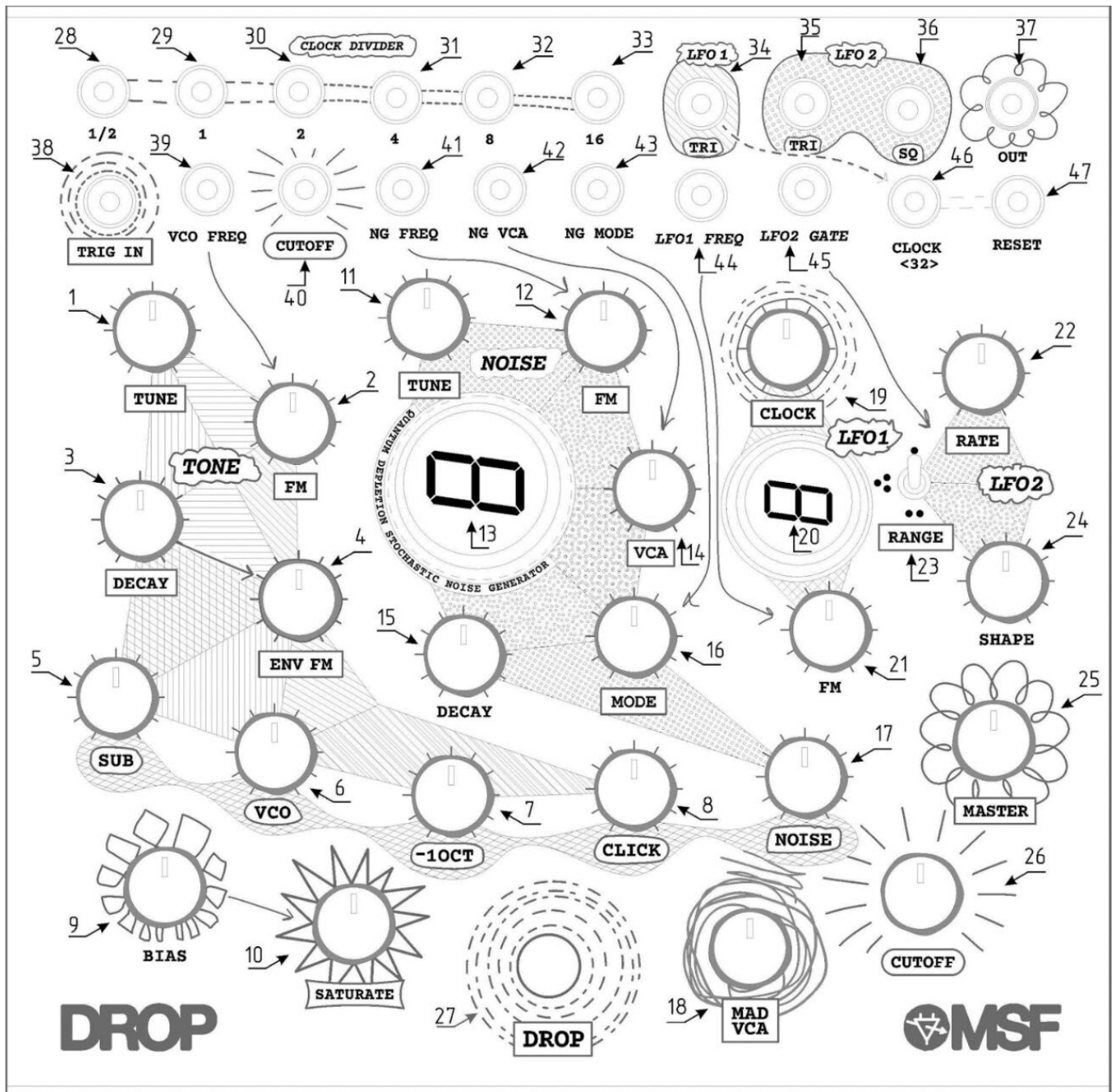
DROP consists of several modules:

- **VCO** – Tone generator
- **NG** – Noise generator
- **CLOCK DIVIDER**
- **LFO I** – Clock generator
- **LFO II**
- **LPF** – Low-pass filter
- **SATURATOR** – Ordinary Magic unit
- **OUTPUT** – Output stage
- **DROP** – VCO & NG trigger sensor

All modules have **banana jack** inputs and outputs. The **top row** contains outputs, while the **bottom row** contains inputs.

MSF DROP BLOCK DIAGRAM REV 1.6





VCO (Voltage-Controlled Oscillator)

1. **TUNE** – Main oscillator frequency
2. **FM** – Depth of frequency modulation from the control signal applied to the **VCO FREQ** input (39)
3. **DECAY** – Controls signal decay/duration (amplitude envelope)
4. **ENV FM** – Envelope-controlled frequency modulation depth
5. **SUB** – Sub signal level, two octaves below the main tone
6. **VCO** – Main oscillator signal level
7. **-1 OCT** – Signal level one octave below the main tone
8. **CLICK** – Level of short percussive click

ORDINARY MAGIC BEE JELLY TECHNOLOGY SATURATION by Zvukofor Sound Lab

9. **BIAS** – Alters the character of signal distortion:

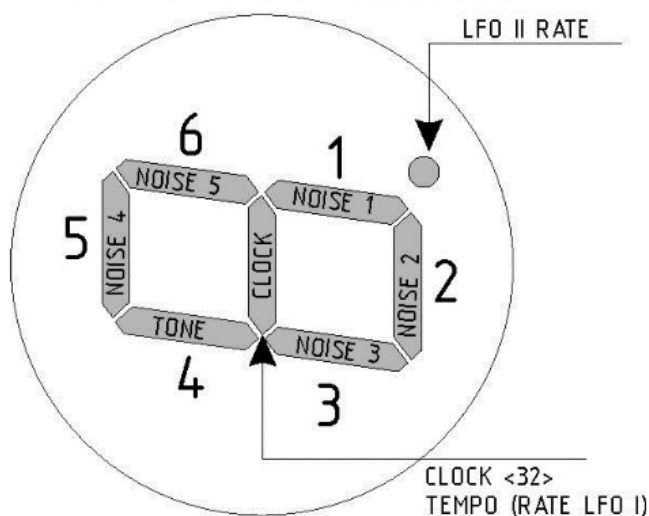
Full left – Amplitude clipping applies to the lower half-wave

Full right – Amplitude clipping applies to the upper half-wave

Center – Symmetrical distortion of both wave halves

10. **SATURATE** – Controls the intensity of this distortion.

NG MODE STATUS



NOISE GENERATOR (NG)

11. **TUNE** – Main oscillator frequency of the noise generator

12. **FM** – Depth of frequency modulation of the generator from the control signal applied to the **NG FREQ** input (41)

13. **Display** – Displays the mode of operation and the frequency of the LFO generators

14. **VCA** – Controls the signal level sent from NG to the main sound path. The output signal level from NG can also be controlled by an external signal connected to the **NG VCA** input (42).

15. **DECAY** – Controls signal decay/duration (amplitude envelope)

16. **MODE** – Switches between the 6 operating modes of the noise generator

17. **NOISE** – Volume of the noise generator signal

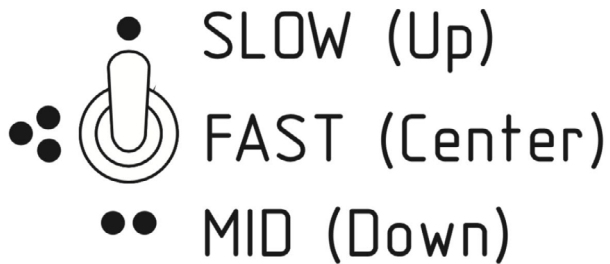
18. **MAD VCA** – Adjusts the depth of distortion in the noise generator

LFO I (TEMPO CLOCK GENERATOR)

19. **CLOCK** – Frequency of the main LFO I generator

20. **Display** – Shows the status of the DIVIDER module (see the MSF DROP block diagram)

21. **FM** – Depth of frequency modulation from the control signal applied to the **LFO I FREQ** input (44)



LFO II

22. **RATE** – Frequency of the LFO II generator

23. **RANGE** – Toggle switch for selecting the frequency range of the LFO II generator, with three positions (**fig. on the left**)

24. **SHAPE** – Alters the waveform of the output signal. On the **SQUARE** output (36), it changes the pulse width. On the **TRIANGLE** output (35), it adjusts the slope of the triangular waveform.

MASTER SECTION

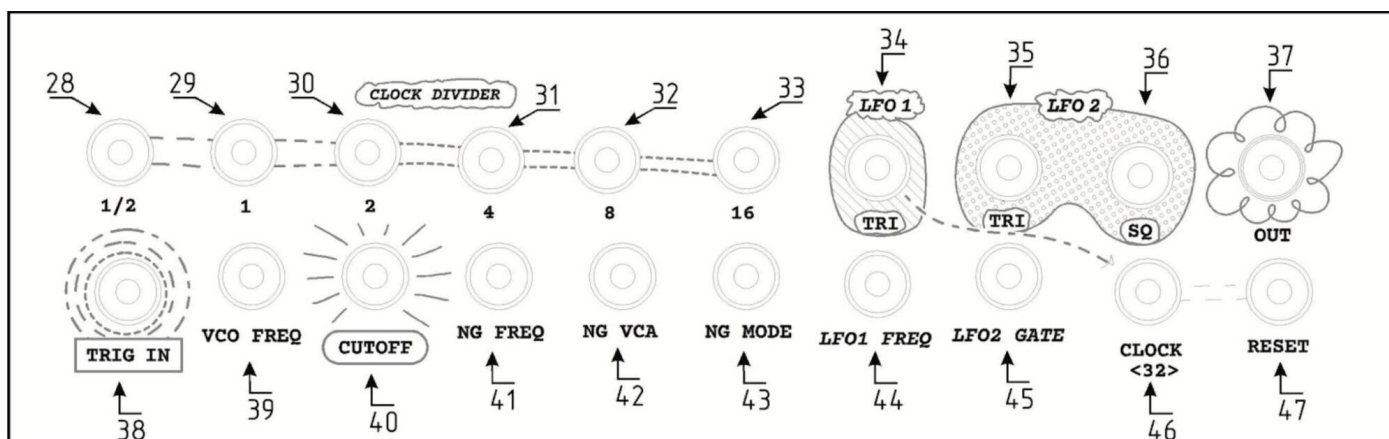
25. **MASTER** – Overall volume of the synthesizer's output signal

VCF (VOLTAGE CONTROL FILTER)

26. **CUTOFF** – Controls the filter's cutoff frequency. When a control signal is applied to the **CUTOFF** input (40), the knob determines the modulation depth of the filter by the input signal.

OTHER

27. **DROP** – Touch sensor that triggers the envelope generators of the **VCO** and **NG** modules. Holding it down stops the trigger signal sent to the **TRIG IN** input (38).



28–33. **Clock Divider** output jacks (from 1/16 to 1/2)

34. **LFO I TRI** – LFO I generator output, triangular waveform

35. **LFO II TRI** – LFO II generator output, triangular waveform

36. **LFO II SQ** – LFO II generator output, square waveform

37. **OUT** – Line output, duplicates the **LINE OUT** jack (4) on the back panel

38. **TRIG IN** – Input for triggering VCO and NG

39. **VCO FREQ** – Input for external control of the VCO frequency

40. **CUTOFF** – Input for controlling the VCF cutoff frequency. To activate external control, fully insert a banana plug into the jack (internal switch, see block diagram).

41. **NG FREQ** – Input for external control of the noise generator frequency

42. **NG VCA** – Input for external control of the noise generator volume (VCA opening). Full insertion of a banana plug activates external control (internal switch, see block diagram).

43. **NG MODE** – Input for external switching of the noise generator mode. Switching behavior is adjusted using the **MODE** knob (16).

44. **LFO I FREQ** – Input for external control of LFO I frequency

45. **LFO II GATE** – Synchronization/locking input for LFO II. Applying a signal stops LFO II.

46. **CLOCK** – Combined jack serving as both the output of LFO I and the input of the **CLOCK DIVIDER** module. To connect an external sync signal, fully insert a banana plug (internal switch, see block diagram). To use the output signal from **LFO I** on other modules, insert the banana plug partially (see block diagram).

47. **RESET** – Reset input for the **CLOCK DIVIDER** module. A short pulse resets all outputs to **0** and restarts the count. A sustained signal blocks the **CLOCK DIVIDER** operation.

5. Details

The VCO and NG are triggered simultaneously in two ways: either by sending a signal to the **TRIG IN** jack (38) or by touching the **DROP** sensor (27). The presence of a trigger signal—whether from the sensor or **TRIG IN**—is indicated by the sensor's LED backlight.

The trigger signal is sent to identical envelope generators for VCO and NG, both of which are controlled by **DECAY** (3 and 15). The **DECAY** knob determines the duration of the signal decay.

Additionally, **DECAY** (3) for the VCO also affects the pitch of the oscillator. The depth of this effect is controlled by the **ENV FM** knob (4).

*Keep in mind that you can use **finger patching** aside from using cables; your body is also a conductor of electricity.*

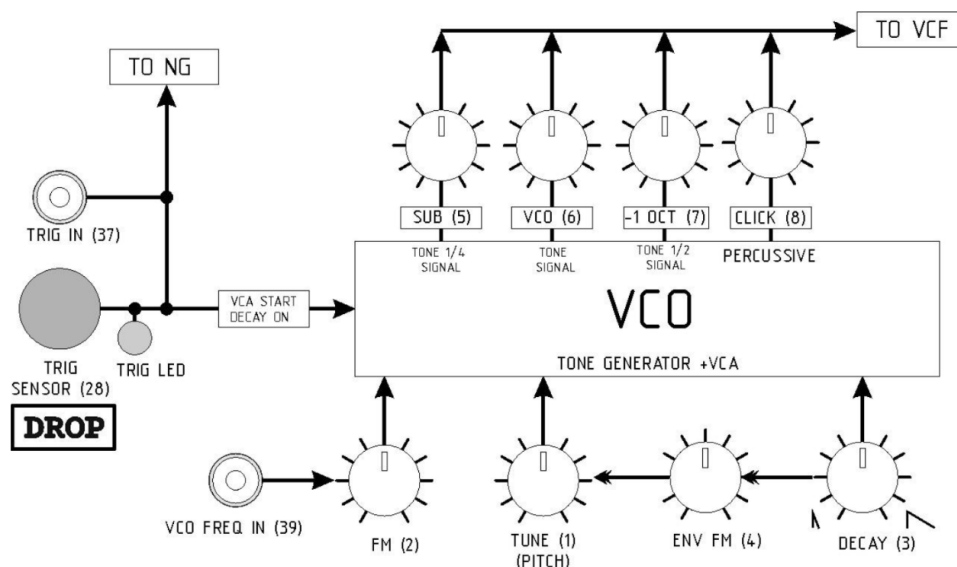
VCO

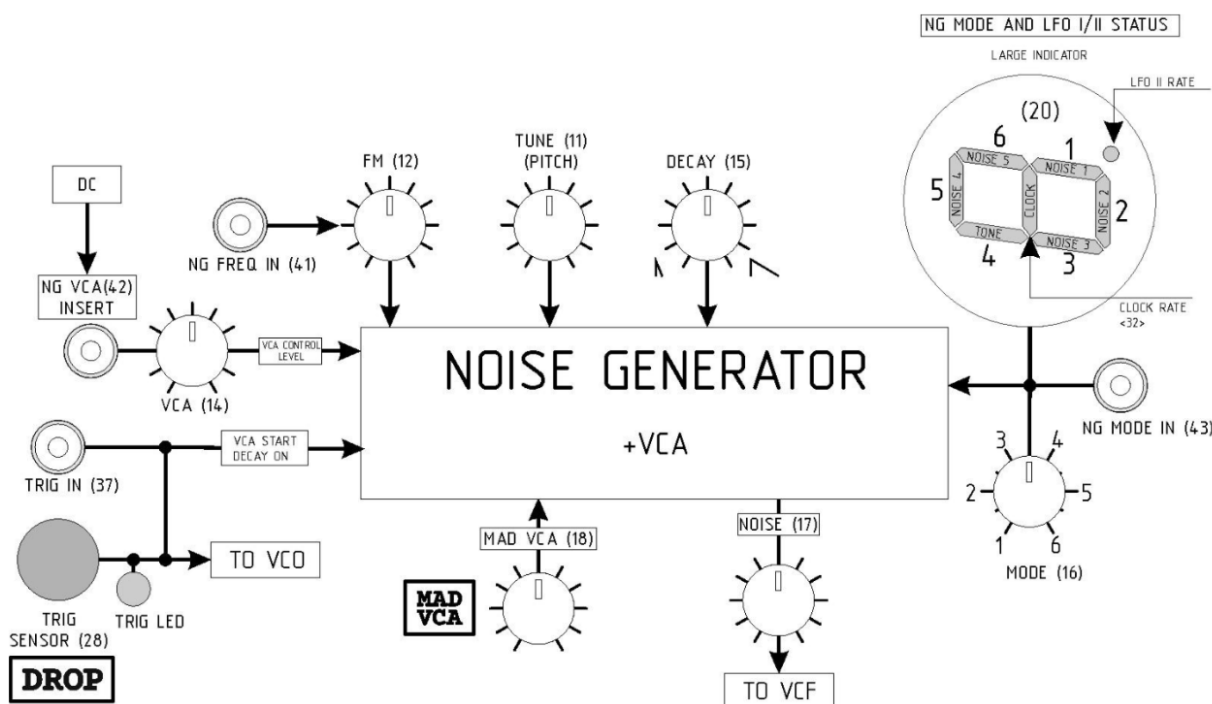
The **TUNE** knob (1) sets the base frequency of the oscillator.

The VCO's frequency can also be controlled by sending a CV signal to the **VCO FREQ** input (39). The **FM** knob (2) adjusts the depth of frequency modulation from an external source.

The VCO produces four signals, each with independent level control:

- **VCO** – the main oscillator tone
- **-1 OCT** – one octave below the main tone
- **SUB** – two octaves below the main tone
- **CLICK** – a short percussive click at the moment of triggering.





The **TUNE** knob (11) sets the main frequency spectrum of the noise generator. The NG's frequency can also be controlled by sending a CV signal to the **NG FREQ** input (41). The **FM** knob (12) adjusts the depth of frequency modulation from an external source.

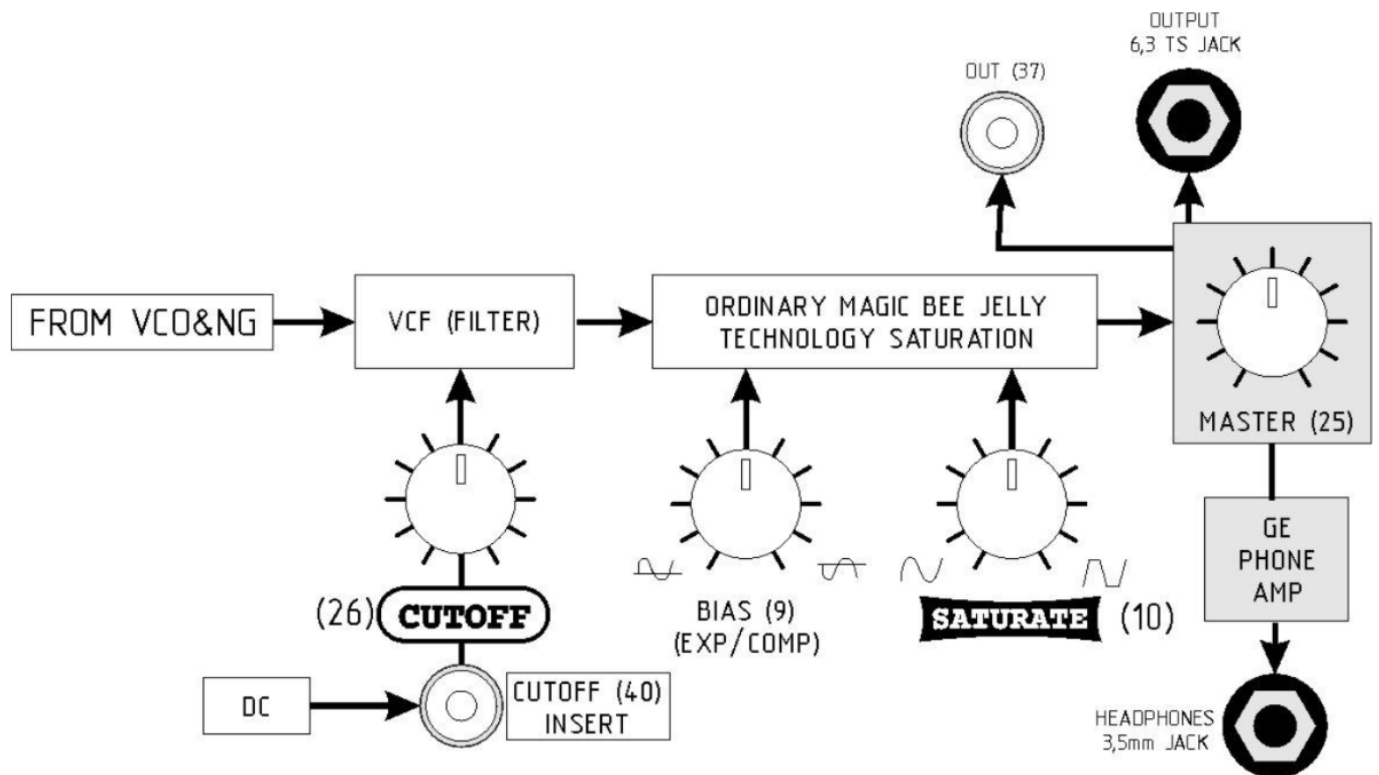
Unlike the VCO, the NG features additional output signal control. The **VCA** knob (14) controls the level of the noise generator's signal sent to the overall audio path. The output level can also be modulated by an external source connected to the **NG VCA** input (42). When an external source is connected, the **VCA** knob sets the desired modulation depth for the NG's output level. The signal sent to the **NG VCA** input is independent of the noise generator's envelope section.

The **MODE** knob (16) switches between six noise generator modes, displayed on the screen (see block diagram).

- Modes **1/3/5** produce different spectral compositions of noise.
- Modes **2/6** behave unpredictably depending on the generator's spectrum and the **MAD VCA** (18) knob setting.
- Mode **4** produces a tonal signal.

The NG has a single signal output, with its level controlled by the **NOISE** knob (17). After all signals are summed in the mixer section (**SUB**, **VCO**, **-1 OCT**, **CLICK**, **NOISE**), the combined output is sent to the **VCF**.

VCF, ZVUKOFOR ORDINARY MAGIC, (GERMANIUM) GE HEADPHONE AMP



VCF (Voltage Control Filter)

The VCF is a **low-pass filter (LPF)** with a soft resonance peak. It is controlled by the **CUTOFF** knob (26). When a CV signal is sent to the **CUTOFF** input (40), the knob determines the modulation range of the filter by the incoming CV signal. After filtering, the signal passes into the **ORDINARY MAGIC BY ZVUKOFOR SOUND LABS** module.

ORDINARY MAGIC BY ZVUKOFOR SOUND LABS

This module has only two controls:

- **BIAS** (9) – Alters the signal waveform distortion. In the far-left position, amplitude clipping is applied to the lower half-wave; in the far-right position, it affects the upper half-wave. In the center, distortion is symmetrical for both waveforms. Adjusting **BIAS** also affects transient response, allowing a smooth transition from soft to sharp attack.
- **SATURATE** (10) – Controls the intensity of signal distortion.

After passing through **ORDINARY MAGIC**, the signal reaches the **Master Section**, where it is distributed to **LINE OUT** (rear panel), **BANANA OUT** (37), and **GE HEADPHONES AMP**.

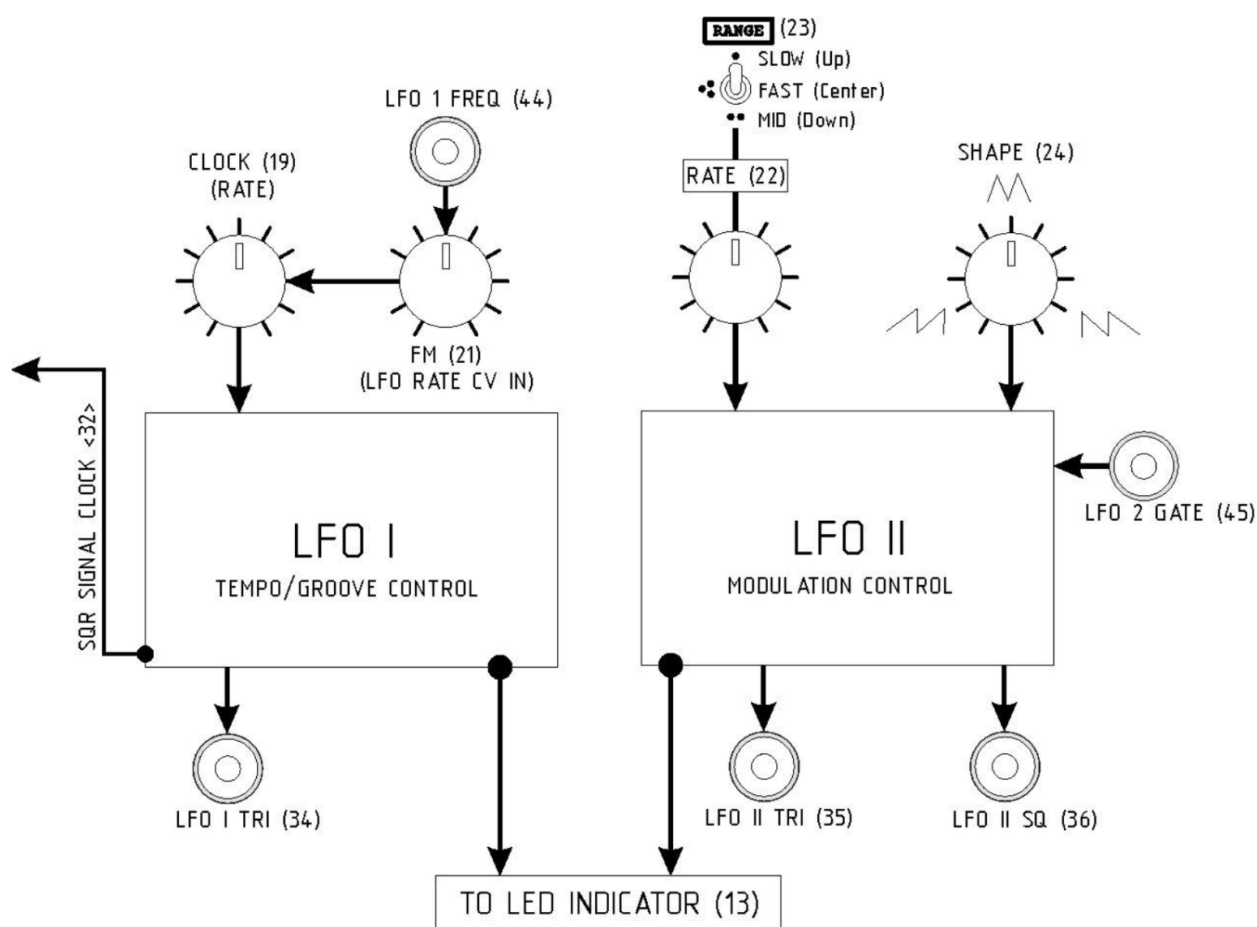
The **MASTER** knob (25) controls the final output level.

GE HEADPHONES AMP

A dedicated amplifier for low-impedance (32Ω) headphones, built with NOS germanium transistors in a **Class AB push-pull** circuit.

 **To prevent overheating and transistor failure, only connect TRS-equipped headphones to the HEADPHONES output!**

LFO I & II



LFO I (CLOCK GENERATOR)

LFO I is designed by the developers as a "tempo-setting" clock generator, working in conjunction with the **CLOCK DIVIDER**. The signal from **LFO I** is fed directly into the **CLOCK DIVIDER** input. The insertion point is the **CLOCK 32 (46)** connector.

If you need to retrieve a square wave signal from the **LFO I** generator, insert the banana plug into the **CLOCK 32 (46)** socket but not all the way (see the block diagram). A triangle wave signal can be obtained from the **LFO I TRI (34)** connector. **LFO I** has a CV input **LFO I FREQ (44)** for controlling the oscillator speed from an external source. The depth of modulation on the oscillator speed is adjusted with the **FM (21)** knob.

The **CLOCK (19)** knob sets the operating frequency of the generator.

LFO II

Designed by the developers as an additional module for modulating various parameters. Through mode switching, it has a frequency range from 0.1 Hz to 1 kHz.

The **RATE** (22) knob sets the operating frequency of the generator.

The **RANGE** switch (23) determines the speed range of the generator.

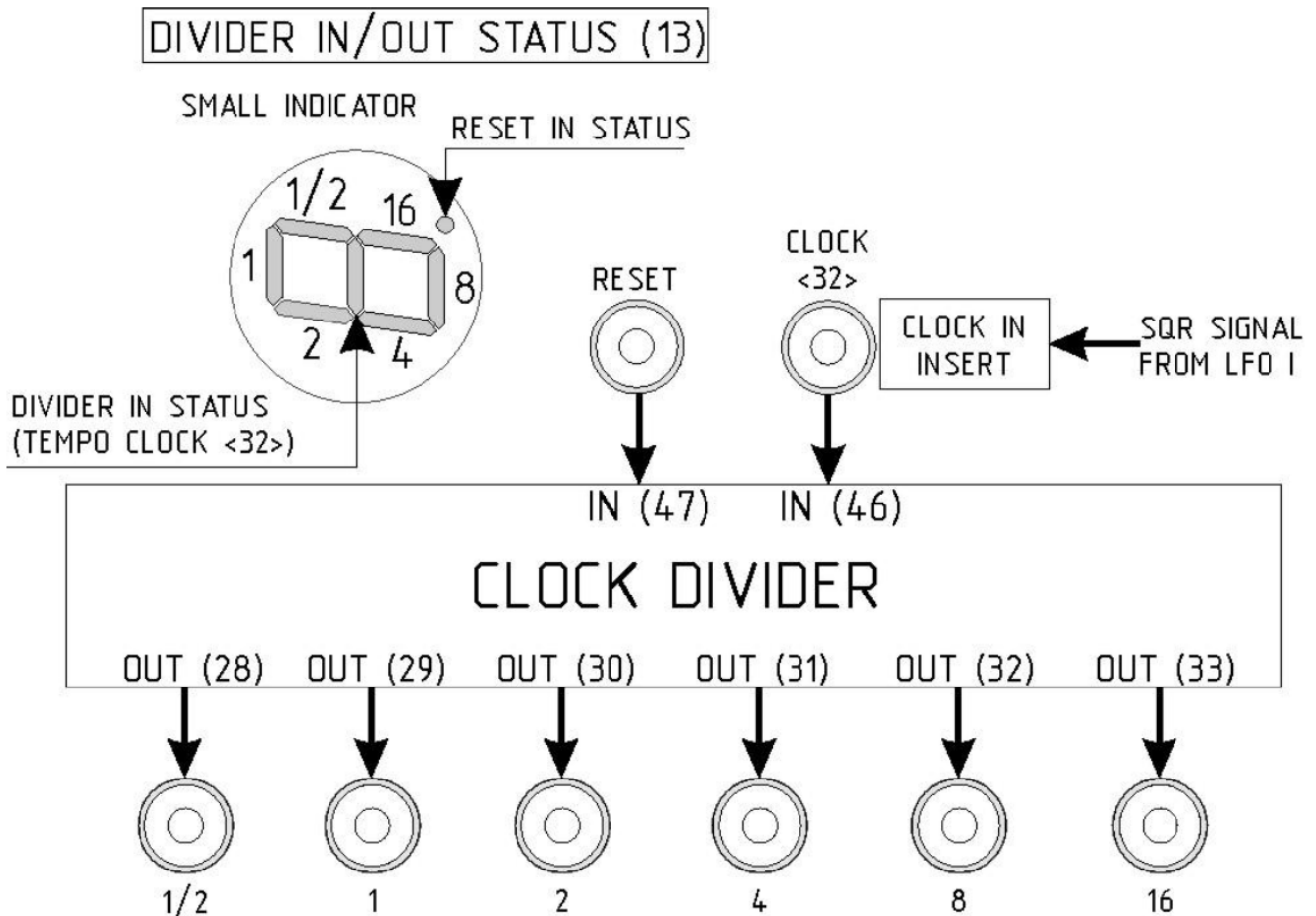
The **LFO GATE** input (45) is used for synchronizing/locking the operation of **LFO II**.

When a signal is applied to the connector, it stops the operation of **LFO II**. This allows for partial tempo synchronization from other clock sources.

LFO II has two outputs with different waveform shapes: triangle (**TRI** (35)) and square (**SQ** (36)).

The **SHAPE** knob (24) alters the shape of the output signal. At the **SQ** output (36), the duty cycle of the pulses is modified. At the **TRI** output (35), the slope of the "shelf" of the triangle wave is adjusted.

CLOCK DIVIDER

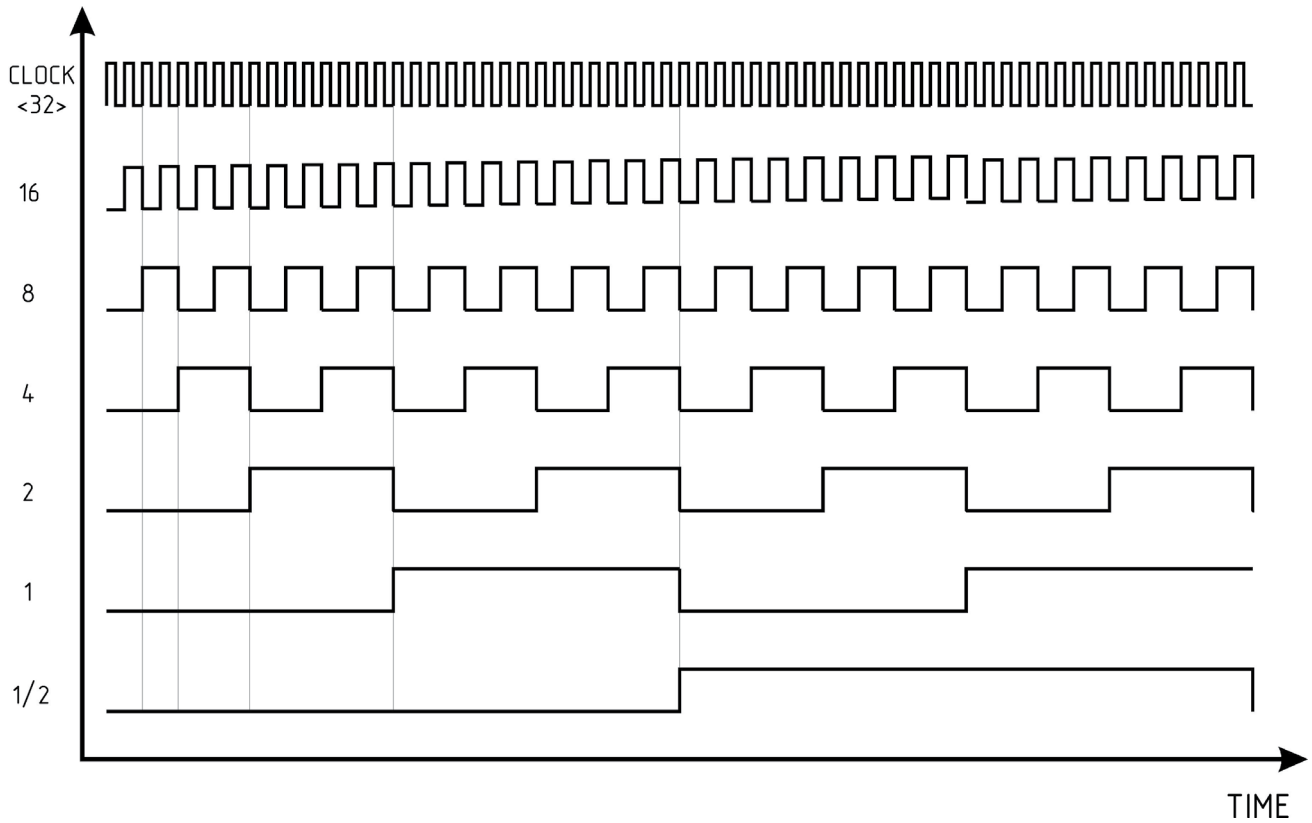


Designed for "dividing" the incoming clock signal to create more complex rhythmic structures.

It has two inputs: **CLOCK <32>** and **RESET**. By default, the **CLOCK <32>** input receives a clock signal from **LFO I**. If synchronization with an external signal source is required, insert a banana cable fully into the **CLOCK <32>** jack (see block diagram). This disconnects **LFO I** from the **DIVIDER** input, allowing it to read pulses from the **CLOCK <32>** jack instead.

When a signal is applied to the **RESET** input (47), the **DIVIDER** stops counting and resets to zero. It will not restart until the **RESET** input no longer receives a high-level signal.

The operation of the **CLOCK DIVIDER** is visually indicated on the display (13) (see block diagram above).



The signal at the $\frac{1}{2}$ jack has the lowest pulse frequency. The signal at the CLOCK <32> jack (DIVIDER input) has the highest pulse frequency.

6. Technical

Dimensions: 230×230×71mm (+/-1mm)

Weight: 2kg

Power Supply: 5V 1A, USB Type-C connection

Power Consumption: up to 5W

MSF DROP is not intended for use in humid environments or at ambient temperatures below +5°C or above +45°C.

Avoid applying excessive force when connecting cables or using the controls.

Do not drop the device or expose it to water or other liquids.

Clock divider

Division ratio	Jack
1	CLOCK <32> (input)
1/2	16
1/4	8
1/8	4
1/16	2
1/32	1
1/64	1/2

Number of Outputs: 6

Number of Inputs: 2

Output Signal Type: Square wave, 50% duty cycle, 11V amplitude

Impedance of Each **DIVIDER** Output: 350Ω (+/-5%)

RESET Signal Threshold: Minimum 4.5V

External **CLOCK** Synchronization Signal: Minimum 2.3V (recommended level: 2.5V or higher)

LFO I & II

LFO I CLOCK:

Minimum frequency: 5.8 Hz (+/-5%)

Maximum frequency: 240 Hz (+/-5%)

Number of output signals: 2

LFO I TRI output: Triangle wave, Amplitude 6V, Output impedance 350 Ω (+/-5%)

Signal at **CLOCK** <32> connector: Square wave, Amplitude 7.5V, Output impedance 2.7 k Ω

Voltage range of the signal at **LFO I FREQ** input: 2.5V – 11V.

LFO II:

RANGE switch position	Adjustment range
Up	<2 Hz – 9 Hz (+/-10 %)
Down	4,5 Hz – 95 Hz (+/-10 %)
Center	51 Hz – 980 Hz (+/-10 %)

Number of output signals: 2

LFO II TRI output: Triangle wave, Amplitude 7.2V, Output impedance 1 k Ω (+/-5%)

LFO II SQ output: Square wave, Amplitude 10V, Output impedance 220 Ω (+/-5%)

Minimum trigger signal for **LFO GATE**: 2.5V

Pulse width/slope adjustment range: 5 – 95% (+/-15%, depending on frequency).

Audio output

Audio Output (6.3mm Jack): Mono, unbalanced

- Maximum undistorted output level: 3.4V RMS (12.8 dBu)
- Output impedance: 330 Ω (+/-5%)

Audio Output ("BANANA"): Mono, unbalanced

- Maximum undistorted output level: 3.4V RMS (12.8 dBu)
- Output impedance: 330 Ω (+/-5%)

Headphone Output:

- Dual mono
- Minimum headphone impedance: 32 Ω
- Output level: >3 dBu per channel

Input signal range

Jack	Input signal range	Note
TRIG IN	2,5 – 11 V	-
VCO FREQ	2,5 – 11 V	The amount of modulation is adjusted using the FM knob
CUTOFF	2,5 – 11 V	The modulation range is adjusted using the CUTOFF knob
NG FREQ	2,5 – 11 V	The modulation depth is adjusted using the FM knob
NG VCA	2,5 – 11 V	The modulation depth is adjusted using the VCA knob
NG MODE	2,5 – 11 V	The modulation range is adjusted using the MODE knob
LFO I FREQ	2,5 – 11 V	The modulation depth is adjusted using the FM knob
LFO II GATE	2,5 – 11 V	-
CLOCK <32>	2,3 – 11 V	To disable the internal CLOCK generator, insert the "banana" connector fully.
RESET	4,5 – 11 V	-

7. Appendix

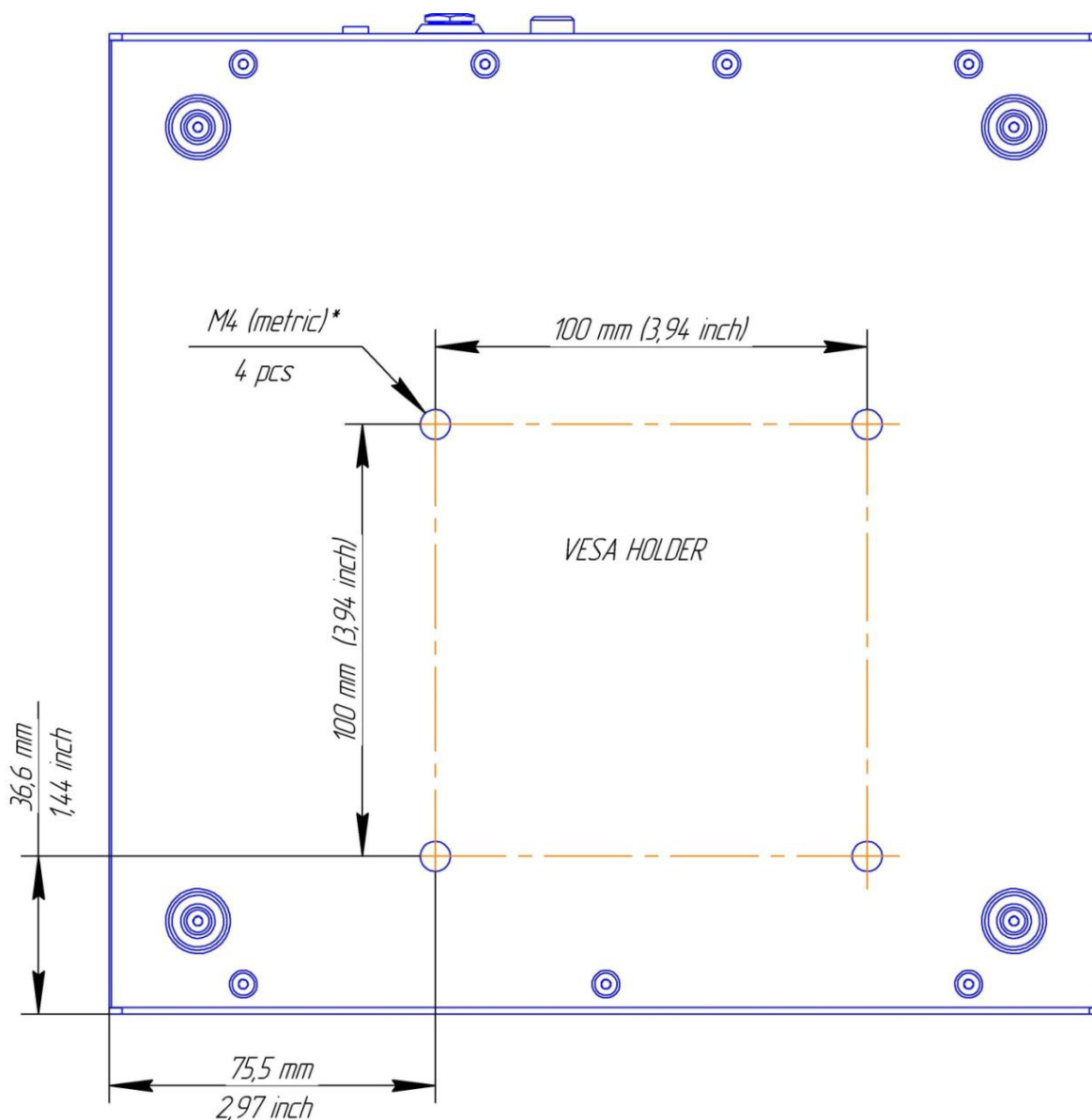
To the MSF DROP User Manual

VESA

The MSF DROP package includes additional screws:

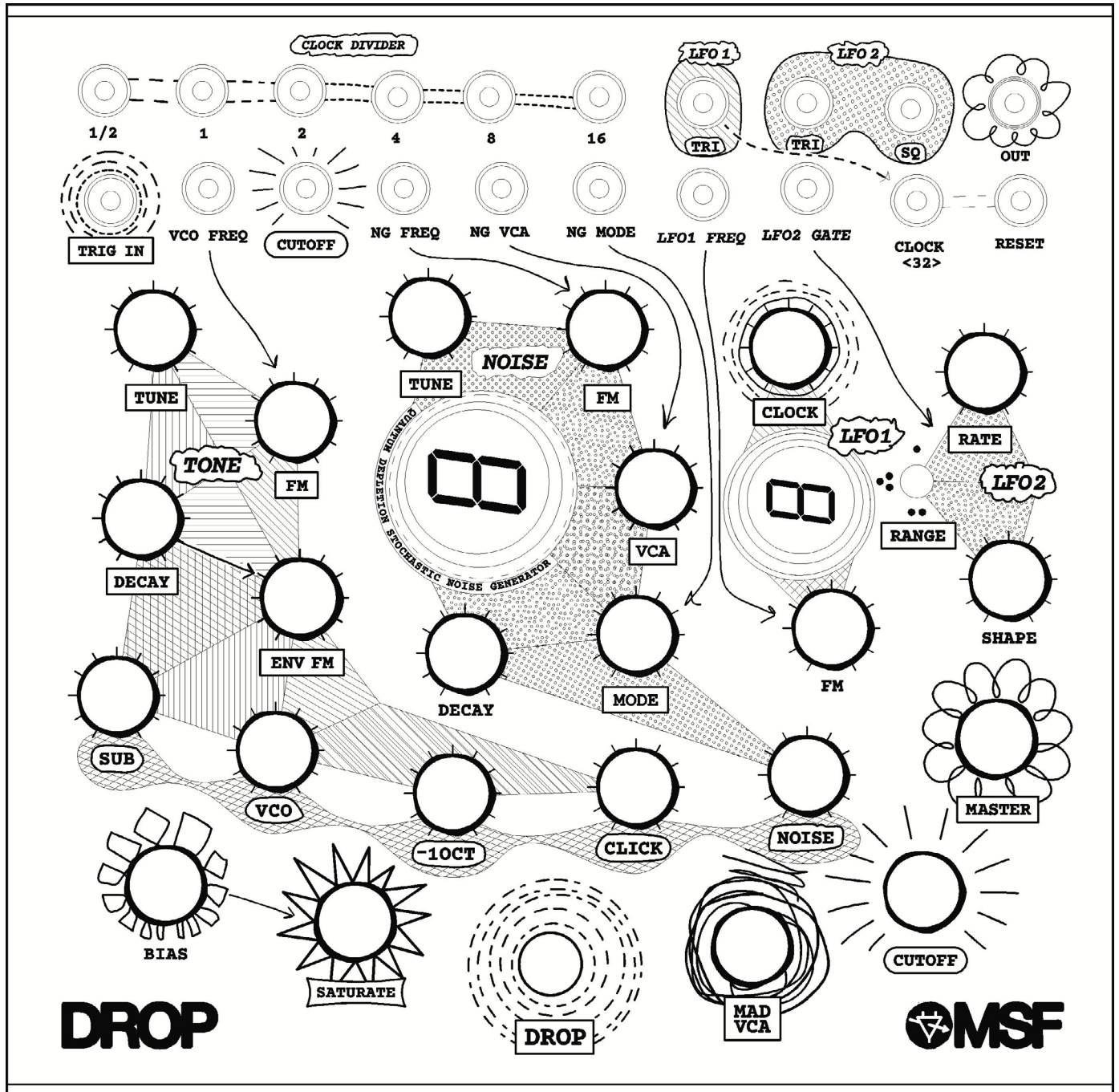
- M4x10mm (4 pcs) for mounting on a holder or stand with a "VESA" attachment
- M3x8mm (4 pcs) for attaching thin side panels (2-4mm thickness)
- M3x16mm (4 pcs) for attaching thick side panels (8-10mm thickness)

Fig. 1: Placement of VESA Mounting Holes



*We recommend using the included M4x10 screws. Do not use screws longer than 10mm.

PRESET MAP



PRESET NAME: _____

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MAD SOUND FACTORY

0052, Armenia, Yerevan, Shrdzhantsik Tunel -20/5
+374-98646224, info@madsoundfactory.com