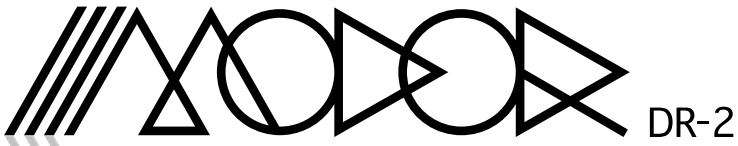

USER MANUAL - OS013

MODOR DIGITAL DRUM SYNTHESIZER

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1 Getting Started ...

1.1 Overview

Thanks for buying a Modor DR-2!

The DR-2 is a digital 6 instrument drum machine with a 128 32nd note step sequencer. Soundwise, the DR-2's digital drum models offer a lot of sound sculpting flexibility. It is not based on samples or analog circuits, the DR-2 is actually a real digital DSP drum synthesizer. It has the sound editing knobs like on a synthesizer, but with digital synthesis algorithms that are aimed towards drum synthesis.

The DR-2 also has extensive sequencing possibilities. It has a 32nd-note resolution and there is the possibility to program accents, flams (double hits) and tuplets (multiple hits), silences (breaks), reversing (backwards running) drum sounds and parameter locks. The sequencer has also extensive possibilities to work with polymeters and polyrhythms.

1.2 Patterns, songs and drumsets

The Modor DR-2 has an internal sequencer, that plays PATTERN or SONG structures, triggering the internal drum synthesizer. The synthesizer creates drum sounds using the sound parameters stored in DRUMSETS. These are the 3 different kinds of 'data structures' you'll meet working with the DR-2.

- A PATTERN is the collection of up to 128 steps of sequencer data of the six instruments, including accents, flams, breaks, reverse notes and parameter locks.
- A SONG is a string or loop of up to 60 patterns.
- A DRUMSET is a set of sound synthesis parameters for the six drum instruments A-F.

So, the DR-2 consists of two main components: the drum *synthesizer*, and the drum *sequencer*. The internal drum synthesizer and its drumsets, are not related to the internal sequencer and its patterns and songs. So you can play any pattern or song using any drumset. But also, this means after restarting your DR-2 you'll have to load both the pattern/song and the drumset separately to restart where you left before. If you

save a pattern or song after editing, the drumset is *not* saved along. You have to save it separately if you want to store it!

By pressing the PATTERN, SONG or DRUMSET buttons, you go into pattern, song or drumset mode. This is important in the menu for loading, saving, initialising and renaming items.

To learn how to load patterns, songs and drumsets, check §1.8.

1.3 Connections

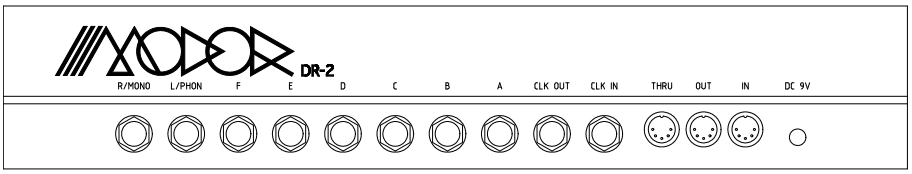
Before you can start playing the Modor DR-2 a few connections have to be made. This chapter is written to help you make the first connections so that you can immediately start playing your instrument. By following these instructions, you will have your Modor drum machine up and running in a few minutes time.

Main Audio Connections The main stereo output of the Modor DR-2 is found on the L/PHON and R/MONO connectors on the backside of the instrument. Connect the DR-2 to an external amplifier or mixing device with two mono 6mm jack cables. The external amplifier or mixing device should be switched off before making this connection, and only be switched on after the connection has been made to prevent damage to the equipment.

You can also connect headphones to the L/PHON audio connector with a 6mm TRS-connector. The signal is strong enough to drive a pair of headphones, although it may not be loud enough to be used in noisy environments.

Channel Audio Connections The Modor DR-2 has six drum channels that can be sent to the main L/R mix, but can also be sent out using the A-F connectors on the backside. If you insert a mono 6mm jack connector into one of these connectors, this channel is taken out of the main stereo mix on the L/R connectors and can be treated separately on an external mixing desk.

However, these connectors can also be used as so-called 'insert' points. Using a 6mm TRS connector you can send a channel out for external treatment, some effect for example, and have it returned back into the DR-2. It then passes the stereo panning and is mixed into the main L/R output.



Clock Syncronisation The DR-2 has CLK IN and CLK OUT connectors for 24PPQN clock signals. You can use the DR-2 as a clock master or clock slave to synchronise with other systems.

MIDI Connections The DR-2 has an internal drum sequencer, but it can also be controlled by an external keyboard or (computer) sequencer via a MIDI connection. Chapter 7 indicates which notes (note numbers) to send. Connect the MIDI output of this external midi source to the MIDI IN connector on the backside of the Modor DR-2.

The patterns generated by the internal sequencer, can also be sent out via the MIDI OUT connector as MIDI note messages, along with the knob movements of the sound parameters as MIDI control messages.

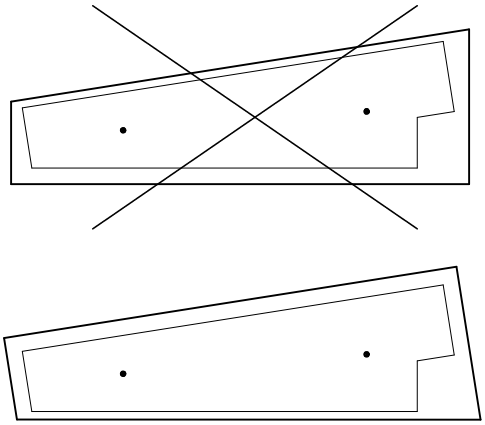
Power Connector Finally, the Modor DR-2 has to receive power via the power connector. Connect the adapter, and turn the volume knob (POW/VOL) on the upper left corner of the front panel clockwise to get the instrument running. Theoretically, any 9V DC-adapter with 9W power (1000mA) will be sufficient, but there are many DC-adaptors around providing unstable or even plain wrong electrical tensions. Only use the DC-adaptor delivered with the Modor DR-2 or refer to a specialised electronics dealer. Damage to the instrument caused by using a wrong adaptor is excluded from any warranty regulation.

1.4 Installing wooden sides or rack-ears

The Modor DR-2 comes with a pair of wooden side blocks, and a pair of white metal rack ears to put the it in a 19" rack. The necessary screws to install these are also included.

- M3x25 screws and ⌀4.3/12mm washers for the wooden side blocks
- M3x6 screws for the metal rack ears

Pay attention not to put the wooden side blocks upside down. The short sides of the blocks shouldn't be vertical, but should follow the shape of the metal case.



1.5 Pattern programming

Programming basic patterns on the DR-2 is quite simple. Push the A-F buttons to select an instrument and hit the 1-16 buttons to toggle drum hits. Then press play to hear the pattern you programmed. That's the basic step sequencing as can be found on many

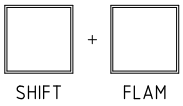
classic drum machines. You can also record patterns live by pushing REC and PLAY, and then playing the A-F buttons.
However, there is more about pattern programming on the DR-2:

Accents can be programmed by keeping the ACC button pressed while programming drum hits with the 1-16 buttons.
Accents can also be programmed in a separate accent track for all instruments simultaneously. Just press the ACC button to access the accent track.

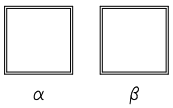
Reverses can be programmed by keeping the REV button pressed and hitting 1-16. Set the reverse delay with REV+VALUE

Breaks or instrument silences can be programmed by keeping the BREAK button pressed and hitting 1-16.

Flams or double hits can be programmed by keeping the FLAM button pressed and hitting 1-16. Set the flam speed with FLAM+VALUE.



Tuplets or multiple hits can be programmed by keeping the SHIFT+FLAM buttons pressed and hitting 1-16. Set the tuplet balance, number and speed with SHIFT+FLAM+Y/Z/T.

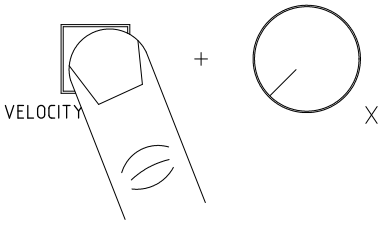


β-variations Every instrument has two separate tracks to program α and β drum hits. The α and β drum sounds are identical, except for one sound parameter. Set the β parameter and value by keeping β pushed and turning a knob.

1.6 Modulations

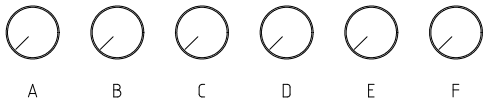
You can bring a lot more life in your drum riffs by using modulations that avoid every drum hit to sound exactly identical. There are 5 different ways of modulation:

Velocity or accents: Velocity or accent can modulate the volume and one extra parameter. Keep the VELOCITY button pressed and move a fader to set the volume sensitivity. Keep the VELOCITY button down and turn one of a drum's parameter knobs, to add another parameter to velocity modulation. When playing notes with different velocity or accent you'll hear a difference in sound. Double click VELOCITY to remove the extra modulation, keep VELOCITY pressed and move the fader down to remove volume sensitivity.

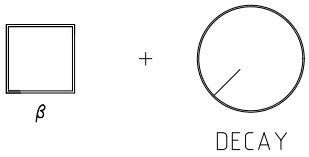


Random: Press the RANDOM button and turn one of a drum's parameter knobs. Now you'll hear a random variation of this parameter with every drum hit. Random can be connected to one parameter per drum. Double click RANDOM to remove this modulation.

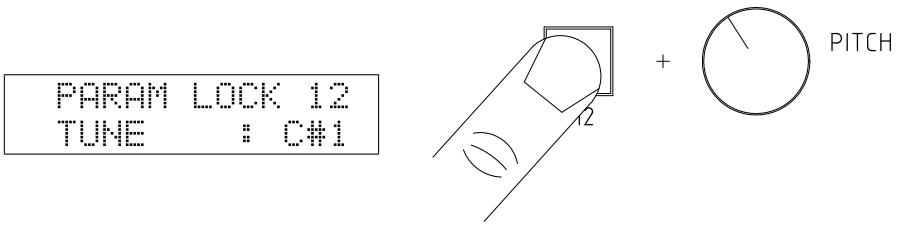
Definable: Press the DEF button and turn one of a drum's parameter knobs. Now the DEF-knob above the instrument's fader can be used to vary this parameter. Definable knobs can be connected to one parameter per drum. Double click DEF to remove this modulation.



Alpha/Beta: Press the β-button and turn one of a drum's parameter knobs. Now you have a β-variation of this instrument. β-variations can be connected to one parameter per drum. The sequencer has separate tracks for the α and β variations, press α or β to program α/β drum hits.



Parameter Locks: If you keep a sequencer button (1..16) down while turning a knob, you program a *parameter lock*. This synthesis parameter is then different for the drum hit playing at that sequencer position. To remove the parameter lock, keep the sequencer button down again, and hit NO(/EXIT).



1.7 Menu navigation

The menu of the Modor DR-2 consists of 7 menu items. When the MENU/YES button is hit you enter the menu, and the first menu item is shown on the upper display line. A black dot starts running from right to left over the display. By pressing MENU/YES again before the dot reaches the left side of the screen, the next menu item is selected. If you stop hitting MENU/YES, after about 1 sec the black dot reaches the left side of the display, and you enter the indicated menu. Following menus can be entered:

1. LOAD: Load a pattern, drumset or song from internal memory

2. SAVE: Save a pattern, drumset or song into the internal memory
3. NAME: Give your pattern, drumset or song a name
4. INIT: Initialize a pattern, drumset or song
5. SONG EDIT: Edit the order of patterns in a song (only in song mode)
6. COPY: An easy way to copy data between different parts of a pattern, or different instruments in a drumset.
7. SYSTEM SETTINGS: To set some global system parameters
8. MIDI DUMP: Dump the memory contents of the DR-2 using Midi Sysex messages

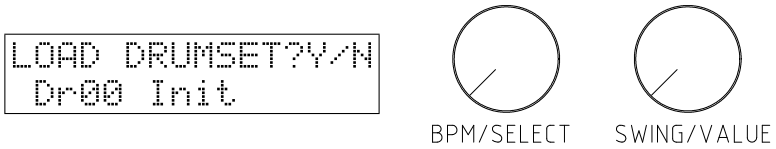
Next, after entering a certain menu, data can be selected and altered using the SELECT(/BPM) encoder and VALUE(/SWING) control. Sometimes you need to validate your choice by pressing the MENU/YES button again, or you might need to cancel your choice by using EXIT/NO. While in the menu, on any moment you can press EXIT/NO to cancel and leave the menu. A full item-by-item reference of the complete menu can be found in chapter 5.

Note: the SONG EDIT menu can only be entered when you are in Song mode, it is skipped otherwise. Press the SONG button to get into song mode. You can also doubleclick the SONG button as a shortcut to the SONG EDIT menu.

1.8 Loading patterns, songs and drumsets

1.8.1 ...from the menu

Press PATTERN, SONG or DRUMSET, hit the MENU/YES button 1 time and wait 2 seconds to enter the LOAD menu. You should see the following screen: On the first line you see "LOAD" to indicate you are in the LOAD menu and PATTERN, SONG or DRUMSET to indicate in which mode you are. On the second line you see the active pattern, song or drumset number and name.



You can now scan through all the available patterns, songs or drumsets in the Modor's memory using the SELECT and VALUE controls. Confirm your choice with MENU/YES.

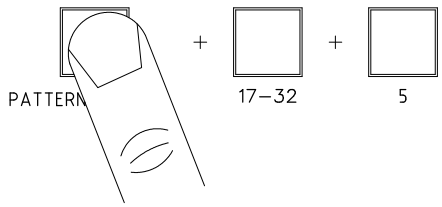
If you are loading drumsets, the selected drumset can be heard when playing the DR-2. This way you can listen to the drumsets in the memory without loosing your current work, and compare your active drumset to any drumset in the Modor DR-2's memory[1].

You can push EXIT/NO at any time to cancel the load operation and return to the situation where you left before.

[1] If the system setting LoadPreview is ON, see §5.7

1.8.2 . . . from the frontpanel

However, there is a much easier and more straightforward way to load patterns, songs and drumsets. Keep the PATTERN, SONG or DRUMSET button pressed, while you hit one of the 1-16, 17-32, 33-48, 49-64 buttons and then one of the 1-16 step buttons. For example [PATTERN] + 17-32 + 5 loads pattern Pt21 (16+5). [DRUMSET] + 33-48 + 13 loads drumset Dr45 (32+13). That's a lot quicker to switch between drumsets, patterns or songs. The downside of this for drumsets is that your current drumset gets immediately overwritten, you can't use it to compare your work to a stored drumset in memory as you can when menu loading.



To load pattern, song or drumset 1-16, you don't need to push 1-16 when loading from the frontpanel. Use for example PATTERN + 7 to load pattern 7.

You can keep both PATTERN and DRUMSET down together to load the pattern and drumset with the same number.

1.8.3 . . . quick reload

If you want to reload the last saved version of the pattern or drumset you are currently working on, keep PATTERN and/or DRUMSET down, and press PLAY.

Watch out however, as there is no 'Are You Sure?' question here, your current work immediately gets overwritten!

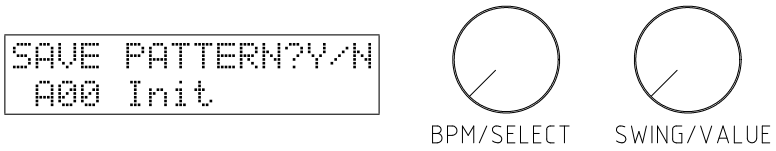
1.9 Saving patterns, songs and drumsets

1.9.1 . . . in the menu

Saving goes more or less identically to menu loading: now press the MENU button twice within one second to enter the SAVE menu. Select a slot in the memory using the SELECT and/or VALUE controls. This slot will be overwritten with the current working pattern, song or drumset if you now hit MENU/YES to confirm.

When you play the DR-2 during the save operation for drumsets, you can hear the drumset in the Modor DR-2's memory that's about to be overwritten. This way you can check which memory position can be overwritten before actually doing it[2]. Hitting EXIT/NO at any time cancels the save operation and exits the menu of the Modor DR-2.

[2]If the system setting LoadPreview is ON, see §5.7



1.9.2 . . . quick save

To save the pattern and/or drumset you are currently working on, you can also keep PATTERN and/or DRUMSET down, and hit RECORD.

Watch out, as this immediately overwrites the pattern/drumset in memory, there's no 'Are You Sure?' question. . .

1.10 Safety Mode

When loading a drumset from the DR-2's memory, or when switching between instruments, the frontpanel control knobs are in a position that doesn't necessarily correspond to their active parameter values. When you turn a knob on the frontpanel, the sound suddenly changes to the value of the frontpanel knob, and this change can be very abrupt!

No problem as long as you aren't touching these control knobs, or if you are on your own, experimenting with the DR-2 in your home studio. But of course, this can be very annoying in certain cases, for example when recording or playing live. When accidentaly touching one of the frontpanel controls, the sound can suddenly change very drastically. That might give the Modor DR-2 a very unreliable or 'unstable' feeling on stage or while jamming in the studio!

Therefore, a safety mode has been installed on the DR-2. When this Safety Mode is activated, the sound parameters do not change when turning a frontpanel knob, until you are passing their current value. This setting can be found in the SYSTEM SETTINGS menu. Activate the menu by pressing MENU 6x, and use the SELECT-encoder to select this setting. Change it using the VALUE-control.

When Safety Mode is activated and you turn a knob on the frontpanel, a '$<$' or '$>$' is displayed when the parameter change is blocked, which indicates at what side you'll find it's current value. This safety block is released when you turn the knob past the current value, and the '$<$' or '$>$' dissapears. So, if you want a parameter to change, you need to 'go get it' at it's current setting and turn it up or down to a new value. This way sudden drastic changes of the sound are prevented.

1.11 Initialisation

1.11.1 . . . from the menu

How to reinitialise the active drumset or pattern? If you want to start building up a new drumset or pattern completely from scratch, this might be helpful. Select Pattern/Drumset/Song with the respective button, and quickly hit the MENU/YES button four times to select the INIT-menu and wait one second to select it (the black dot reaches the left side of the screen). Confirm with MENU/YES (or cancel with EXIT/NO).

When you initialise a drumset, you get a simple straightforward techno orientated drumset with a bassdrum, claps, hihat, snaredrum, rimshot and cymbal. Upon initialisation of a pattern, you get a very simple 1-bar 4-on-the-floor pattern, a Euclidean pattern (per instrument) or an empty pattern (per instrument). An initialised song will contain nothing but a list of patterns all set to pattern Pt00. For more details on initialising, check §5.4.

1.11.2 . . . shortcut for patterns

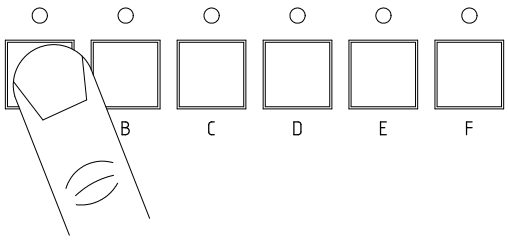
You can also empty an instrument's pattern line by keep the NO(/EXIT) button down and hitting an instrument's selection button A..F. By quickly hitting A to F while keeping NO(/EXIT) down, you'll clear the entire pattern.

1.12 Fingerdrumming. . .

The DR-2 is about programming drum sequences, it's not really built for 'live' electronic finger drumming, the buttons aren't built for that. But of course, you can check the sounds in a drumset by pressing the A..F buttons.

However, the A..F buttons are not velocity sensitive. You can check what it sounds like when accented, by holding ACC down while playing A..F. The same goes for flams, tuplets, breaks and reverses. Hold down the appropriate buttons while playing A..F.

Fingerdrumming works when the sequencer is not playing, or when it's recording. When playing, there are two playing 'modes', that can be toggled with the PLAY button. If you can't hear the sounds when hitting the A..F buttons, press PLAY once more to toggle between the two playing 'modes'. See also §4.2.



1.13 Key combinations

The DR-2 has a number of key and knob combinations to make things faster and easier. Try the combinations in the table below, to get accustomed to what all these different keys and knobs can do.

PATTERN (+ 1-16/.../49-64) + 1...16	Load Pattern
DRUMSET (+ 1-16/.../49-64) + 1...16	Load Drumset
SONG (+ 1-16/.../49-64) + 1...16	Load Song
PATTERN + REC	Quicksave Pattern
DRUMSET + REC	Quicksave Drumset
PATTERN + PLAY	Quick Reload Pattern
DRUMSET + PLAY	Quick Reload Drumset
REV (+16/32) + 1...16	Toggle Note Reverse
BREAK (+16/32) + 1...16	Toggle Note Break
FLAM (+16/32) + 1...16	Toggle Flam
SHIFT+FLAM (+16/32) + 1...16	Toggle Tuplet
16/32 + 1...16	Toggle 32nd Notes
SHIFT + A...F	Mute/Unmute Instrument
SHIFT + 1...16	Set Pattern Length
SHIFT + 1-16/.../49-64	Set Number of Pattern bars
SHIFT + 17-32/33-48/49-64 + 1...16	Set Pattern Length longer than 16 steps
A...F + 1...16	Set Instrument Polymeter
A...F + 17-32/33-48/49-64 + 1...16	Set Instrument Polymeter longer than 16 steps
VELOCITY + fader	Set Velocity/Accent Volume Sensitivity
VELOCITY + Knob	Set Velocity/Accent 2nd Parameter and Amount
RANDOM + Knob	Set Random Parameter and Amount
DEF + Knob	Set Definable Parameter and Amount
β + Knob	Set β Parameter
ACC + SWING/VALUE	Set Global Accent Level

16/32 + SWING/VALUE	Set 32nd Note Swing
FLAM + SWING/VALUE	Set Flam Time
REV + SWING/VALUE	Set Reverse Delay Time
SHIFT + FLAM + Y	Set Tuplet Velocity Balance
SHIFT + FLAM + Z	Set Tuplet Retrig Number
SHIFT + FLAM + T	Set Tuplet Retrig Time
Double Click VELOCITY	Remove Velocity Parameter and Amount
Double Click DEF	Remove Definable Parameter and Amount
Double Click RANDOM	Remove Random Parameter and Amount
Double Click SONG	Shortcut to Song Edit
NO + A...F	Delete an instrument's pattern track
RANDOM + A...F	Randomise an instrument's pattern track
SHIFT + fader	Set Gain
SHIFT + Def Knob	Set Amp Attack Time
SHIFT + Amp DECAY	Set Amp Attack Time
SHIFT + Amp CURVE	Set Transient Click Time
SHIFT + X	Set Distortion
SHIFT + Y	Set Tilt Filter
SHIFT + Z	Set Compressor Treshold
SHIFT + T	Set Compressor Attack Time
SHIFT + PITCH	Set Finetune (on certain models)
SHIFT + PITCH DECAY	Set Parametric Equaliser Frequency
SHIFT + PITCH CURVE	Set Parametric Equaliser Gain
SHIFT + PITCH AMOUNT	Set Parametric Equaliser Q
DEF + fader	Set Compressor Treshold
DEF + Def Knob	Set Compressor Attack Time
DEF + A...F	Set Compressor Sidechain Source
SHIFT + REV + SELECT	Set Euclidean pattern length
SHIFT + REV + VALUE	Set Euclidean number of drum hits
SHIFT + REV + AMOUNT	Set Euclidean rotation
SHIFT + REV + YES	Generate Euclidean rhythm
A...F + REC	Copy Instrument Track
A...F + PLAY	Paste Instrument Track
1-16/.../49-64 + REC	Copy Pattern Bar
1-16/.../49-64 + PLAY	Paste Pattern Bar
DRUMSET + Knob	Inspect Parameter
DRUMSET + VELOCITY/RAND/DEF/β	Inspect Parameter Modulation

1...16 + Knob	Add Parameter Lock
1...16 + NO	Remove Parameter Lock
RANDOM + SELECT	Set Instrument Random Probability
RANDOM + α / β / ACC	Set α/β/ACC Randomization Type
α/β + SELECT	Set α/β Polyrhythmic Ratio Numerator
α/β + VALUE	Set α/β Polyrhythmic Ratio Denominator
A...F + α/β	Assign α/β Polyrhythmic Clock to instrument

2 Overview

2.1 Structure of the DR-2

The Modor DR-2 has 2 main components: a drum sequencer and a drum synthesizer, working more or less independently from each other.

Sequencing... The drum sequencer is a classic step sequencer able of playing 64 16th notes, or 128 32nd notes per pattern for each of the 6 drum instruments (A..F) of the drum synthesizer. It generates the triggers to induce the synthesis of drum sounds. However, the sequencer can also create accents, reverses, note breaks, etc... for the drum synthesizer.

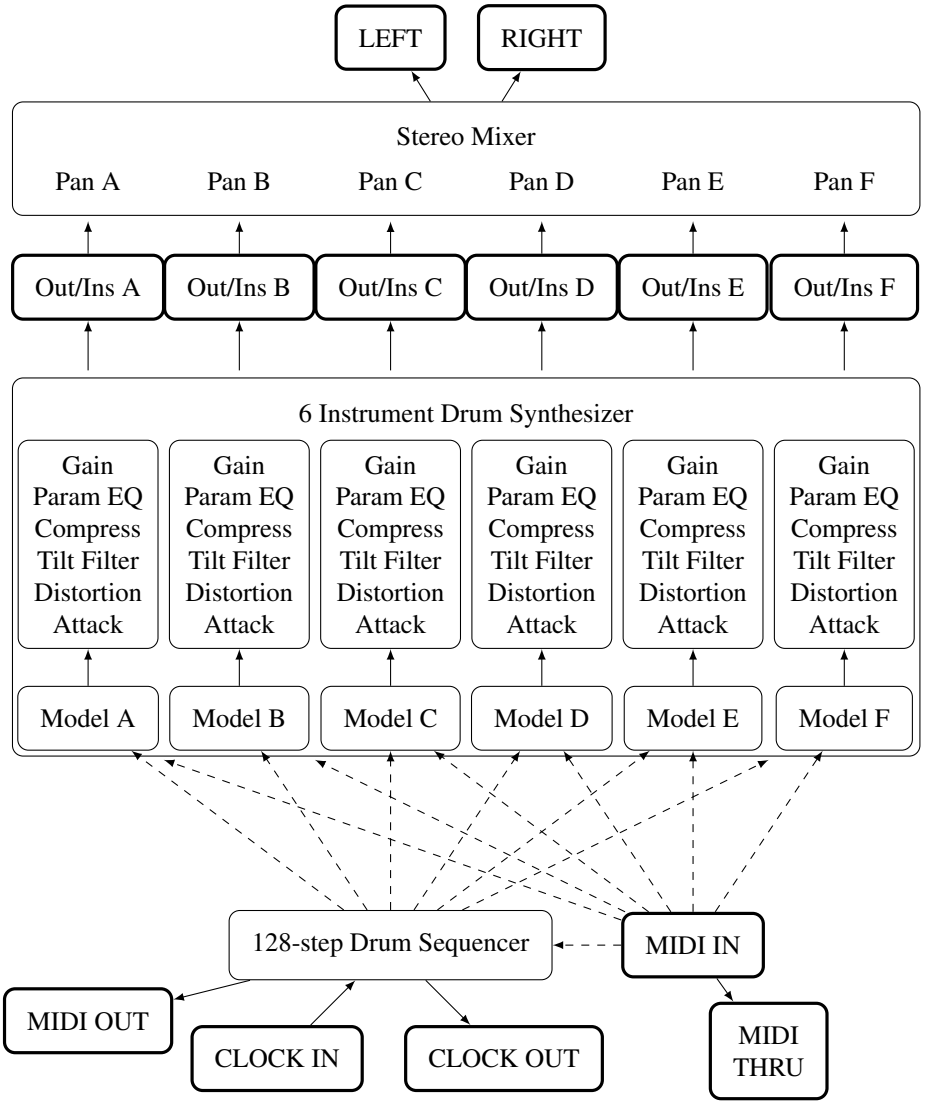
Next to that, the drum synthesizer can of course also be controlled with external gear connected to MIDI IN.

Drum models The drum synthesizer has 6 instruments (A..F). For each one you can choose a separate drum DSP algorithm or *model*. There are models for bassdrums, snaredrums, cymbals, claps, ... These models can be chosen independently. If you want a drumset with 6 different snaredrums, just do it. It's up to you to decide which instruments you want in your DR-2 drumset. See §3.1 and following paragraphs for a detailed overview of the drum models.

Each instrument of the DR-2 drum synthesizer can have up to 12 drum parameters:

- Pitch, with a pitch envelope decay, amount and curve
- Volume, with an amp envelope decay and curve
- Pan
- X, Y, Z and T parameters, different for each drum algorithm
- Transient Click Volume (SHIFT+CURVE)

Each of these 12 parameters has it's own control knob on the DR-2's frontpanel. Select one of the 6 drum instruments with the A..F buttons below the faders, and turn the knobs to alter it's sound.



After treatment Next, the sound produced by these algorithms or models, gets an 'after treatment': a gain setting, a distortion, a tilt filter, a parametric equaliser, a dynamic range compressor and a small transient amp attack envelope. So, this introduces 11 more parameters per instrument:

- Gain setting: SHIFT + fader
- Amp attack: SHIFT + DEF-knob or SHIFT + DECAY
- Click volume : SHIFT + AMP CURVE
- Distortion: SHIFT + X
- Tilt Filter: SHIFT + Y
- Compressor treshold: DEF + fader or SHIFT + Z
- Compressor attack time: DEF + DEF-knob or SHIFT + T
- Compressor sidechain source: DEF + A..F

- Parametric Equaliser Frequency, Gain and Q: SHIFT + PITCH DECAY, SHIFT + PITCH CURVE and SHIFT + PITCH AMOUNT

Channel outputs After that, the 6 instruments' sound signals are sent to the outputs. Each of the 6 (A..F) drum instruments or drum channels from the drum synthesizer has a separate output or insert connector at the backside of the DR-2. This can be used to send each channel separately to external mixing gear, or to treat it with external effect gear and return it into the DR-2. Use 6mm TS (mono jack) connectors to output a channel to a separate mixing desk, or use 6mm TRS (stereo jack) connectors to use it as an insert point for external effect gear.

Panning, mixing, output And then finally, there's a stereo panning, a mixer and output amp for the signals (A..F) that weren't separated.

2.2 Pattern, song and drumset modes

Pattern, song and drumset modes are selected using the respective PATTERN, SONG and DRUMSET buttons. These modes mainly affect the menu. Outside of the menu, the influence of the active mode is limited. Select Pattern, Song or Drumset mode to load, save, rename or initialise patterns, songs or drumsets.

However, selecting Song mode has a different influence. When in Song mode, the sequencer doesn't repeat the same pattern over and over again. It plays a list of patterns in a single movement or in a loop. That list of patterns is called a *song*. When at the end of one pattern, the sequencer jumps to the next pattern in the list.

The main difference now, is that eventual changes to the playing pattern made with the 1..16 STEP buttons are discarded when moving on to the next pattern. First, carefully design your song's patterns, before combining them into a song. Or, when changing things in a song's pattern, save it first in pattern mode, before moving on.

Every pattern has it's own BPM, Swing, Swing32 and Flam and Reverse timings. When playing in Song mode however, these pattern parameters are overridden by the Song BPM, Swing and timing settings. So you can share patterns between different songs, each song will play the pattern in its own way.

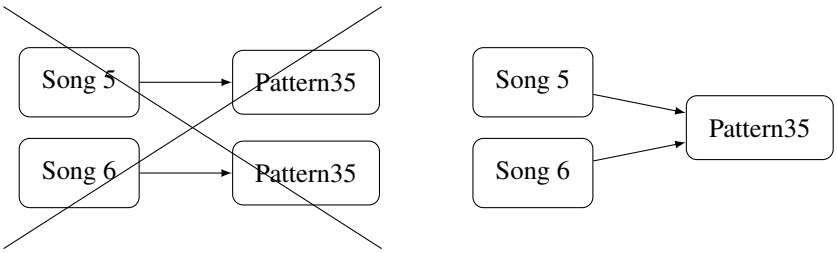
The same thing happens in Pattern mode, when switching between patterns without stopping the sequencer. If you load a new pattern while the sequencer is playing, it switches to the new pattern after the current pattern has ended. The pattern's own BPM, swing and timing settings are overridden with the currently playing settings.

2.3 Flash memory

The DR-2's internal flash memory has space for:

- 64 Drumsets (0..64) of 6 instruments
- 96 Patterns (0..96) of up to 128 32nd note steps and up to 64 parameter locks
- 32 songs (0..32) of up to 60 pattern numbers.

Caution: A pattern and a song are 2 different things, that are stored separately in the DR-2's memory. A song does not 'contain' it's patterns, it only refers to pattern numbers. For example, imagine song Sn05 and song Sn06 both contain pattern number



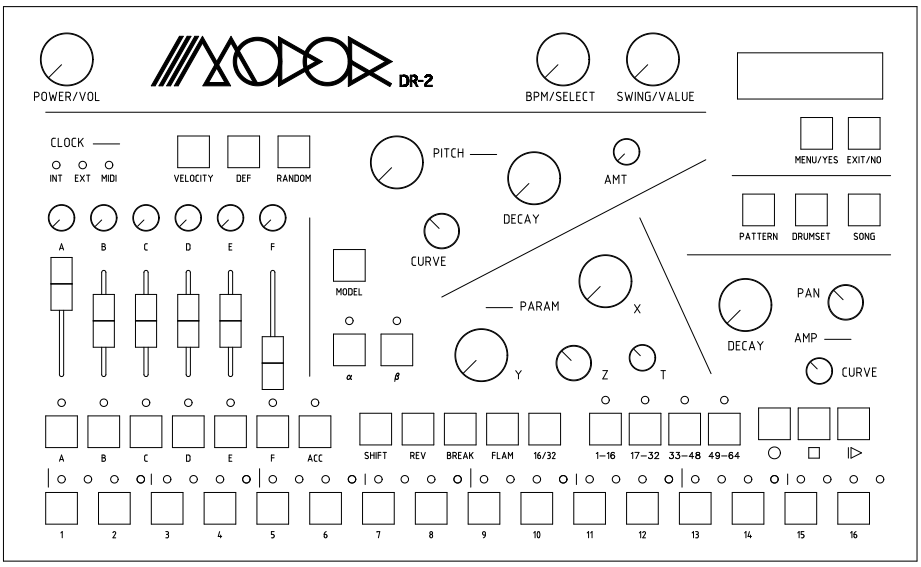
Pt35. If you change and store pattern Pt35 (in pattern mode), then both songs Sn05 and Sn06 (in song mode) will have changed.

2.4 Frontpanel overview

You can find 18 rotary knobs, 6 faders and 46 pushbuttons on the frontpanel of the Modor DR-2.

In a short overview, following controls are found:

- MENU/YES and EXIT/NO menu buttons.
- PATTERN button to select pattern mode.
- DRUMSET button to select drumset mode.
- SONG button to select song mode.
- Drum synthesizer, chapter 3
  - 6 volume faders A..F [0, 127]
  - 6 definable knobs A..F [-64, +63] to control 1 user selectable sound parameter per instrument
  - MODEL button to select the drum synthesis model (or algorithm)
  - PITCH knob [0,127]
  - pitch env DECAY knob [0, 127]
  - pitch env AMOUNT knob [0, 127]
  - pitch env CURVE knob [0, 127]
  - X knob [0, 127]
  - Y knob [0, 127]
  - Z knob [0, 127]
  - T knob [0, 127]
  - amp env DECAY knob [0,127]
  - amp env CURVE knob [0,127]
  - PAN knob [-64, +63]
  - β button to set 1 β modulation per instrument
  - VELOCITY button to set velocity (or accent) modulations
  - DEF button to set 1 definable parameter per instrument to be controlled by the definable knobs A..F, and to control the dynamic range compressor
  - RANDOM button to set 1 random parameter modulation per instrument
- Drum sequencer, chapter 4
  - 6 channel or instrument selection buttons A..F
  - 1 accent channel selection button



- RECORD, PLAY and STOP buttons
- α and β buttons to program α and β sequencer lines
- REV button to program envelope reverses
- BREAK button to program immediate note mutes
- FLAM button to program double hits
- SHIFT button to access extra functions
- 16/32 button to program 32nd notes and events
- 1-16, 17-32, 33-48, and 49-64 pattern bar selection buttons.
- 16 step buttons
- BPM encoder (doubling up as SELECT control in the menu)
- SWING control (doubling up as VALUE control in the menu)

3 Drum synthesizer

3.1 Drum models or algorithms

The DR-2 uses drum 'models' or drum synthesis algorithms that create a drum sound when a trigger from the DR-2's step sequencer or MIDI receiver comes in. At this moment, the available drum models are:

- DIST BD: a sinewave bassdrum that has a parallel filtered distortion path
- NOISE BD: an overdriven triangle bassdrum with a filtered noise burst attack
- SQUARE BD: a square wave oscillator bassdrum with lowpass and notch filters
- STRING BD: an overdriven triangle bassdrum with a rattling string sound on top
- RUMBLE BD: a sinewave bassdrum with a drive and a rumbling reverb tail
- BASIC SN: a snare drum algorithm using 6 sinewave FM oscillators and a 'snappy' noise burst
- MARCHING SN: a much tighter sounding marching band type of snare drum
- ANALOG SN: an electronic snare algorithm with two overdriven triangle waves and a snappy noise burst
- ELECTRO SN: another electronic snare drum algoritm with two sinewave oscillators and a snappy noise burst
- CLAPS: a heavily filtered white noise burst with multiple triggering
- FILTER CLAPS: another filtered white noise burst, with selectable filter slopes
- HIHAT: short to medium long hits of 'cymbal noise' and white noise
- RIDE CYMBAL: a set of bandpass and hipass filters working on cymbal noise
- CRASH CYMBAL: a series of 6 parallel bandpass filters filtering white noise and cymbal noise
- FILTER HH: another hihat algoritm with a much more pronounced filtering action
- TOM: a set of 3 overdriven triangle wave oscillators with a filtered init noise

burst

- TENORDRUM: a series of 32 sine oscillators with different tuning and length settings, and a filtered attack noise burst
- RIMSHOT: 3 sine waves that get overdriven and highpass filtered
- RATTLE: a short clicky sound with 2 base frequencies, with retriggering possibility to make 'rattle' sounds.
- COWBELL: a series of 18 cowbell tuned sine oscillators with different tunings, with a lowpass filter and a noisy init click
- BOTTLE: a series of 17 glass bottle tuned sine oscillators with different tunings, in 2 groups with different envelope, and with a noisy init click
- SAW SYNTH: a sawtooth oscillator with a resonant filter and envelope
- SQU SYNTH: a square wave oscillator with a resonant filter and envelope
- SIN SYNTH: a set of 3 sine oscillator set one octave apart, and a soft overdrive
- FM SYNTH: a simple 2-operator FM setup, ie. 2 sine wave oscillators in which one modulates the frequency of the other

Future firmware upgrades will include new drum models.

Selecting an algorithm: Push the MODEL button to cycle through the different available drum synthesis algorithms, SHIFT+MODEL cycles the other way round. You can also keep the MODEL button down and turn SELECT(/BPM).

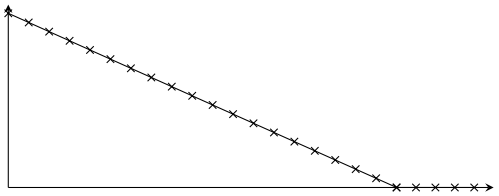
3.2 Envelope generator

The DR-2 runs a special central envelope generator, serving all the different drum models. The possible DECAY range is mostly adapted to the specific drum algorithm, but apart from that the envelopes are identical for all drum models.

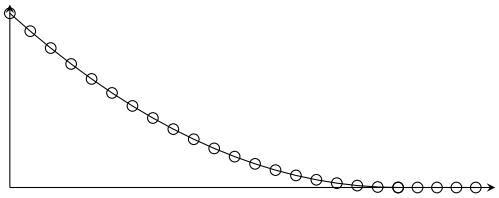
Envelopes used in drum synthesis aren't very complex. In synthesizers you often see ADSR envelopes, or even more complex envelopes such as the Modor NF-1's 4-stage envelopes. In drum synthesis you need decay-only envelopes, a control value starting at high level (1) and dropping to low level (0). A drum sound starts loud, and drops to silence. It's pitch starts high, and drops to a low pitch. So, you don't need attack, sustain or release settings. Only a DECAY setting.

However, there's another very important property of envelopes used in drum sound synthesis: its curvature. Does the envelope drop to zero in a uniform, linear way? Or does it drop fast in the beginning, slowing down towards the end? The envelopes of the DR-2 have -next to the DECAY rate- also a CURVE parameter. Behind the CURVE parameter of the DR-2's envelope generators there are 5 different curvature types:

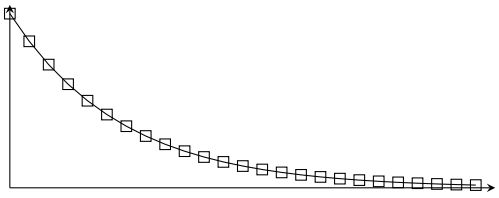
Linear full left, 8 'o clock setting of the CURVE knob:
The linear envelope drops uniformly from 1 to 0. For the math freaks, it follows a $y = (1 - ax)$ curve, a being a decay speed parameter.



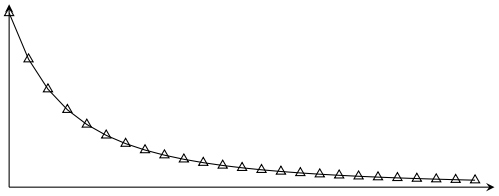
Squared linear at 10 'o clock setting of the CURVE knob:
In between the linear and exponential curve is the squared linear curve: $y = (1 - ax)^2$



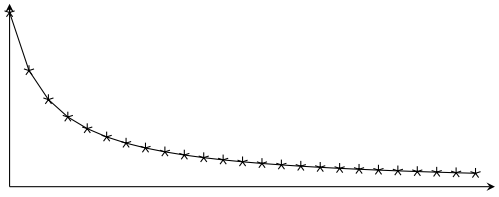
Exponential central, 12 'o clock setting:
This is the most extensively used curve in drum synthesis, as it matches to many natural decay processes. It drops fast in the beginning, and slows down while dropping, theoretically never coming to an end. It follows a $y = e^{-ax}$ curve.

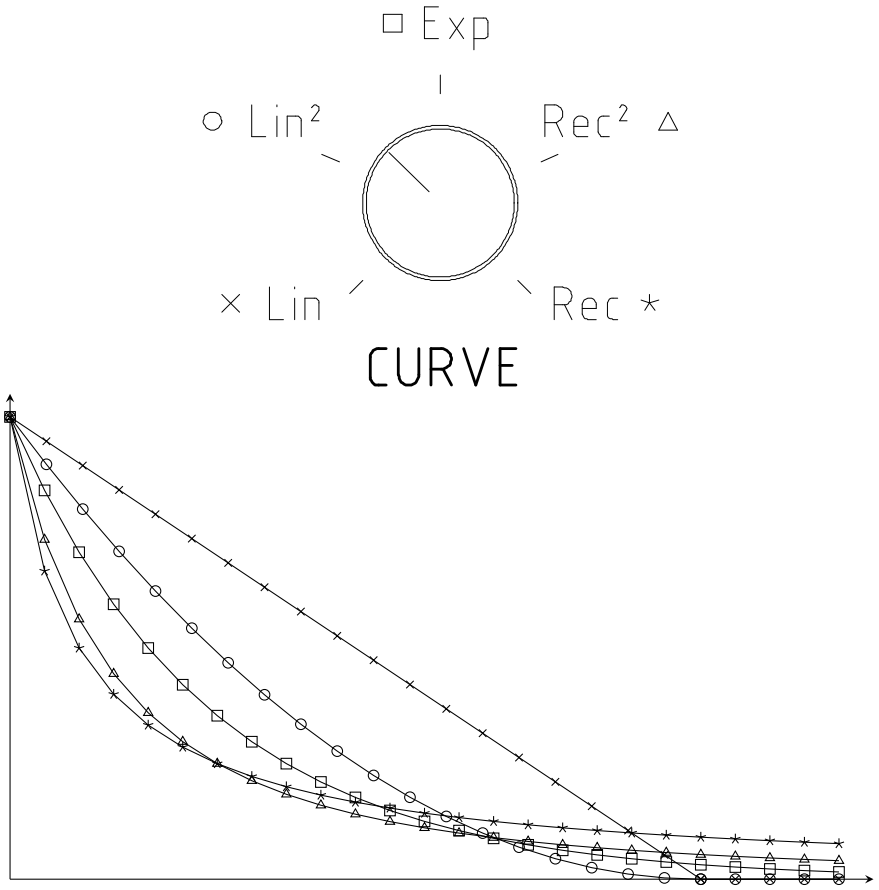


Squared reciprocal 2 'o clock setting:
In between the exponential and reciprocal curve is the squared reciprocal, $y = \left(\frac{a}{x+a}\right)^2$.



Reciprocal Full right, 4 'o clock setting:
The reciprocal curve also drops fast at the beginning, even faster then an exponential curve, but it slows down a lot earlier, resulting in a different curvature with a longer tail that never really seems to stop decaying. It follows a $y = \frac{a}{x+a}$ curve.




□ Exp
○ Lin²
Rec² △
× Lin
Rec *
CURVE

3.3 Bass drums

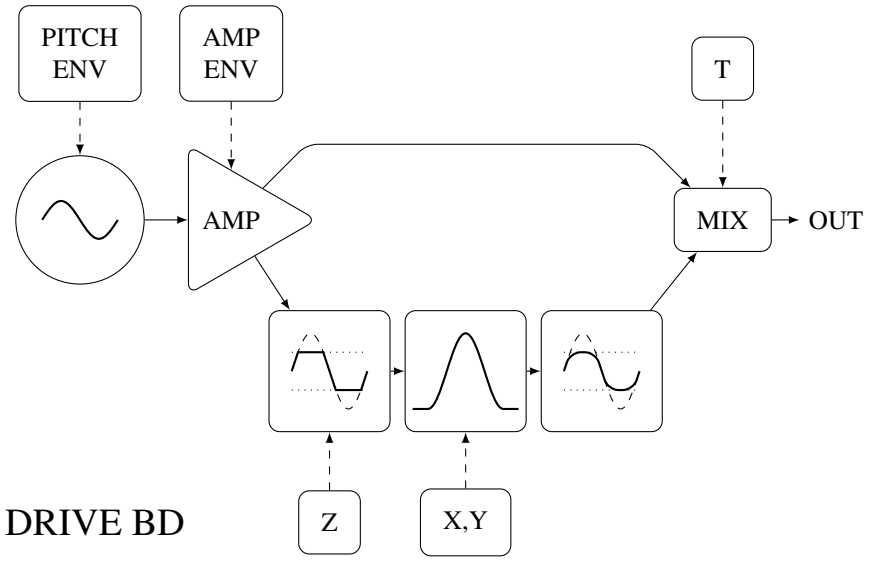
3.3.1 Drive BD

The first bass drum model is the Drive BD. This model uses a very basic sinewave bassdrum, that has a parallel drive&filter path that can be mixed with the dry sine bassdrum to get harmonic overtones in a certain frequency range.

The sinewave oscillator creates a basic bassdrum sound using the pitch, pitch envelope and amp envelope settings. Then, the signal is split and routed directly to the output, and to the drive and filter part.

In the drive and filter part, the basic sinewave is overdriven and clipped using a quite hard saturation curve. This creates a broad range of overtones on top of the basic sinewave frequency. This clipped sound is then filtered using a resonant 12dB/oct bandpass filter, and finally overdriven and clipped again with a softer saturation curve to get some overtones of the filter and/or resonance frequency. The result of this can be dry/wet mixed with the original unaltered sinewave bassdrum.

- X controls the bandpass filter cutoff
- Y controls the bandpass filter resonance, upto self oscillation
- Z controls the overdrive gain
- T controls the dry/wet mix



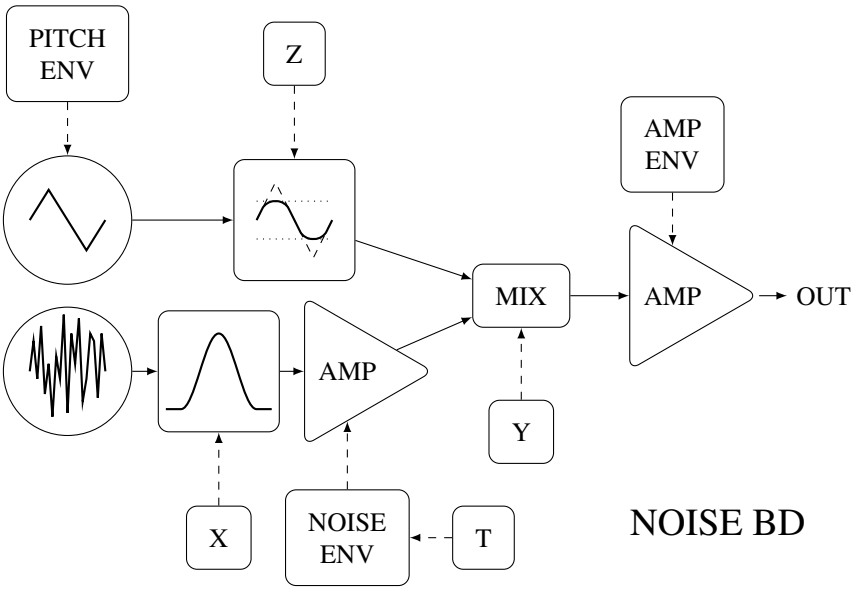
3.3.2 Noise BD

A second bassdrum model is the Noise BD. In this bassdrum model a triangle oscillator creates a basic bassdrum, using the pitch and pitch envelope. It is then clipped using a soft saturation curve that 'rounds the corners', such that the result approaches a sinewave, but still contains a small amount of the lower harmonics. This technique is often used in classic analog machines to make 'sinewaves'.

Next to this, there is a noise oscillator that gets filtered by a bandpass filter and gets it's volume set by a noise envelope. The wave and noise parts finally get mixed and sent to the output.

The noisy part can be used for example to create very short init clicks or to make longer, low filtered attack noises that make it sound more like a physical bassdrum. Or, the noise part can be disabled by turning down the noise-wave balance (Y) if you just want the overdriven triangle oscillator alone, to get a classic electronic-style bassdrum sound.

- X controls the noise filter frequency
- Y controls noise/wave mix
- Z controls the wave clipping overdrive gain
- T controls the noise envelope decay rate



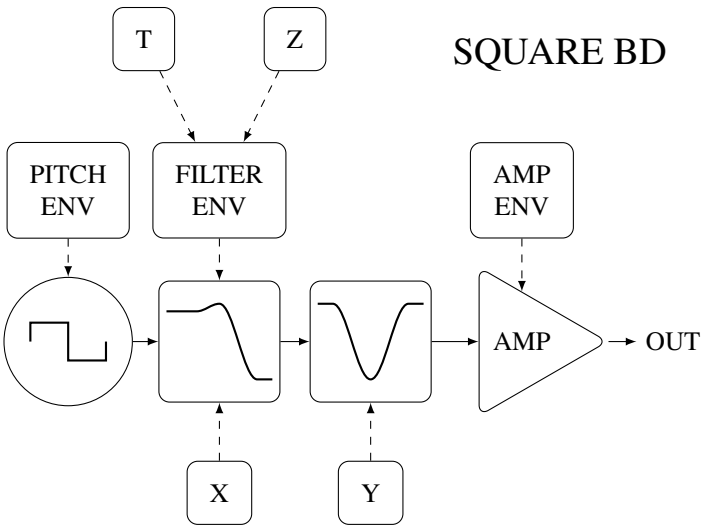
3.3.3 Square BD

A third bassdrum model is the Square BD. This model is based on a square waveform oscillator, that produces a large number of harmonics. The result is filtered by two filters in series: a lowpass filter with an envelope controlling the cutoff frequency, and a notch filter.

The lowpass filter controls the amount of higher harmonics. The envelope on the cutoff frequency makes it possible to give it a bright 'attack phase' with more harmonics.

Sometimes you clearly want some of the higher harmonics of the square oscillator, while you want to cut the disturbing frequencies somewhere in the middle range. In that case, a lowpass filter alone is not sufficient. Therefore, there's an extra notch filter. It has a broad frequency range from low to high frequencies, but you'll often find yourself putting it somewhere over the middle frequency range.

- X controls the lowpass filter cutoff frequency
- Y controls the notch filter frequency
- Z controls the lowpass envelope amount
- T controls the lowpass envelope decay rate



3.3.4 String BD

A fourth bassdrum model is the String BD. This model has an oscillator section with a drive and asymmetry parameter, and a 'string sound' section to create a buzzing sound on top of the oscillator sound.

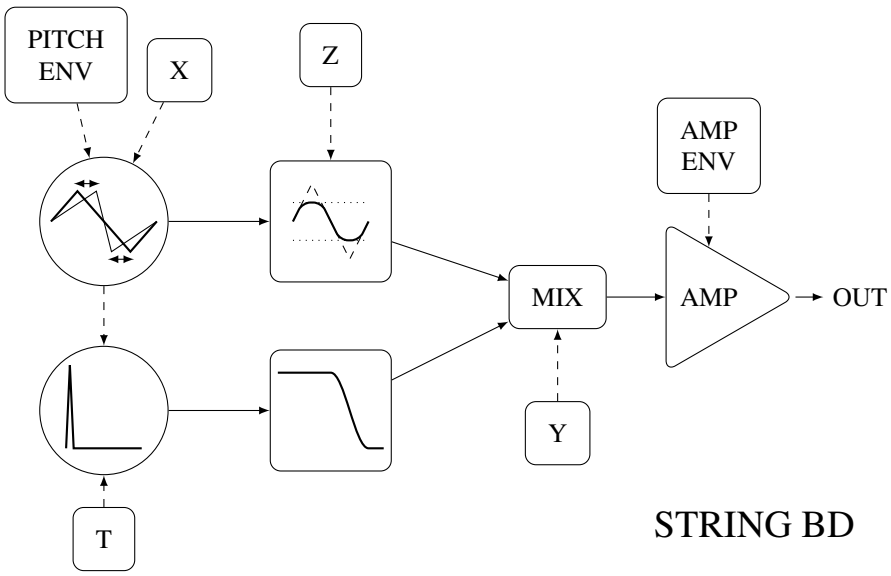
The oscillator section is not unlike that of the Noise BD, but with an important difference: the asymmetry factor. The oscillator creates triangle waves again, that are clipped using a soft saturation that rounds the corners and reduces the amount of higher harmonics. The triangle oscillator however, can also be made asymmetric, which induces a certain amount of even harmonics in the sound.

Symmetric waveforms, such as sinewaves, triangle and square waves have a left-right symmetry, which invokes they only have odd harmonics. But sometimes it can be interesting to have an amount of even harmonics in an electronic BD sound too. Thus in general, the asymmetry parameter controls the amount of even harmonics in the sound, while the drive parameter controls the odd harmonics.

The string sound section creates a little tick every time the oscillator passes zero, thereby mimicking the sound of a string stretched over a drum head as sometimes found on ethnic drum instruments. The string sound passes through a lowpass filter that reduces the very high frequencies above 7kHz.

The randomization factor randomizes the strength of each tick. Without randomization, the string sounds like a very narrow pulse oscillator. With a certain randomization degree, it sounds more like something rattling along with the BD sound.

- X controls the wave asymmetry
- Y controls oscillator/string mix
- Z controls the wave clipping overdrive gain
- T controls string randomization



3.3.5 Rumble BD

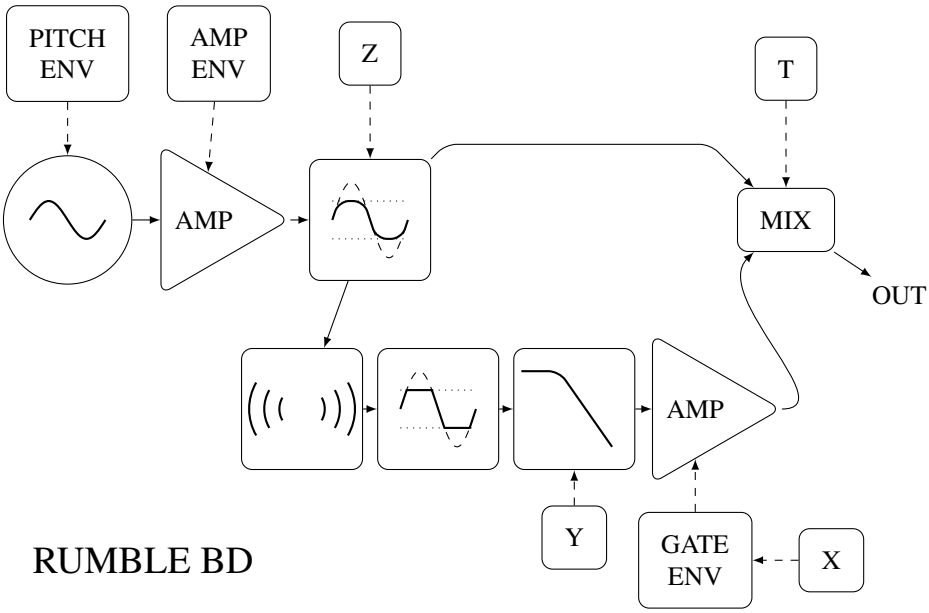
The Rumble BD has a sinewave oscillator, more or less like the Drive BD. This oscillator can be distorted using a rather soft drive stage, controlled by the Z-parameter.

After that, the signal is split. A first part goes directly to the output, the second goes into the 'rumble circuit'. The signal gets reverberated, which creates a long tail of echos. This reverb sound is then distorted and passes a lowpass filter. The filter cutoff is controlled by the Y-parameter.

Finally, this rumble tail is gated: an envelope prevents it from mixing up with the initial kick sound, which would make it less punchy. The X-parameter sets the gate time.

The T-parameter finally controls the mix between the direct signal and the rumble.

- X controls the reverb tail gate time
- Y controls the filter cutoff frequency
- Z controls the overdrive gain
- T controls the dry/wet balance



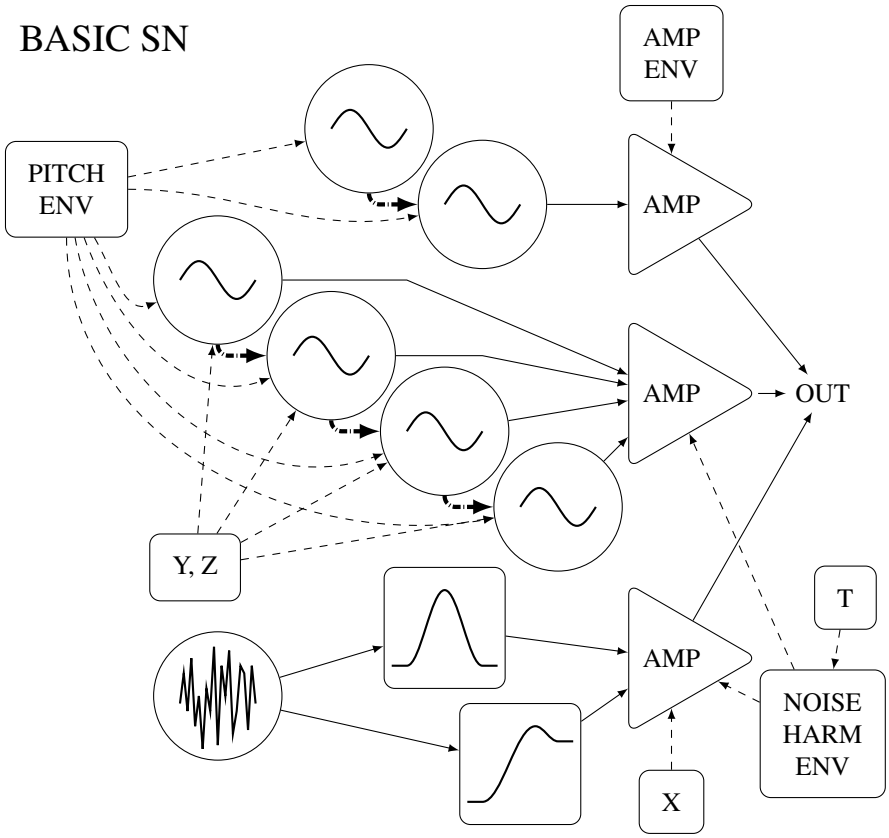
3.4 Snare drums

3.4.1 Basic SN

This snare model uses FM synthesis and filtered noises to create a snare drum sound that sounds the most 'realistic' (at certain settings) from the DR-2's snare drums.

This model uses a 2-operator FM path to create the 'fundamental' tonal element, and a 4-operator part to create overtone harmonics. Next to that there is a noise path, that is split up in a middle and a high frequency filtering path.

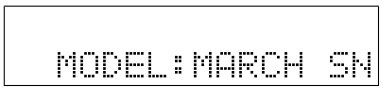
The amp envelope controls the volume of the fundamental, while the snare noise and the overtone harmonics are controlled by a separate harmonics and noise envelope.



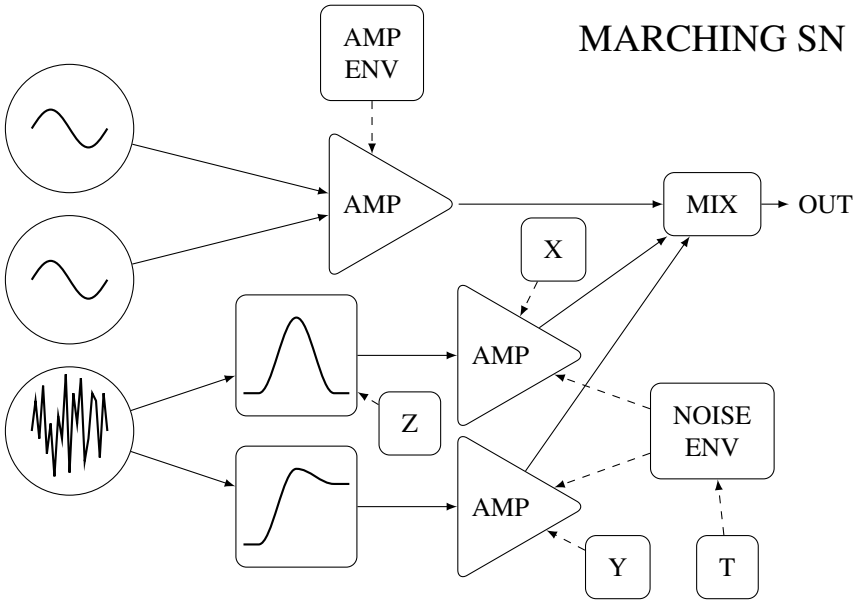
- X controls the amount of snare noise
- Y controls the FM intensity
- Z controls the FM harmonics pitch separation
- T controls the harmonic and noise envelope decay

3.4.2 Marching SN

This snare drum is modelled after the tighter and more intense sound of snare drums as they are used in marching bands and bagpipe bands. It has a very short sounding 'tonal' attack part that uses 2 sinewave oscillators, and a 'snarenoise' part that creates separately controllable middle and high frequency noise.



- X controls the middle frequency noise volume
- Y controls the high frequency noise volume
- Z controls the middle noise's frequency
- T controls the noise envelope decay rate



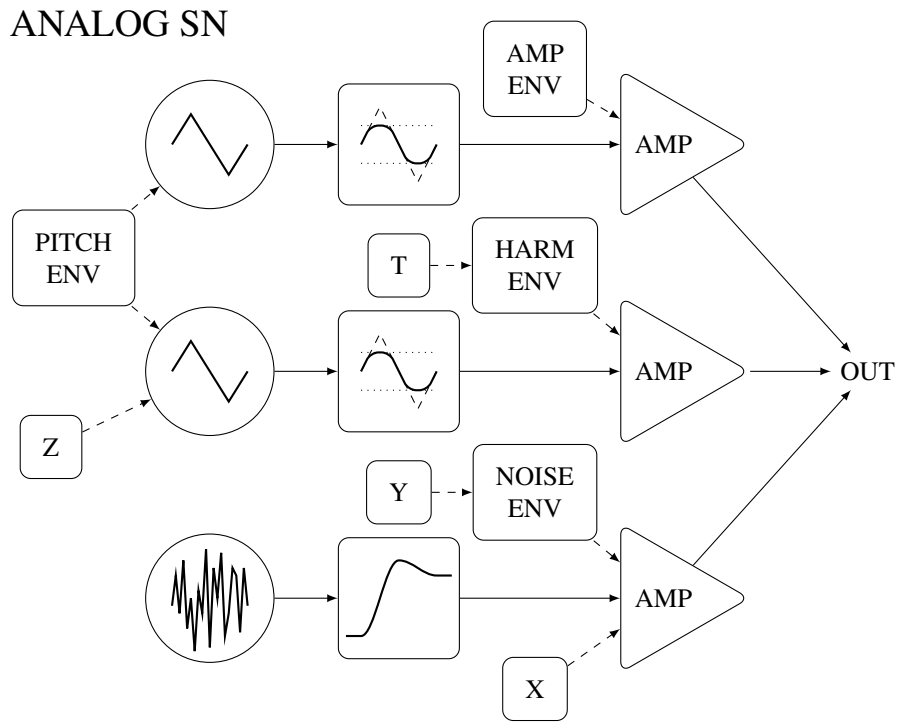
3.4.3 Analog SN

This snare model comes closer to what snare drums on analog drum machines sound like. It has 2 separate overdriven triangle oscillators and a 'snappy' snare noise oscillator. Each of these elements has a separate amp envelope.

The overdriven triangle oscillator was a classic analog trick to make 'sinewave' oscillators. The output of a triangle oscillator is sent into a soft overdrive stage that rounds the corners of the triangle wave. This doesn't produce perfect sinewaves but waves that still contain some harmonic overtones, which were however found to be more pleasing to the ear than pure sinewaves. So, in this Analog SN model we used this same approach to give the snaredrum a more 'analog' sounding result.

Tip: Add some pitch envelope to get a more 'realistic' analog snare sound.

- X controls the 'snappy' snare noise volume
- Y controls the snare noise envelope decay length
- Z controls the oscillators pitch separation
- T controls the second oscillators envelope decay length



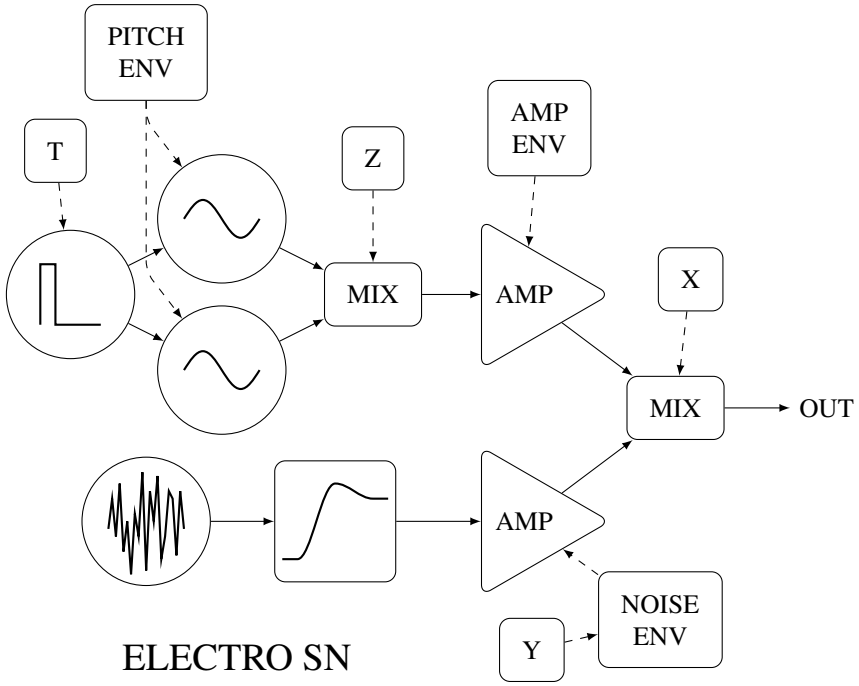
3.4.4 Electro SN

This model produces a second way of 'analog' snare sound synthesis. It uses two sinewave oscillators an octave apart in pitch, with a balance parameter that reflects the snaredrum's 'tone'. To initiate the sound, these oscillators are struck by a pulse with a certain pulse length the can be varied. Next to it, there's also a hipass-filtered noise oscillator to produce snare noises.

- X controls the oscillator/noise balance
- Y controls the snare noise envelope decay length

- Z controls the oscillator balance
- T controls the pulse length

The possible range of the pitch envelope amount parameter has also been increased on this model compared to the other drum models. This enables quite extreme amounts of pitch enveloping, to create zap/snap style 'drums'.



3.5 Cymbals

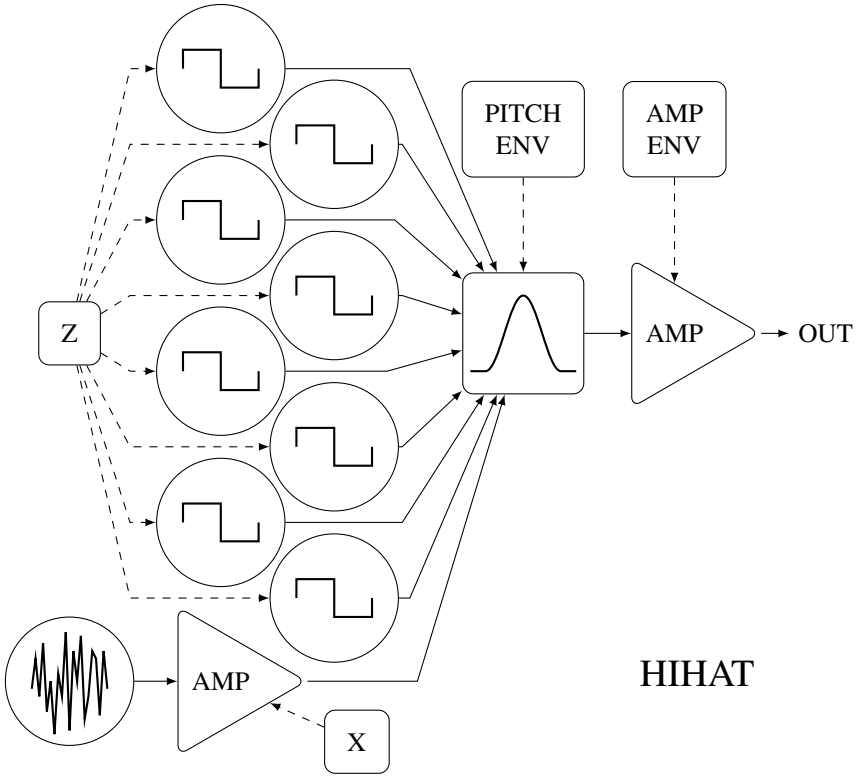
Cymbals are made out of filtered 'cymbal noise'. Cymbal noise is different from white noise, it actually has very little to do with noise. It is created by mixing 8 quite low and completely inharmonically tuned square oscillators. Filtering out the low frequencies of this mix give it a basic cymbal sound. So, cymbal noise is just a quite large number of harmonically unrelated frequencies in the mid to high frequency range.

3.5.1 Hihats

The hihats are short to moderately long 'bursts' of bandpass filtered cymbal noise. You can control the spectral content with the Z-parameter, and you can add, if you want, a slight amount of white noise. The pitch and pitch envelope control the bandpass filter frequency.

- X controls the amount of added white noise
- Z controls the spectral content of the cymbal noise

Tip: It is possible to make closed and open hihats on a single instrument by using the α and β variations, see §3.13.



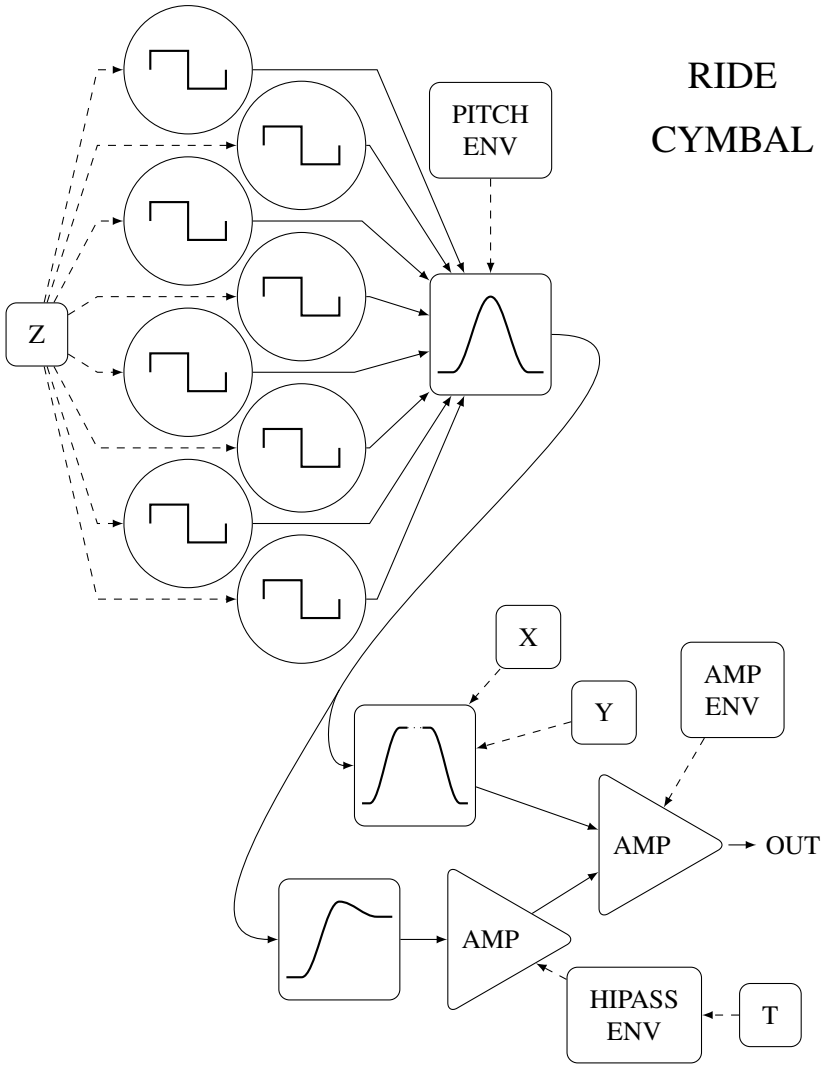
3.5.2 Ride cymbal

The ride cymbal model moves on where the hihat ends. First the 8-oscillator cymbal noise is filtered by a 12dB/oct bandpass filter, controlled by the pitch (+pitch env) setting to create a basic filtered cymbal noise. Then, the ride cymbal has two parallel filters that enhance a range of frequencies from this basic cymbal noise.

The main filter is a bandpass filter with frequency and bandwidth setting, and it has some non-linearities in it's design that thicken up the amount of different frequencies that are produced in the cymbal noise. A second parallel 24dB/oct highpass filter can produce a shorter bright 'ting' sound in the attack phase of the ride cymbal.

- X controls the frequency of the main filter

- Y controls the bandwidth of the main filter
- Z controls the spectral content of the cymbal noise
- T controls the decay rate of the hipass filter's envelope

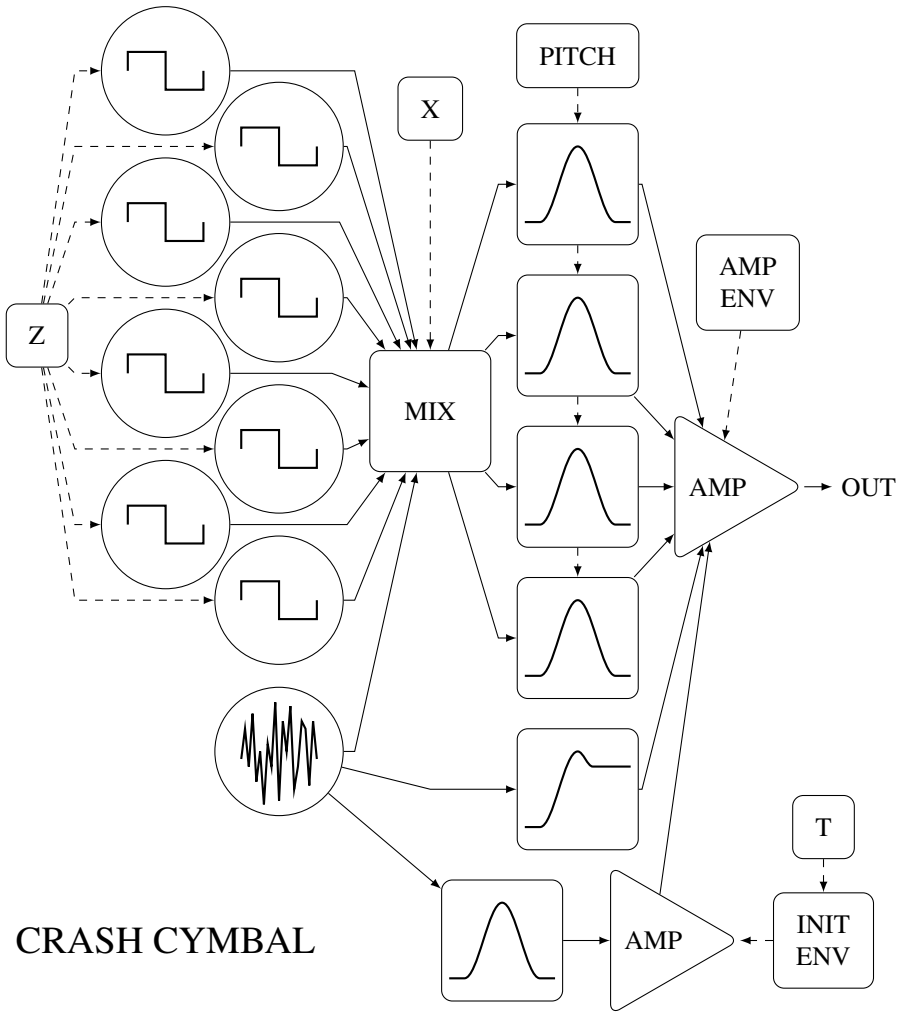


This way the ride cymbal algorithms is capable of producing a wide range of cymbal sounds, not limited to ride cymbals alone. The extra filters and the non-linearities in the main filter make it sound thicker and noisier than the hihat algorithm. The settings however allow you to produce much more non-realistic sounding cymbal-like sounds.

3.5.3 Crash cymbal

The crash cymbal is a set of 6 parallel filters working on white noise or a mix of white noise and 8-oscillator cymbal noise.

A first bandpass filter works with white noise on a rather low frequency with a short amp envelope to create the first 'hit' of the cymbal.



Secondly there is a group of 4 bandpass filters with different middle to high frequencies working on a mix of white noise and cymbal noise.

Finally, there is a highpass filter working on white noise to create the upper 'zing' of the cymbal sound.

- X controls the mix of white vs cymbal noise for the 4 middle bandpass filters
- Z controls the spectral content of the cymbal noise
- T controls the decay rate of the initial noise's envelope

3.5.4 Filter hihats

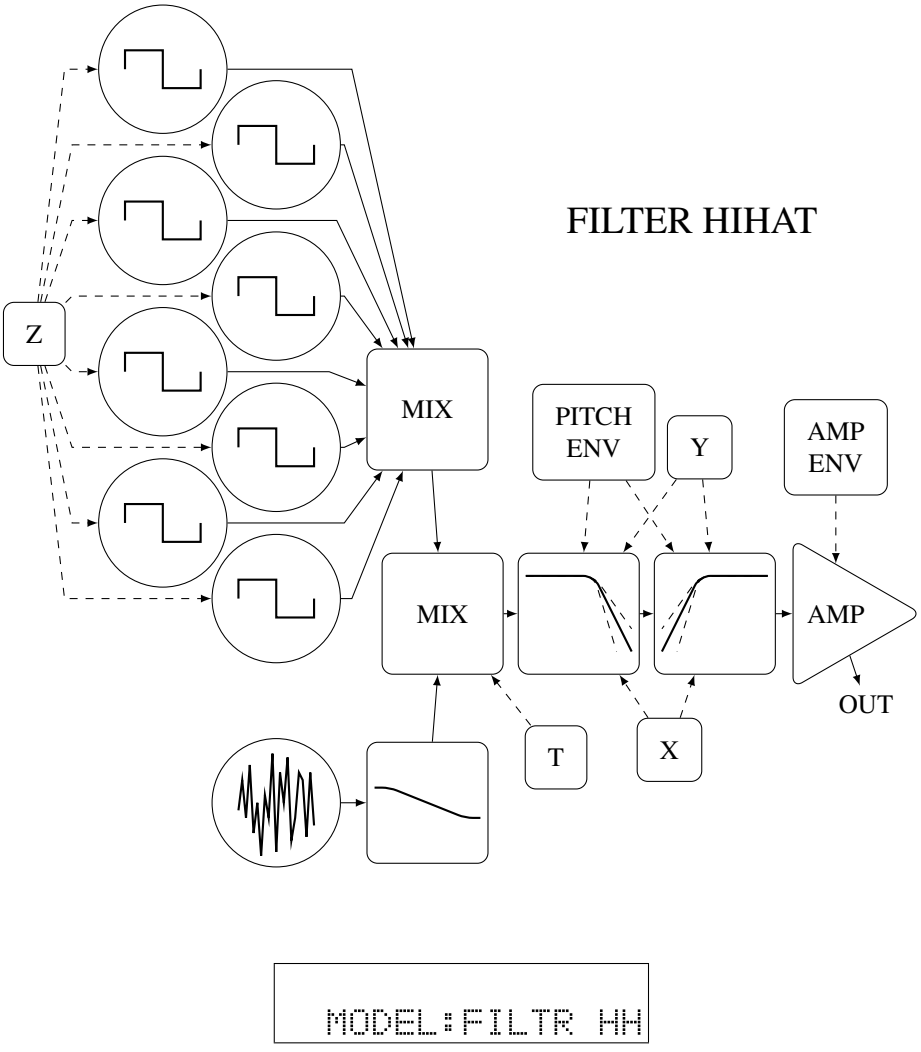
This hihat model utilises some digital filtering techniques on a mix of pink noise and 'cymbal noise' to create more a more 'electronic' sounding kind of cymbal sounds. Using the steeper filtering slopes, this model can be made to fit into a well-defined separate frequency range.

It again uses the mix of 8 harmonically unrelated square wave oscillators for 'cymbal noise' as in the previous cymbal models, with an adjustable 'spectrum'.

The pink noise is created by a white noise source, that is treated by low-boost filter with a 3dB/oct filter slope. Pink noise has a better balance between lower and higher frequencies than white noise, such that the noise source sounds more or less equal in volume over the complete pitch range.

This mix then passes through a lowpass and a highpass filter that have their filter slope controllable in steps of 12dB/oct from 0dB/oct upto a very steep 84dB/oct.

The central filtering frequency is set by the pitch and pitch env parameters. The separation between the hipass and lowpass filters is set with the 'bandwidth' parameter.



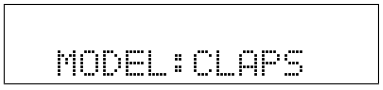
- X controls the filter slope of both filters in steps of 12dB/oct, ie. 0, 12, 24, 36, 48, 60, 72 or 84dB/oct
- Y controls the bandwidth or the separation between the hipass and lowpass cutoff frequencies
- Z controls the spectral content of the cymbal noise
- T controls the balance between cymbal noise and white noise

3.6 Claps

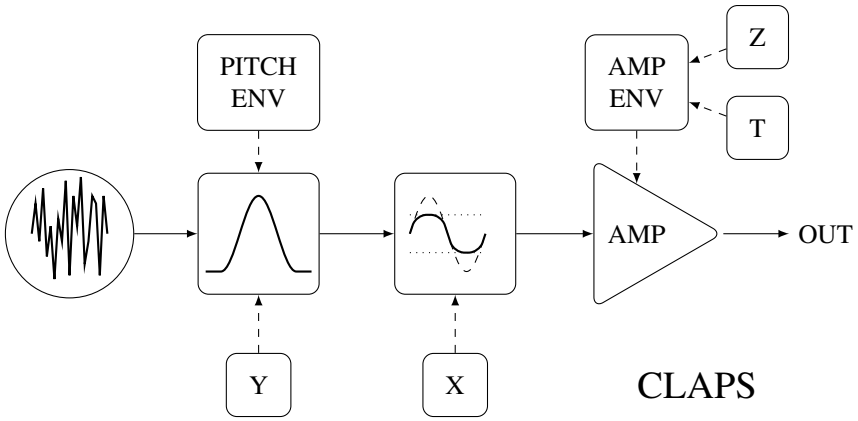
Although you could say it's technically not really a 'drum' sound, it's obvious that handclaps made their way into the electronic music, and can't be missing on an electronic drum machine.

3.6.1 Claps

The regular claps sound is made out of white noise, that is filtered by a resonant bandpass filter, sent through a drive stage, and attenuated by an amp envelope. The amp envelope can be set to trigger multiple times, to simulate the effect of multiple simultaneous handclaps. In this model, the pitch (and pitch envelope) determines the filter cutoff frequency.



- X controls the drive's gain factor
- Y controls the bandpas filter's resonance parameter
- Z controls the number of amp envelope retriggers
- T controls the time between the amp envelope retriggers

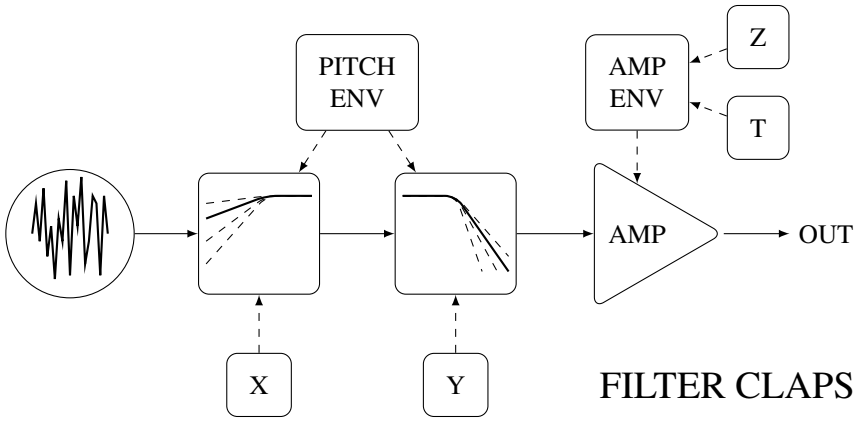


3.6.2 Filter claps

The filter claps sound shares a lot of properties with the previous model. It is also made out of white noise, that gets filtered to isolate a certain passband of frequencies, and is then attenuated by an amp envelope. Also this claps model's amp envelope can be set to trigger multiple times, to simulate the effect of multiple simultaneous handclaps, like from a group of people.

The difference from the previous claps model is in the filter settings. There's no distortion or resonance in this model, but the filter roll-off slope can be determined separately for the lowpass and hipass part of the filter.

- X controls the hipass filter's slope roll-of in 4 steps: 0dB/oct [0-31], 6dB/oct [32-63], 12dB/oct [64-95], 18dB/oct [96-127]
- Y controls the lowpass filter's slope in 8 steps. 0dB/oct [0-15], 12dB/oct [16-31], 24dB/oct [32-47], 36dB/oct [48-63], 48dB/oct [64-79], 60dB/oct [80-95], 72dB/oct [96-111], 84dB/oct [112-127]
- Z controls the number of amp envelope retriggers
- T controls the time between the amp envelope retriggers



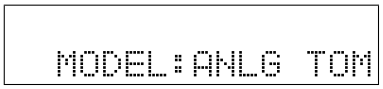
3.7 Toms

3.7.1 Analog Tom

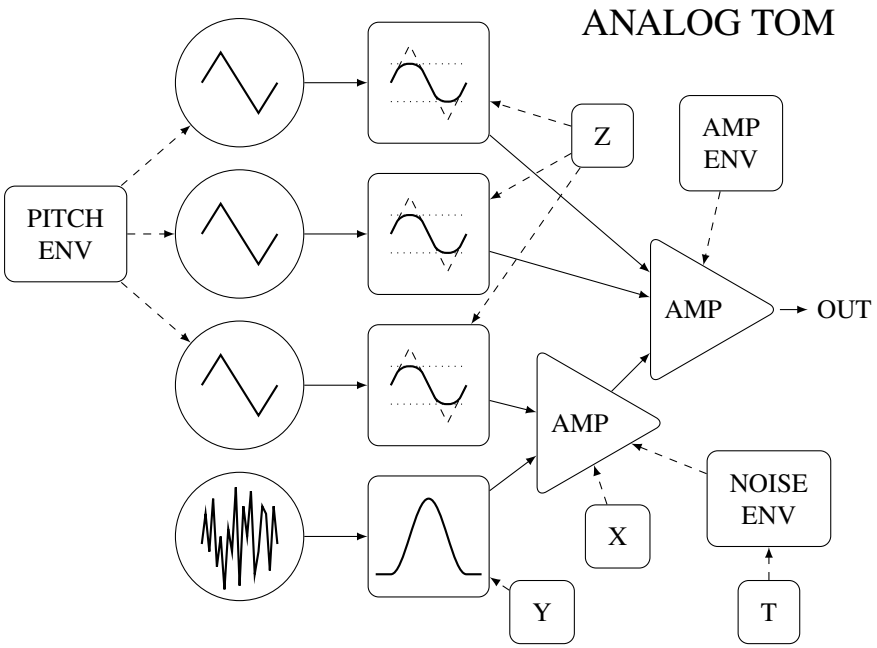
The toms are made using three oscillators with frequency ratios 1:1,5:2,7. The oscillators are the same kind of overdriven triangle waves such as in Analog SN and the Noise BD that contain a small amount of extra harmonics of each of the three oscillator frequencies.

The Analog Tom model also has a noise path that adds a noisy attack phase to the tom sound. The noise is filtered by a bandpass filter in the low to middle range.

Tip: Add a little pitch envelope to get a more 'realistic' tom sound.



- X controls the noise volume
- Y controls the noise filter frequency
- Z controls the triangle oscillators drive gain
- T controls the decay rate of the third oscillator and noise

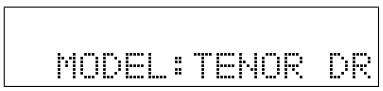


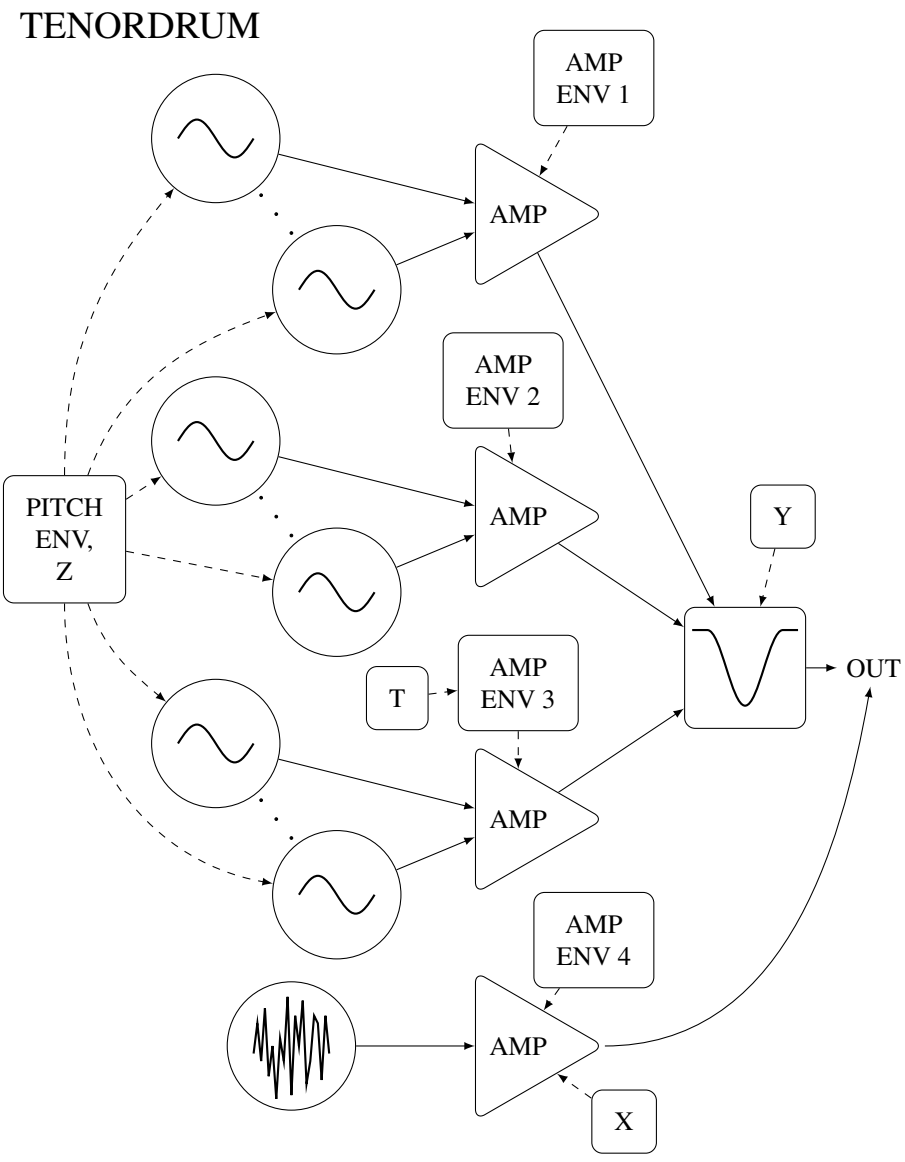
3.7.2 Tenordrum

The tenordrum is produced by 32 sinewave oscillators that produce a number of inharmonic frequencies to form the basic tenordrum sound. The oscillators are divided in 3

groups that have different amp envelopes, to create a certain spectral variation during the 'ringing' of the drum hit. These groups of sine oscillators can be pitched and their frequency separation can be controlled with the Z parameter. There is also a notch filter that can be used to further control the spectral content, controlled with the Y parameter.

Next to these groups of oscillators, a filtered noise hit that mimics the drum stick impact can be added.





If you don't know where to start with the pitch and Z parameters, put them both at the center (+64), and turn down the pitch envelope to get a more or less regular sounding tenordrum.

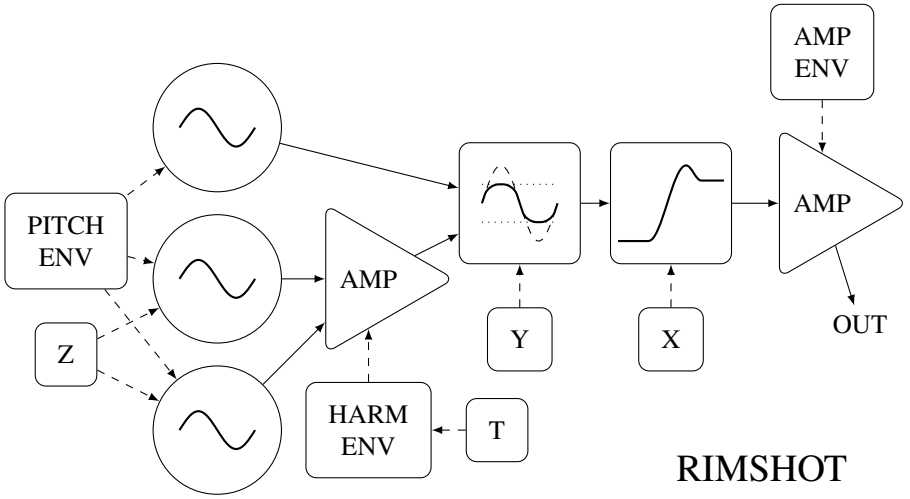
- X controls the noise hit volume
- Y controls the notch filter frequency
- Z controls the spectral content of the tenordrum sound
- T controls the longer harmonics decay rate

3.8 Miscellaneous

3.8.1 Rimshot

The rimshot is created out of 3 sinewave oscillators, that pass through a drive and a highpass filter. The lowest oscillator, the 'fundamental' goes directly into the drive, the upper two 'harmonic' oscillators are attenuated by a harmonic envelope first, and then go into the drive.

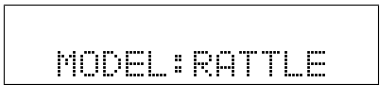
With the right settings, this model can sound very much like a rimshot on a classic analog drum machine, but this model is quite flexible and is able to create a lot more sounds. Put the pitch, pitch separation (Z) and filter cutoff (X) knobs in a central position, turn down pitch envelope amount and play a little with the amp and harmonic envelope decays to get a classic rimshot.



- X controls the highpass filter cutoff frequency
- Y controls the drive's gain factor
- Z controls the harmonic oscillators pitch separation
- T controls the harmonic envelope decay rate

3.8.2 Rattle

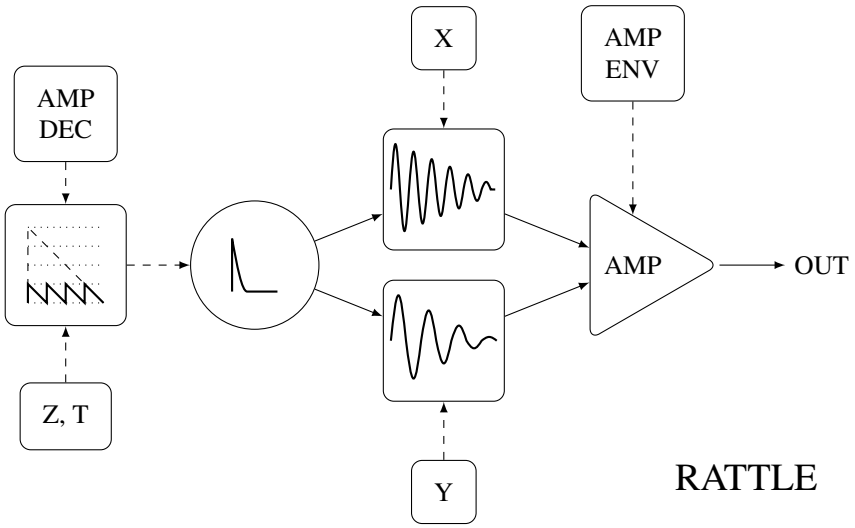
The rattle may be a bit of a weird instrument...It is made by short clicks that are sent into 2 parallel highly resonant filters, who are transforming the clicks into short sinewave pulses. The resonant frequencies of these two filters can be set separately.



But there is a second aspect to this instrument: one of it's envelope is multiplied by an adjustable factor (T) en then undergoes a so-called modulo division by 1. This results in a retriggering envelope that clicks multiple times for a single drum hit.

The rattle envelope has the same decay rate as the amp decay (set by the amp DECAY knob), but has a separate envelope curve setting (Z). So you can set the rattling amount, length and character by experimenting with the amp DECAY, Z and T knobs.

- X controls the first filter's frequency
- Y controls the second filter's frequency
- Z controls the rattle envelope's curvature
- T controls the retriggering multiplication factor



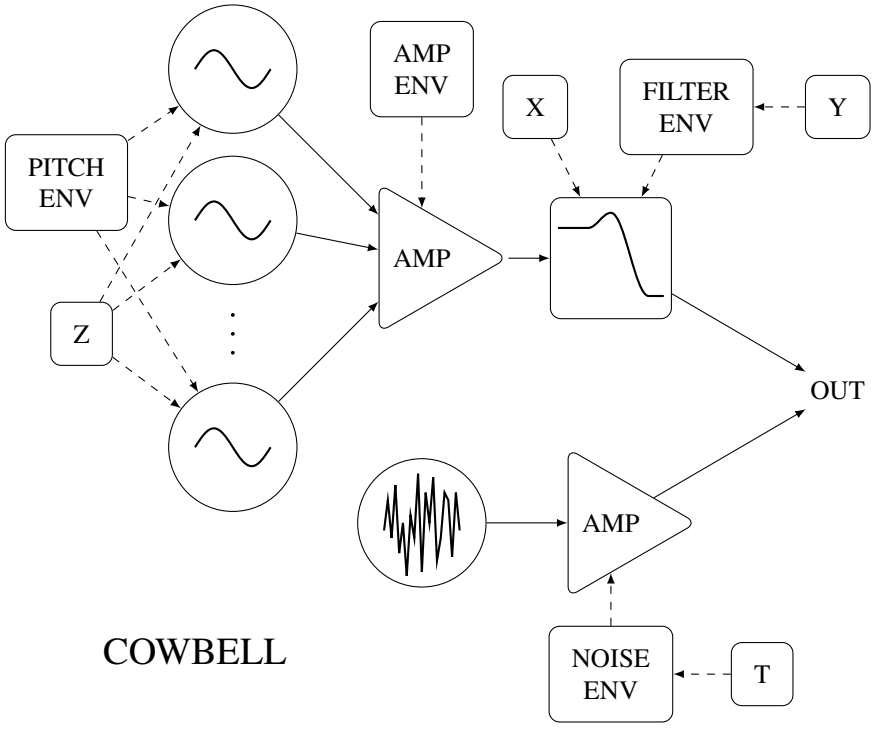
3.8.3 Cowbell

The cowbell sound is produced by 18 sinewave oscillators that produce a number of inharmonic frequencies to form the basic cowbell sound. This group of sine oscillators can be pitched and their frequency separation can be controlled with the Z parameter. The result can be lowpass filtered, and a short envelope can be applied to this filter to get the initial sound clearer, getting more filtered towards the end.

Next to this filtered group of oscillators, a very short white noise click can be added.

If you don't know where to start with the pitch and Z parameters, put them both at the center (+64), and turn down the pitch envelope to get a more or less regular sounding cowbell.

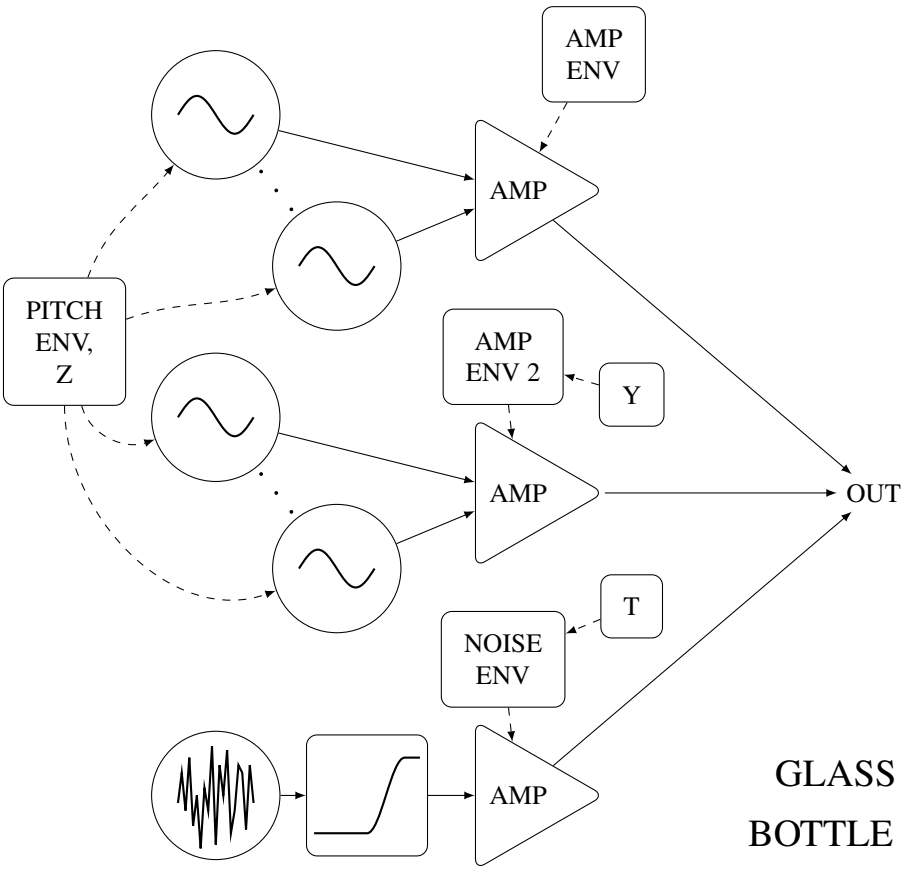
- X controls the filter's cutoff
- Y controls the filter's envelope amount
- Z controls the spectral content of the sound
- T controls the initial noise click



3.8.4 Glass Bottle

This model mimicks the sound of a glass bottle being hit with a stick. By playing with the pitch and Z parameters, a large range of sounds can be made, going far beyond a realistic sound glass bottle sound. The range of frequencies of the glass bottle model is rather high, ranging from 1kHz to 5kHz in case of a neutral pitch and Z-setting.

The glass bottle sound is produced more or less the same way as the cowbell model, but with different synthesis frequencies. There are 17 sinewave oscillators, divided in 2 groups. The first group of 7 sinewaves is attenuated by the 'main' amp envelope, controlled by the amp DECAY parameter. The second group of 10 by a second amp



envelope, controlled by the Y parameter. This division in 2 groups allows some spectral evolution in the glass bottle sound.

Next to this, there is a short noise envelope, controlled by the T parameter. This envelope controls a short initial burst of hipass filtered noise.

Of course, the complete group of sinewave oscillators can be pitched, and their frequency separation can be altered with the Z parameter.

- Y controls the second oscillator group's roll-off
- Z controls the spectral content of the sound
- T controls the highpassed noise click

3.9 Bassline synth models

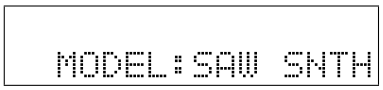
Though bein a 'drum machine', the Modor DR-2 also has a number of bassline synth models. They are not aimed towards drum sound synthesis, but are built with simple

monophonic bassline synths in mind, to accompany the drum instruments and together make a solid drum and bass foundation to build tracks on.

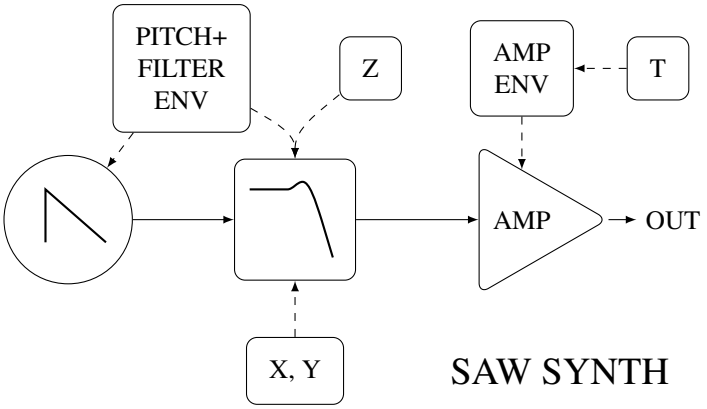
Bassline melodies can be created using parameter locks on the pitch parameter, and there's also a pitch portamento, controlled by SHIFT + AMP CURVE, see §3.10.

3.9.1 Saw Synth

This bassline model consists of a simple sawtooth oscillator and a resonant lowpass filter. The pitch envelope can also be assigned to the cutoff for typical basic filter sweeps. The amp envelope has an extra sustain stage, before starting to decay.

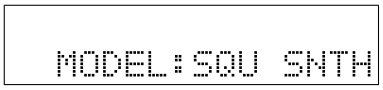


- X controls the filter cutoff frequency
- Y controls the filter resonance
- Z controls the cutoff envelope amount
- T controls the sustain length

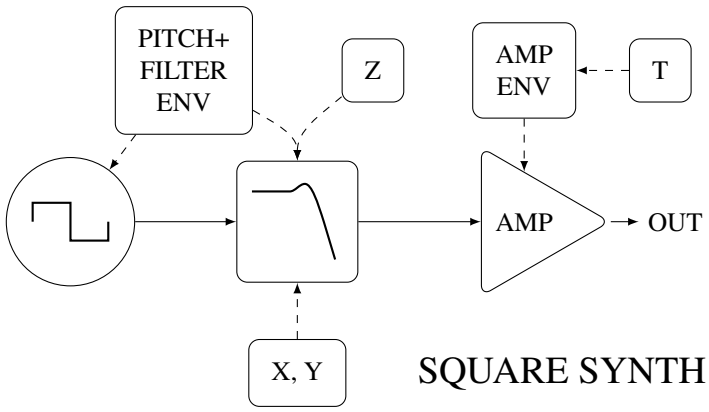


3.9.2 Square Synth

This model is identical to the previous one, but it uses a square oscillator instead of a sawtooth.



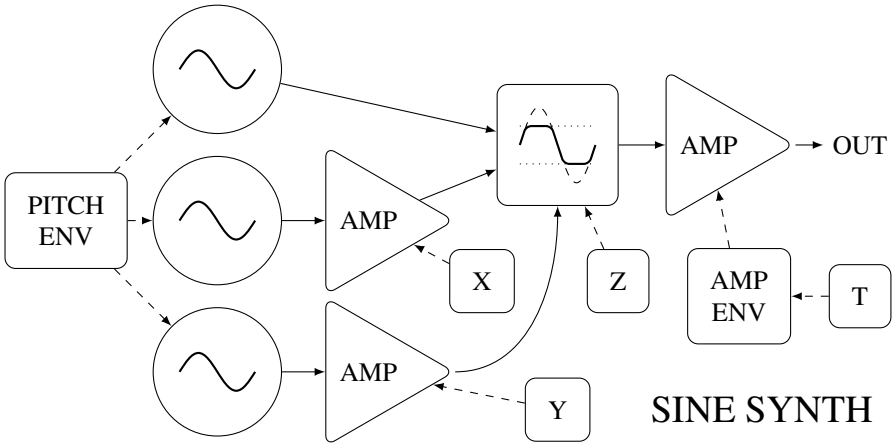
- X controls the filter cutoff frequency
- Y controls the filter resonance
- Z controls the cutoff envelope amount
- T controls the sustain length



3.9.3 Sin Synth

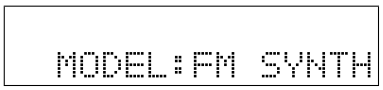
This bassline model uses three sinewave oscillators. The main sinewave oscillator can be mixed with a sine sub oscillator, and a sine 'upper' oscillator one octave above the main sinewave. The mix of the three can be sent through a soft overdrive section. Finally, it also has an extra sustain stage.

- X controls the sub oscillator volume
- Y controls the upper oscillator volume
- Z controls the overdrive
- T controls the sustain length

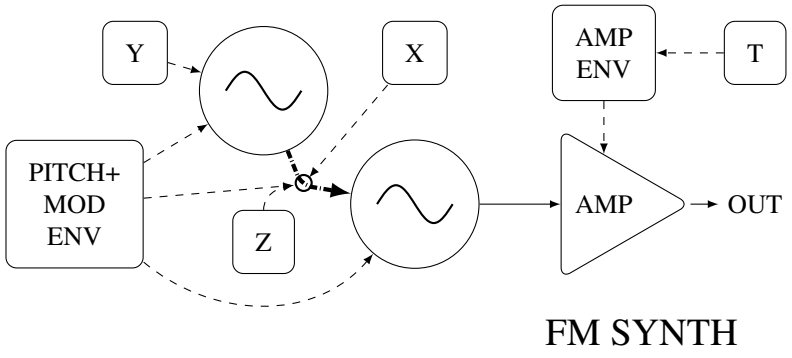


3.9.4 FM Synth

This bassline model has a basic 2-operator FM setup. A modulator sinewave oscillator modulates the frequency of a carrier sinewave oscillator. The modulator's frequency can be set on a certain ratio to the carrier frequency for typical simple FM sounds. The modulation amount can be modulated with the pitch envelope.



- X controls the FM amount
- Y controls the modulator/carrier frequency ratio
- Z controls the FM amount envelope
- T controls the sustain length



3.10 Tonal models

3.10.1 Tuning

Certain models of the DR-2, especially the bassdrums and the bassline synths, are 'tuned' or 'tonal', ie. you can tune them to tonescale notes.

When you use the PITCH control on most drum models, it will just show a value between 0 and 127. But for the bassdrum and bassline models this has been reworked to a standard F#-1 to F4 range in semitone steps. When you turn the PITCH control on a bassdrum or bassline synth model, you'll see the note names instead of just a value [0,127].

To reach the pitches in between the semitone steps, the bassdrum models also have a finetune parameter, that can be accessed with SHIFT+PITCH [-64,+63].

The tuning scale of the bassdrums and bass synths is an equal temperament scale: if finetune is at zero, A4 = 440Hz. Note that when loading a drumset from the factory presets, the finetune parameter will rarely be zero, so don't forget to check this parameter when you want to tune a bassdrum or bassline in harmony with other instruments.

3.10.2 Creating melodies

By using parameter locks (see §4.9), you can easily create simple bass melodies with the tonal bassdrums and/or bassline synths.

Keep a step button 1 to 16 down, while turning the PITCH knob to create pitch parameter locks. See §4.9 for more info on parameter locks.

3.10.3 Portamento

The bassline synths also have a portamento (or 'glide') setting, that can be controlled with SHIFT+CURVE (the bassline synth models have no transient click). It is also possible to use parameter locking on the portamento setting, but it can be especially interesting to modulate the portamento with β- or Accent-modulation to make melodies with gliding and non-gliding notes.

For example, set the portamento (SHIFT+CURVE) to zero, but give the β-version another portamento value (hold β + SHIFT + CURVE). α notes will then have no portamento, while β notes have.

3.11 Transient click volume

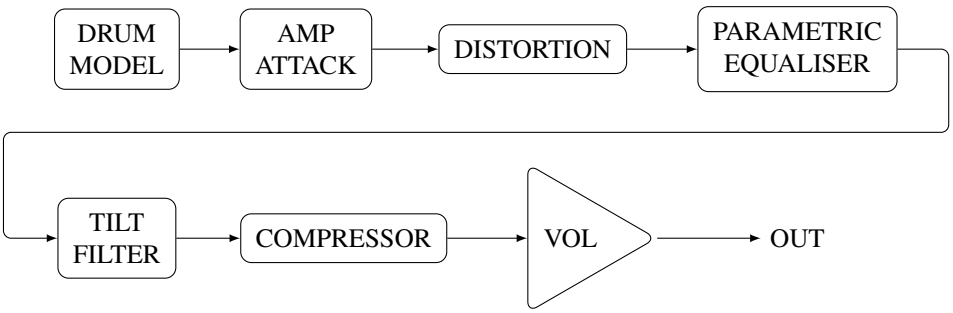
On the bass drum models and the Analog SN and Tom models, it is possible to reduce the transient clicks' volumes. These clicks have been built into these drum models intentionally, but at certain parameter settings, they can sound too intrusive. Reduce its volume or completely remove it using SHIFT + the CURVE knob in the amp section.

- SHIFT + CURVE controls the transient click volume

3.12 After treatment

The sounds generated by the drum models are passed into an 'after treatment section' of the drum synthesizer, consisting of:

- Amp Attack (SHIFT+AMP DECAY or SHIFT+def knob)
- Distortion (SHIFT+X)
- Parametric Equaliser (SHIFT+PITCH DECAY, SHIFT+PITCH CURVE, SHIFT+PITCH AMOUNT)
- Tilt Filter (SHIFT+Y)
- Compressor with a compressor treshold (SHIFT+Z or DEF+fader) and attack setting (SHIFT+T or DEF+def knob)
- Gain and Volume setting controlled by the faders and SHIFT+faders

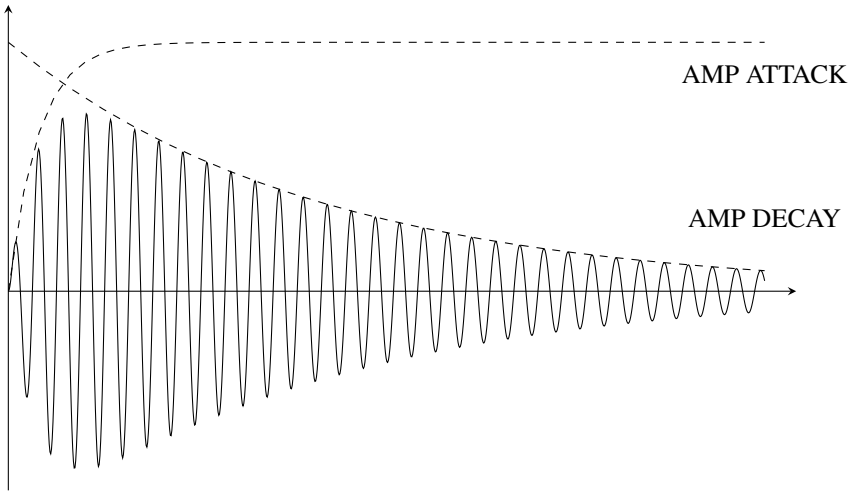


3.12.1 Attack envelope

The short amp attack envelope can soften the attack phase of drum sound somewhat, or it can be used to remove the sometimes excessive 'click' sounds at the start of a drum sound. At zero setting, there is no attack, and depending on the drum model, quite loud initial clicks can be produced.

The attack envelope is independant from any other envelope involved in the drum synthesis models. It just adds an extra amp envelope, that quickly goes from zero (no sound) to one (full sound). The amp attack setting does not influence the length or decay of a drum sound.

- Use SHIFT + DEF-knob (knob above fader) or SHIFT+DECAY to set the amp attack time.

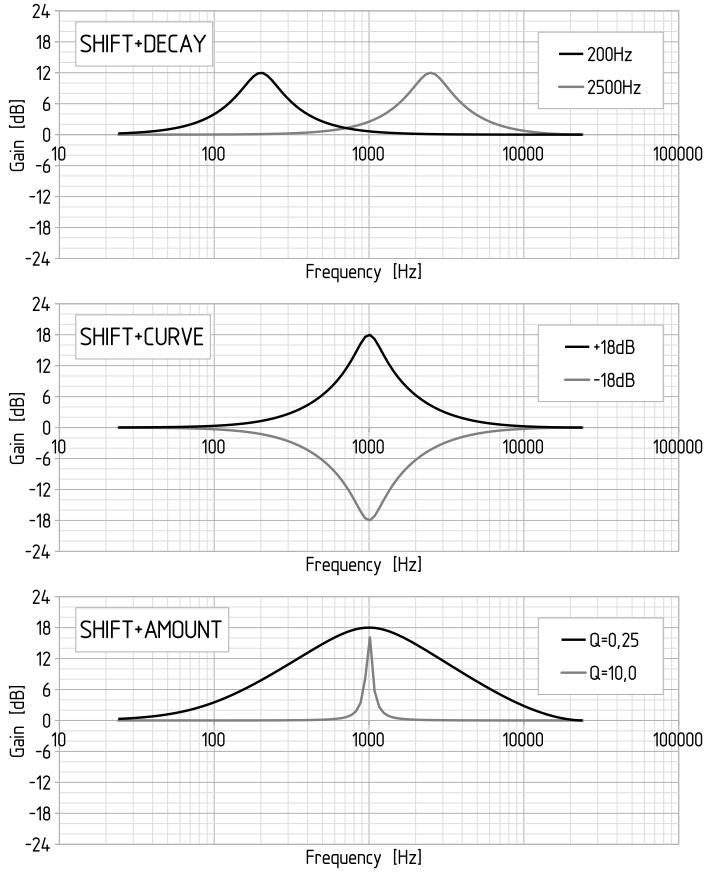


3.12.2 Distortion

The relatively soft 'drive' type distortion is controlled by the SHIFT+X knob and can be set from 0 to 127. At zero there is no distortion, the clean signal from the drum model is preserved, at +127 the maximum distortion is applied.

3.12.3 Parametric Equaliser

With the parametric equaliser you select a frequency band to amplify or reduce in volume. You can adjust following parameters:

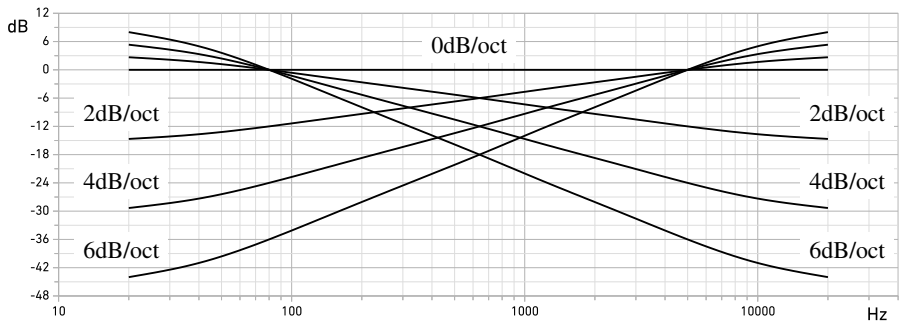


- The center frequency using SHIFT + (pitch) DECAY, between 0Hz and 12kHz. [0-127]
- The amplification/reduction, using SHIFT + (pitch) CURVE. Left from the center you reduce the volume of the chosen frequency band downto -36dB, right from the center you amplify it upto 36dB. [-64 - +63]
- The bandwidth of the frequency band, using SHIFT + (pitch) CURVE. It can be set between $+\infty$ and 0,25 [0-127].

3.12.4 Tilt Filter

The tilt filter is controlled by SHIFT+Y, and can be set from -64 to +63. At the central setting (+0) the filter has no effect. Left and right from the center position an increasingly steep slope, expressed in dB/oct is applied to the sound. Left from the center the high frequencies are attenuated ('lowpass'), right from the center the low frequencies ('high pass').

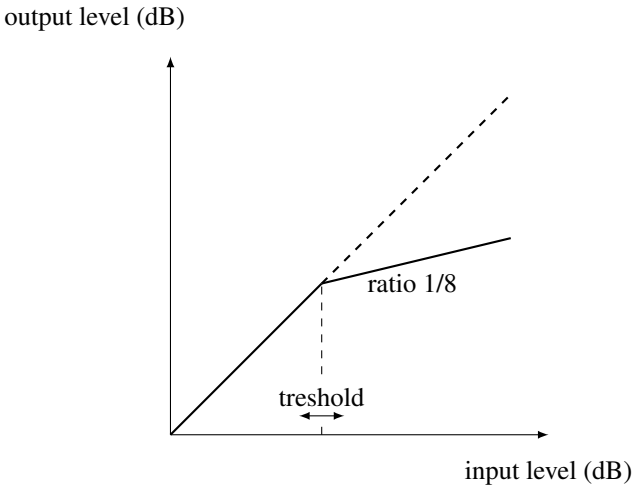
However, this filter is more subtle than a classic lowpass/highpass filter, as it allows more gentle slopes. Also, the filter parameter doesn't move a cutoff frequency as on a classic synthesizer filter. It alters the roll-off slope instead, in a range of -6dB/oct and +6dB/oct.



Left from the center the tilt filter can be seen as a lowpass filter with cutoff at 80Hz and an adjustable dB/oct slope, right from the center as a highpass filter with cutoff at 5kHz and an adjustable dB/oct slope.

3.12.5 Compressor

After the tilt filter, each channel or instrument has its own separate compressor, with sidechaining possibility and an adjustable attack time. The compressor uses a 1/8 compression ratio, a hard knee transition and has an automatical make-up gain. The compressor is operated via the DEF button (or DEF/COMP on newer machines) or with SHIFT + Z and SHIFT + T.

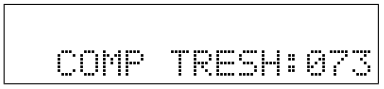


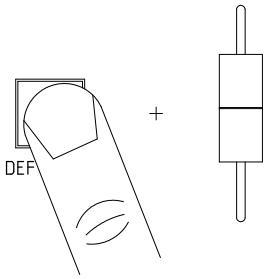
The compressor has an adjustable attack time. With the attack time at zero, the compression works instantly. But a somewhat higher value of the attack time can induce a little uncompressed 'click' transient at the beginning the sound, which can be used as a dynamics effect.

The compressors each work on their single instrument only, not on the mix of instruments. But it is possible to influence the dynamics of one instrument by another instruments level by sidechaining. By default, the compressors sidechain input is normalled to it's own audio input, but any of the other instruments can also be chosen. So,

you can get a drum instrument 'ducking' to the bass drum for example.

- DEF + fader or SHIFT + Z defines a channel's threshold level between 0dB and -96dB. At maximum, this disables the compressor. The functionality of DEF+fader and SHIFT+Z is identical.
- DEF + definable knob (knob above fader) or SHIFT + T defines a channel's attack time, between 0 and 20ms. The functionality of DEF+def knob and SHIFT+T is identical.
- DEF + button A..F defines the active channel's sidechain source.





3.12.6 Gain setting

Each instrument also has a so-called 'gain' setting. If you are using the DR-2 for playing live, you maybe don't want to be finetuning the different instruments levels everytime you touch a fader.

Therefore, there is the gain setting. By using SHIFT+fader you can set the level that corresponds to the volume level when the volume fader is all the way up. Consider it a bit as the gain setting on top of the channel strip of a mixing desk.

So, the gain setting allows you to balance the fine level adjustments right in your studio, to let you use the full range of the faders afterwards, for example when playing live, without the risk of setting one of the instruments too loud or out of balance.

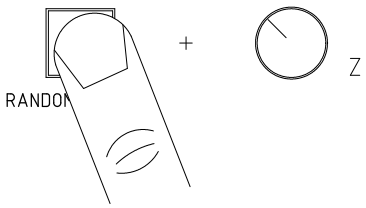
- Use SHIFT + fader to set an instruments' gain.

Note: turning down its fader is not the only way of muting an instrument. You can also use SHIFT + A..F buttons to toggle mute/unmute of an instrument.

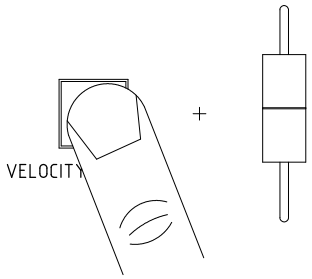
3.13 Modulations

You can bring a lot more 'life' in your drum riffs by using modulations that avoid every drum to sound exactly identical. Modulations alter the parameter value of one the drum model's parameters. There are 4 different ways of modulation:

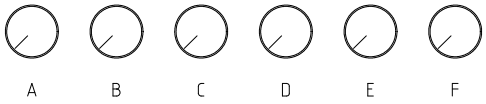
- Random: keep the RANDOM button pressed and turn one of a drum's parameter knobs. Now you'll hear a random variation of this parameter with every drum hit. Random can be connected to one parameter per drum. Double click RANDOM to remove the modulation.



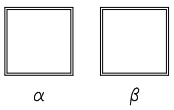
- Velocity or accents: keep the VELOCITY button pressed and turn one of a drum's parameter knobs. Now this parameter is modulated by velocity. When playing notes with different velocity or accent you'll hear a difference in sound. Velocity modulation can be applied on the volume parameter (VELOCITY+fader) and a 2nd parameter (VELOCITY+knob) per drum. Double click VELOCITY to remove the 2nd parameter modulation.



  Accents can be programmed in the sequencer, and are nothing more than drum hits with a higher velocity. If programming accents doesn't seem to have effect, increase the amount of velocity modulation. There is also a Global Accent Level. See §4.6.2
- Definable: keep the DEF button pressed and turn one of a drum's parameter knobs. Now the DEF-knob above the instrument's fader can be used to vary this parameter. Definable knobs can be connected to one parameter per drum. Double click DEF to remove this modulation.

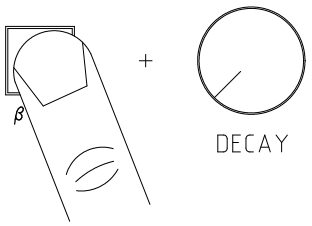


- Alpha/Beta: keep the β-button pressed and turn one of a drum's parameter knobs. Now you have a β-variation of this instrument. β-variations can be connected to one parameter per drum. The sequencer has separate tracks for the α and β variations, press α or β to program α/β drum hits.



- Parameter Locks: see §4.9

Closed and open hihats A very typical use for α-β variations is the closed and open hihat. Set all parameters for a closed hihat, then set the amp decay length for the open (β) hihat using β + AMP DECAY. Now you can use the α and β sequencer lines to program closed and open hihats, α for the closed hihats and β for the open hihats.



3.14 Loading and copying instruments

Loading a single instrument It is possible to load a single instrument from a drumset in memory, by keeping an instrument button A...F down, while loading a drumset from the menu.

- Press the MENU/YES button 1x to enter the LOAD menu
- Press the DRUMSET button, to load drumsets
- Use SELECT and/or VALUE to select a drumset. If you have LoadPreview on (see §5.7) you can prelisten before loading
- Press and keep the instrument button A...F down of the instrument you want to load
- Press MENU/YES to load the instrument (or EXIT/NO to cancel)

Only the instrument(s) of which you kept the button down while loading will be loaded, the other instruments remain in place.

Copying instruments in a drumset You can copy instruments from one instrument slot A...F to another, by using the REC and PLAY buttons.

- Keep down the button of the instrument A...F you want to copy from, and hit REC to copy
- Keep down the button of the instrument A...F you want to copy to, and hit PLAY to paste

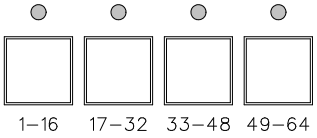
Note that copying instruments is also possible using the COPY menu, see §5.6.

4 Drum sequencer

4.1 16 step, 64 step or 128 step sequencer?

The Modor DR-2's sequencer has the typical 16 step buttons as can be found on many classic drum machines, typically playing the 16th notes of a 4 beat bar. Select an instrument by pushing one of the buttons A-F, and then program rhythms on the buttons 1 to 16. Press PLAY to hear the resulting drum riff. That's a classic 16 step drum sequencer.

The DR-2 patterns can have up to 4 of these bars of 16 steps, so a pattern can have a length of up to 64 16th notes. That's for example 4 bars of 4 beats of a classic four-on-the-floor pattern. Use SHIFT + 1..16/17..32/33..48/49..64 to set the pattern length to 1, 2, 3 or 4 bars.



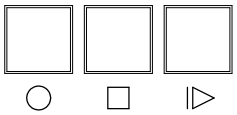
But the DR-2's sequencer can also do the steps 'in between' the steps. Just above the row of 16 step buttons, you can see there are not 16, but 32 leds. The DR-2's sequencer has actually up to 128 32nd note steps, 4 bars of 32 32nd notes. To program a note at the 32nd note in between, keep the 16/32 button pushed while hitting one of the 16 step buttons.

4.2 Rec, Play, Rec Pause and Stop

The sequencer can be playing or not playing, and can be recording or not recording. The current playing/recording status is indicated on the LCD screen.

- Hitting STOP stops both playing and recording.

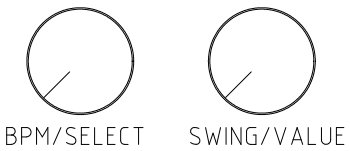
- Hitting PLAY puts the sequencer in 'playing' status, ie. in Play or Record.
- Hitting REC puts the sequencer in 'recording' status, ie. in Rec Pause or Record.



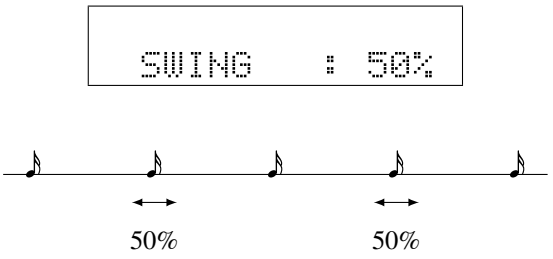
	If you hit PLAY while the sequencer was stopped, it starts playing. There are two playing 'modes' that can be toggled with the PLAY button. In the first playing mode, hitting the A..F buttons only selects an instruments track, it doesn't trigger any sound. If you press PLAY once more, you can manually trigger drums along with the playing pattern. The play symbols on the LCD screen are a bit different.
	If you hit REC when the sequencer was stopped, it goes into 'Rec Pause'. The sequencer doesn't run, but is ready to start recording. Hitting the A..F buttons you can hear the different instruments A..F get triggered, but nothing is recording yet.
	If you hit REC and then PLAY, the sequencer starts recording. Hitting the A..F buttons now triggers the instrument, and programs a new hit at the current playing step. You can also hit REC while playing to engage recording. After recording hit PLAY to stop recording but keep playing.
	After hitting STOP the sequencer isn't playing or recording. You can trigger the drum sounds with the A..F buttons.

4.3 BPM and Swing

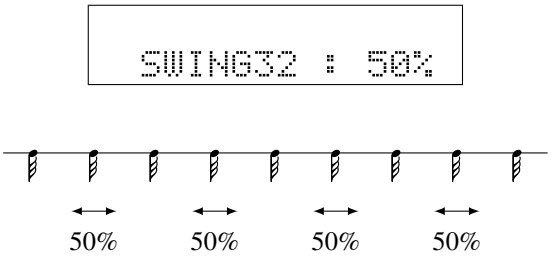
The tempo in Beats Per Minute (BPM) can be set using the BPM/SELECT knob at the top. When inside the menu, this knob is used as a data or menu selection encoder. So, go out of the menu (hit EXIT/NO) to be able to alter the BPM.



Swing can be set using the SWING/VALUE knob at the top. With Swing at 50%, all notes have identical note lengths. With Swing going above 50%, the first note in a pair of 16th notes gets longer, the second note gets shorter. This creates a certain 'shuffle' feeling in your drum pattern. When inside the menu, this knob is used as a VALUE knob, so go out of the menu (hit EXIT/NO) to be able to set a swing value.



The DR2 also has a 'Swing32' setting. This does the same as the Swing setting, but with 32nd note pairs. It can go both above and below 50%, This way you can change the timing of the 32nd notes 'in between' to be right in the middle, or just a little before or after the 16th notes. Keep the 16/32-button down while turning SWING/VALUE to set Swing32.



Every pattern and every song has its own BPM and Swing settings. But: when loading a new pattern while the sequencer is already playing, the new pattern's BPM and Swing are *not* adopted, the DR-2 keeps playing in the pace it was playing before.

When playing a song in Song Mode, the Song BPM and Swing settings always override the pattern's settings.

4.4 Pattern mode

Press the PATTERN button to get into pattern mode. In pattern mode patterns can be programmed and stored. When the sequencer is playing in pattern mode, the same pattern is played over and over again (while in song mode, a list of consecutive patterns is played).

A pattern is a set of sequencing data used by the drum sequencer. The sequencer uses these data to tell the synthesizer what the different drums should play: which notes should be played where, which ones should have accents or flams, etc... A Pattern contains all the drum sequences for the 6 instruments, including the α/β-variations, flams, tuplets, breaks, accents and reverses.

Pattern properties Apart from the drum sequences and parameter locks, a pattern also contains some other data, the pattern properties. These are :

- Pattern name

- Pattern BPM
- Pattern length (number of steps)
- Pattern Swing and Swing 32
- Pattern Reverse Time
- Pattern Flam Time
- Pattern Tuplet Number, Time and Balance
- Pattern randomization data per instrument
- Pattern Polyrhythmic clocks data

Pattern switching If a new pattern is loaded while the sequencer is playing, the sequencer first finishes the active pattern and then switches to the new pattern. Thereby, the active pattern properties such as BPM and swing settings are kept. The sequencer does *not* switch to the new pattern's BPM.

When loading a new pattern while the sequencer is not playing, the newly loaded pattern's BPM and all other pattern properties are adopted.

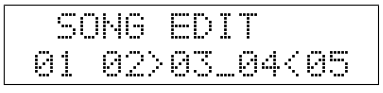
Only exception to this are the tuplet settings: tuplet number, time and balance. These are always adopted from the newly loaded pattern, whether the sequencer is playing or not.

4.5 Song mode

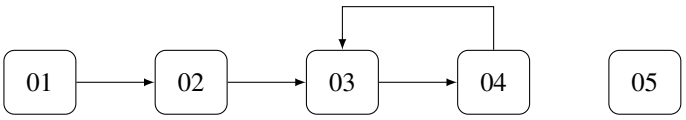
Press the SONG button to get into song mode. In song mode songs can be programmed and stored. A song is a list of patterns that can be played sequentially or in a loop. When the sequencer is playing in song mode, every time a pattern comes to an end, it switches to the next pattern in the list.

Song edit You can double click the SONG button, or go via the menu (5x MENU-button) to get into the SONG EDIT menu. Here you can alter the song's pattern list. Use the SELECT encoder to move back and forth in the song pattern list, and use VALUE or SHIFT+SELECT to alter the pattern numbers.

Song loop Songs can also be used to make loops of a number of patterns, if the 64/128 steps of a pattern are insufficient. Hold the SONG button down while turning the SELECT encoder in Song edit to set the loop markers.



Song end You can set a pattern number in the song pattern list to 'none', turn it past pattern 96 (VALUE full right). If the sequencer meets this, it will stop playing.



Song properties Just like a pattern, a song has a speed setting (BPM), swing and swing32 settings, a flam and a reverse timing. When playing in song mode, these pattern data are overridden by the song's data. So, a pattern can sound somewhat different in different songs. If the BPM differs between two songs that have the same pattern number in their list, the pattern will play faster in one song and slower in the other.

The tuplet settings however (tuplet number, time and balance) are always adopted from the playing pattern.

Song switching If a new song is loaded while the sequencer is playing, the sequencer first finishes the current pattern, and then switches to the first pattern of the newly loaded song.

At that moment, the song properties such as the BPM speed setting and Swing settings of the new song are adopted. So it's possible this results in an abrupt tempo switch.

4.6 Pattern programming

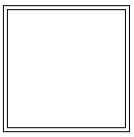
Basic pattern programming happens by selecting an instrument by pressing a button A..F, and then toggling notes on/off in the sequencer with the number buttons 1..16. That's the classic 16-step drum sequencing. But there's more to pattern programming on the DR-2...

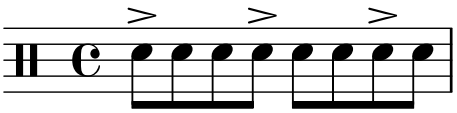
4.6.1 32nd notes

The DR-2s' sequencer can also play 32nd notes, or the 'notes in between the 16th notes'. Toggle these notes on/off by keeping the 16/32-button pressed.

4.6.2 Accents

By applying accents, you can make certain steps more intense than other. The drum synthesizer can be set to vary loudness and one extra parameter with accents, by applying velocity modulations, see also §3.13.





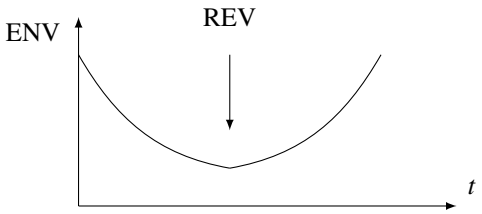
There are two accent 'levels' or velocity values in the DR-2's sequencer: a separate accent line per instrument, and a global accent line for all instruments at once.

- Keep the ACC(ent) button down and select the steps you want to accentuate to use the per-instrument accent line,
- or just shortly hit ACC(ent) to access the global accent line for all instruments together.

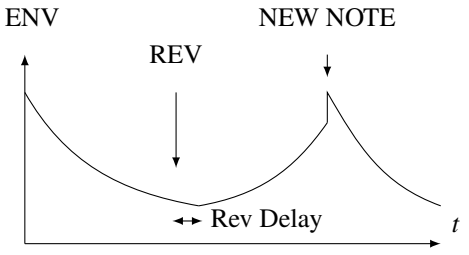
The instensity of the global accents is not only influenced by the velocity modulation (§3.13), but also by the Global Accent Level. The Global Accent Level is set using ACC + SWING/VALUE, and determines how intense the global accents sound. It doesn't influence the per-instrument accents.

4.6.3 Reverses

By using the REV-button you can program reverse events. When meeting a reverse event, all the drum synthesizer's envelopes (for that instrument) will start running backwards, resulting in a reversed drum sound. Keep the REV button pressed and select the steps where you want the drum sound to start running backwards. So, the selected step is not the place where the reversed drum note will end, it's where it will reverse and start running backwards. Keep REV and 16/32 pressed if you want to program a reverse on a 32nd note step.

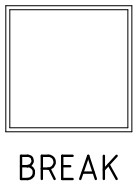


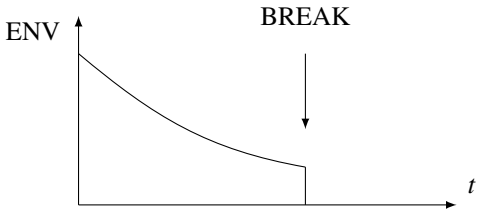
If you turn the (SWING/)VALUE knob while holding REV down, you can set a slight delay between the reverse event on the sequencer and the actual turnaround of the envelopes. Often, when using a reversed drum sound to run up to new drum hit, without such delay the new drum hit would lose it's impact. This can be avoided using the reverse delay. With a certain reverse delay, the instrument is not yet entirely back 'up' when a new drum hit arrives, so the new drum hit keeps it's impact.



4.6.4 Breaks

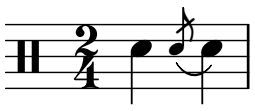
When meeting a break, all envelopes are immediately set to zero, so the playing note is immediately silenced. Keep the BREAK button pressed and select the steps where you want the drum sound to stop. Keep BREAK and 16/32 pressed if you want to program a drum break on a 32nd note step.



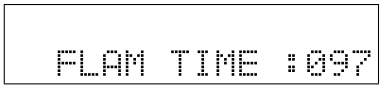


4.6.5 Flams

A 'flam' is a double hit of a drum, like a drummer that lets his drumstick bounce twice or plays a drum hit with both hands almost simultaneously. Keep FLAM button pressed and select the steps where you want to program a double hit. Keep FLAM and 16/32 pressed to program a flam on a 32nd note step.

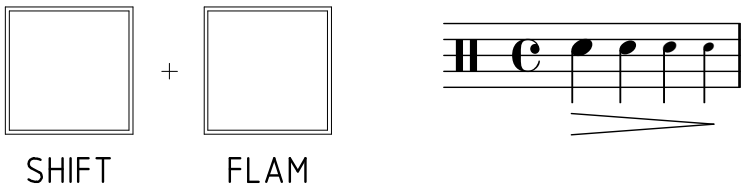


If you turn the (SWING/)VALUE knob while keeping the FLAM button pressed you can set the FLAM time, the time between the two almost simultaneous hits.



4.6.6 Tuplets

A 'tuplet' is a series of multiple consecutive drum hits. It can for example be used to program triplets, or just for notes that go 'off the grid'. Keep SHIFT+FLAM button pressed and select the steps where you want to program a tuplet. Keep SHIFT + FLAM + 16/32 pressed to program a tuplet on a 32nd note step.



Tuplets have a balance setting. This is the velocity 'evolution' of the consecutive drum hits. If it is set neutral, all tuplet drum hits are played equal in volume. If it's set positive, the drum hits decrease in velocity, sounding a bit like an echo. If the balance is negative, the tuplet's drum hits increase in velocity, like an upcoming drum roll. Don't forget to set a volume velocity sensitivity to get the full effect (VELOCITY + fader, see §3.13).

If you turn the Y, Z or T knob while keeping the SHIFT+FLAM button pressed you can set the tuplet balance, number and time:

- SHIFT+FLAM+Y: tuplet balance, can be set to diminutive (positive) or growing (negative)
- SHIFT+FLAM+Z: tuplet number, the number of tuplet drum hits
- SHIFT+FLAM+T: tuplet time, or the time between tuplet drum hits

The tuplet balance, number and time parameters are parameters that belong to the pattern. You can save and recall them with the pattern.

4.6.7 Meter or bar length

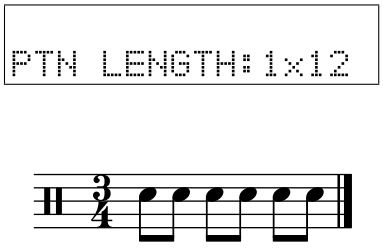
Bar lengths can be set using the SHIFT+button:

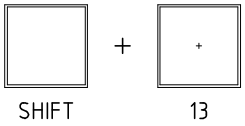
- SHIFT + 1-16/../49-64 sets how many bars you want in your pattern: 1, 2, 3 or 4.
- SHIFT + step button sets the number of steps in a bar.
- SHIFT + 17-32/33-48/49-64 + step button sets the number of steps in a bar, possibly spanning more than 16 steps.

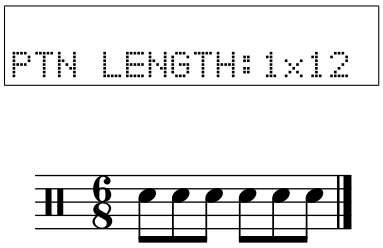
If you want to play a piece in 6/8 time signature for example, press SHIFT+13. You'll have a bar length of 6 8th-notes now. When the sequencer arrives at step 13, it restarts from zero. The display shows 'Patt Length:1x12' (or 2, 3 or 4 x12).

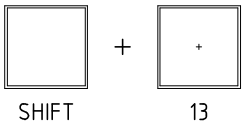
You can also combine this with the 16/32 button to create very special time signatures... 27/32, anyone?

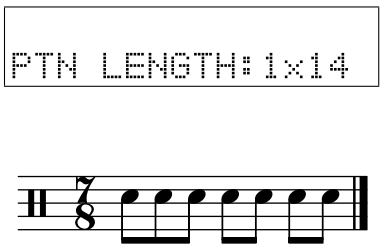
It is also possible however, to create bars with more than 16 steps. Therefore use SHIFT + one of the four buttons 1-16/../49-64 + a step button. For example, SHIFT + 17-32 + 5 creates a bar length of 20 steps, for a 5/4 meter.

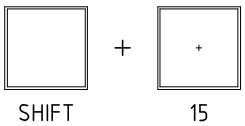

PTN LENGTH:1x12

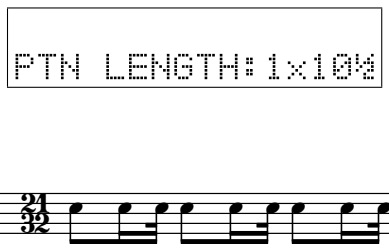

SHIFT
13

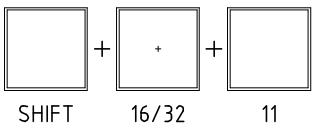

PTN LENGTH:1x12

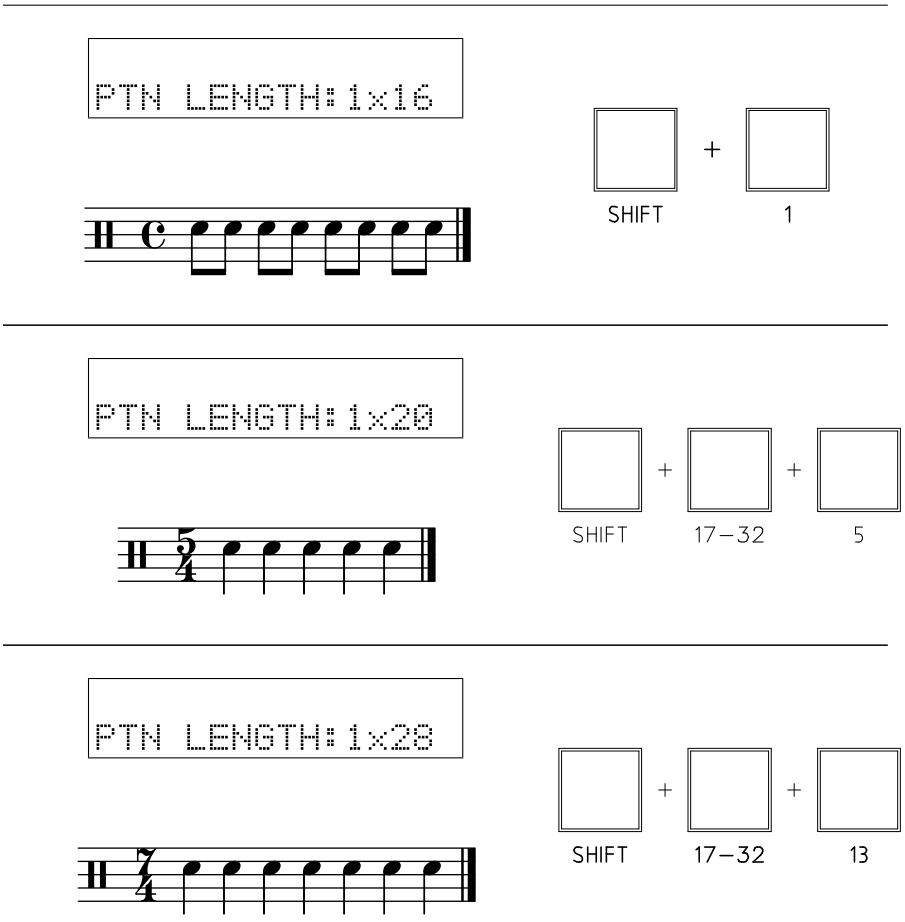

SHIFT
13


PTN LENGTH:1x14


SHIFT
15


PTN LENGTH:1x10%

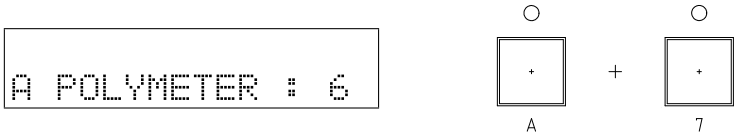

SHIFT
16/32
11

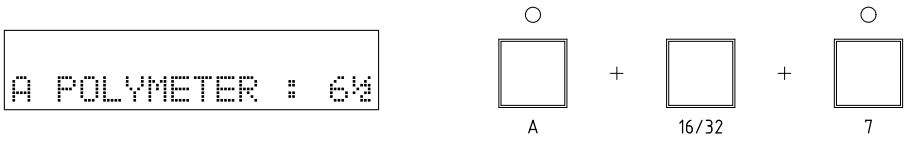


4.6.8 Polymeters

The DR-2 can also use polymeters. These are different meters or pattern lengths for each of the 6 instruments of the DR-2. They are a very easy and interesting way to bring a live and variation in a drum pattern.

Polymeters are programmed the same way as meters or pattern lengths above. Just hold the instruments' button A..F down (instead of SHIFT) and use one of the 16 number buttons to set a different polymeter, eventually combined with 16/32.



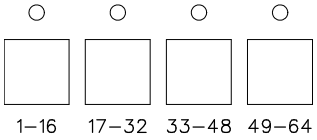


4.6.9 Bars and pattern variations

The bar buttons 1-16/17-32/33-48/49-64 are used to select the 4 bars of the sequencer. These buttons can serve 2 different purposes.

- You can make long patterns of up to 4 bars, or 64 (16th note) steps (or 128 32nd notes)
- Or you can make shorter patterns where the bars serve as variations, for example, to program fill-ins

Press SHIFT + 1-16/17-32/33-48/49-64 to set the length of the pattern to 1, 2 3 or 4 bars. When set to 1 or 2 bars, the other 'unused' bars can be used as pattern variations.



- With a pattern length of 1 bar (SHIFT + 1-16), you can switch between 4 variations: 1-16, 17-32, 33-48 and 49-64.
- With a pattern length of 2 bars (SHIFT + 17-32), you can switch between 2 variations: 1-32 and 33-64.
- With a pattern length of 3 or 4 bars (SHIFT + 33-48/49-64) there is only one single variation

If using longer bars with more than 16 steps, you can still apply the same system. In a 5/4 meter using a 20 step bar length, a single bar uses the 'pages' 1-16 and 17-32. Thus there's a second bar possible at 33-48 and 49-64.

- Use the 1-16/../49-64 buttons to switch between the two bars, or
- Use SHIFT + 1-16/../49-64 to set a pattern length of 1 or 2 bars.

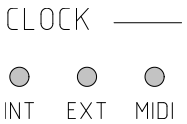
4.7 Synchronisation

The DR-2 can be played in synchronisation with a lot of other gear. There are 2 synchronisation methods, the DR-2 can use them both as a master or as a slave:

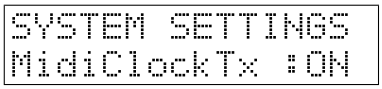
- MIDI Clock on MIDI IN and OUT connectors
- 24 PPQN clock on CLOCK IN and OUT connectors

The DR-2 starts working as a slave when it receives MIDI clock signals on the MIDI IN input or clock pulses on the CLOCK IN input. In this case the BPM setting of the sequencer is overridden by the external clock's tempo. If there is no external clock coming in, the DR-2 works as a master and can send both clocks ticks on the CLOCK OUT connector and a MIDI clock on it's MIDI OUT.

The leds on the upper left corner of the frontpanel indicate which clock is in control of the DR-2.



The MIDI clock output can be disabled or enabled in the SYSTEM SETTINGS menu. If you don't succeed synchronising external MIDI gear to the DR-2, check the Midi Clock Tx setting.

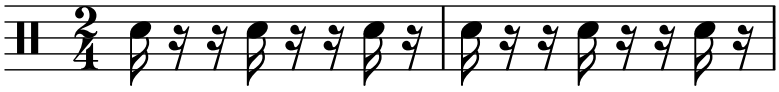


The CLOCK OUT connector's output is determined by the ClkOutput in the SYSTEM SETTINGS. This setting can be set to DRUM A - DRUM F, 24PPQN or 48PPQN clock output. Use 24PPQN or 48PPQN to synchronise external slave gear to the DR-2. If you don't need the clock output, you can use it as a drum trigger output for one of the drums in instruments A-F.

If you don't succeed synchronising external gear to the DR-2 CLOCK OUT output, check the Clock Output setting.

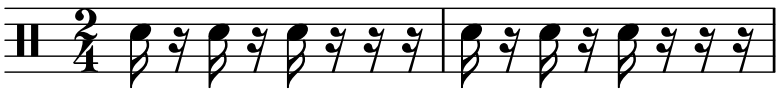
4.8 Euclidean Generator

Euclidean rhythms are drum patterns characterized by a number of drum hits in a total number of steps, whereby the drum hits are spread out or separated as much as possible over the available total number of steps. An example:

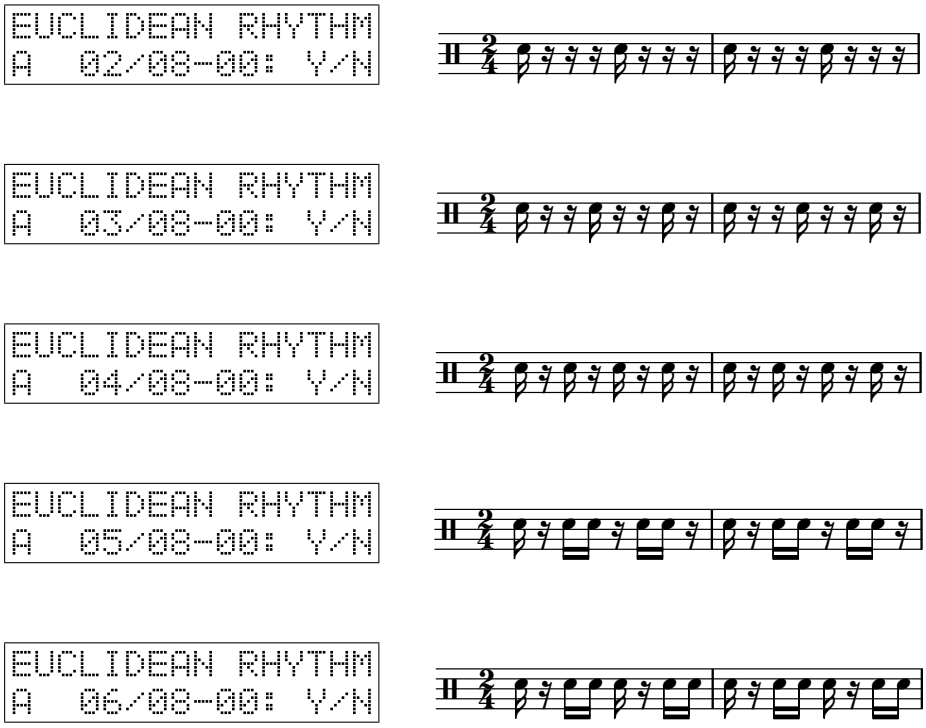


This is a Euclidean 3|8 rhythm. It contains 3 drum hits in 8 steps (8 16th notes on the DR-2 sequencer). To achieve a maximum drum hit separation, they are spaced with 2 times 2 rests and 1 time 1 rest in between the drum hits, totalling 3 drum hits and 5 rests, or 8 steps.

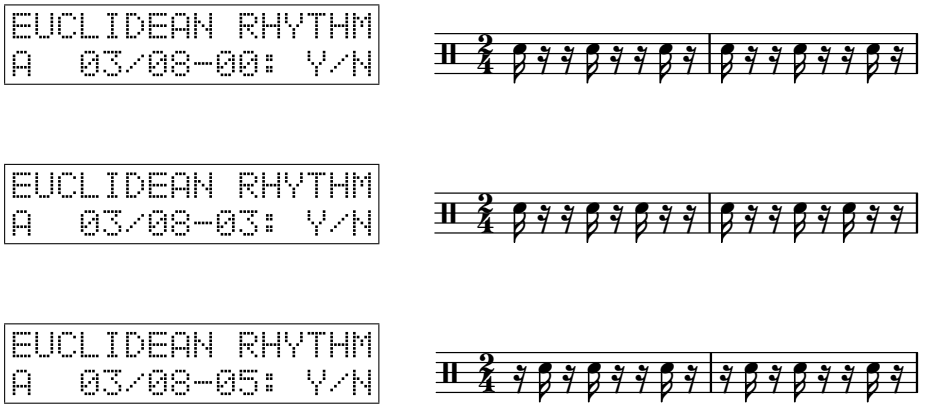
This, as a counterexample, is *not* a Euclidean rhythm. The drum hits and rests are not evenly spread.



Here are a few more examples of Euclidean rhythms with a total number of 8 steps: 2|8, 3|8, 4|8, 5|8 and 6|8:



Another important parameter of Euclidean rhythms is the so-called 'rotation', the number of steps the pattern is shifted. Below are two examples of 3|8 Euclidean rhythms with a different rotation:



Euclidean rhythms can serve as a quick way to initialize drum patterns, or as a starting point to create your own. The DR-2 has two different ways of accessing the Euclidean rhythm generator:

- via the INIT menu in pattern mode

- via the SHIFT+REV buttons

. . . via the INIT menu The first way to access the Euclidean generator is through the INIT menu:

- Press PATTERN to get into pattern mode
- Press MENU(/YES) 4 times to get into the INIT menu
- Use the SELECT encoder to select the Euclidean generator
- Use VALUE to set the number of drum hits
- Use SHIFT+SELECT to set the total number of steps
- Use SHIFT+VALUE to set the pattern rotation
- Now press YES(/MENU) to initialise the active instruments' pattern (or press NO to cancel)

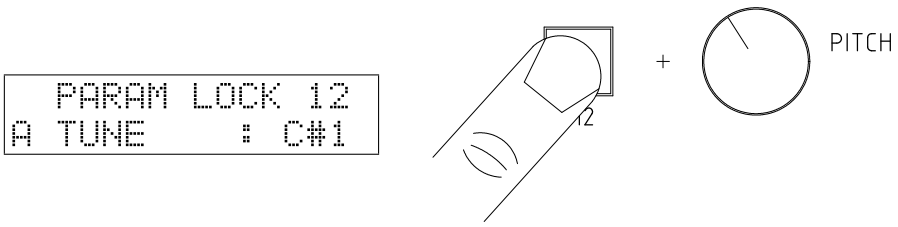
. . . using SHIFT+REV But there is also a quicker and lot more intuitive way to access the Euclidean generator directly from the frontpanel. Keep the SHIFT and REV buttons down simultaneously while you:

- Turn SELECT to set the total number of steps
- Turn VALUE to set the number of drum hits
- Turn AMOUNT to set the pattern rotation
- Press YES to apply the Euclidean rhythm to the active instrument (or just release SHIFT+REV to cancel)

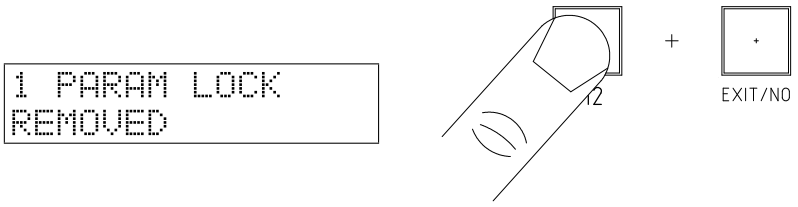
4.9 Parameter Locks

A parameter lock is a deviating value of a certain synthesis parameter, programmed at a certain step in the sequencer. It allows you to program differently sounding drum hits at certain positions in a pattern. Programming and removing parameter locks is very easy:

- Keep a sequencer button (1. . . 16) down, with or without 16/32, while turning a knob to program that parameter value at that position in the pattern



- Keep the sequencer button down and hit NO(/EXIT) to remove parameter locks at that position.



Note: a parameter lock does not necessarily have to be aligned with a drum hit in the sequencer. Parameter locks can also be programmed anywhere in between two drum hits. The current sounding drum will then get the parameter variation the moment the sequencer passes the parameter lock's step position. The next drum hit returns again to the normal situation.

Note: parameter locks on the pitch parameter can be used to create simple melodies, check §3.10.

Parameter locks are stored as parts of a pattern. A pattern can contain a maximum of 64 parameter locks.

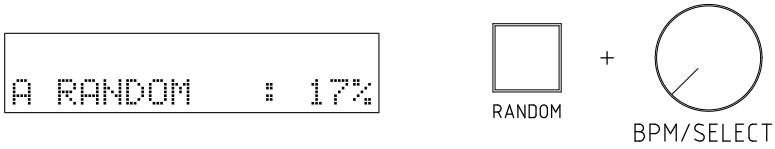
4.10 Pattern randomization

The DR-2 has some versatile options onboard to generate random variations of the drum hits programmed in a pattern. It has three action types that can be randomly applied on the α, β and accent tracks of each instrument separately and independently.

- ADD can only add drum or accent hits to the already programmed ones. Existing drums and accents always remain.
- SWI can both add to or remove drum or accent hits from the already programmed pattern (it can switch their on/off status).
- SUB can only remove drum or accent hits from the already programmmed ones, only existing drums and accents can randomly get skipped.

For each of the 6 instruments A...F, an independent random probability value can be set between 0% and 100%. At 0% no randomization happens at all, at 50% each drum hit has a 50% chance of being hit for action (ADD, SWI, SUB), and at 100% the chosen action is always applied.

- Keep RANDOM pushed and turn SELECT(/BPM) to set an instrument's random probability.

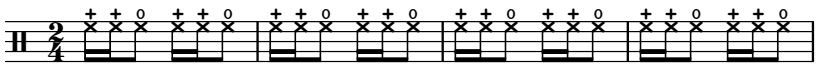


The action types can be applied on:

- The α track, keep RANDOM down and hit the α-button to choose ADD, SWI, SUB or OFF for the α drum hits.
- The β track, keep RANDOM down and hit the β-button to choose ADD, SWI, SUB or OFF for the β drum hits.

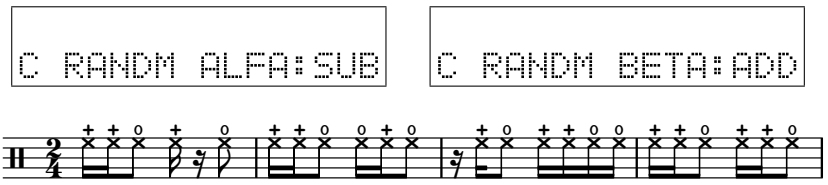
- The accent track, keep RANDOM down and hit the ACC-button to choose ADD, SWI, SUB or OFF for the accents.

Let's look at the example below: suppose we programmed the common hihat sequence below, two short (16th) closed hihats and a long (8th) open hihat on the afterbeat. The closed hihats are α hits, the open hihats β hits.



Now, it would be interesting to have randomly, every now and then, a open hihat added to the sequence, while sometimes a closed hihat gets removed from it. That way the characteristic open hihat on the afterbeat always remains.

Put the α random action to SUB (RANDOM+α), and put the β action to ADD (RANDOM+β). Now turn up the the probability (RANDOM+SELECT) and listen. The DR-2 will randomly generate patterns like the one below, closed hihats have been removed in the first and third bar, open hihats have been added in the second and third bar.

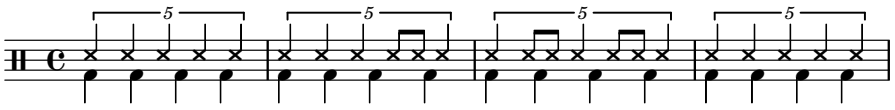


4.11 Polyrhythmic clocks

Next to the regular main clock, instruments can also be assigned to one of two 'polyrhythmic clocks'. Polyrhythmic clocks have a certain speed ratio *N:M* to the main clock. If it has, for example a *10:16* ratio, the polyrhythmic clock runs at 0,625x[1] the main speed, and takes 10 sequencer steps equally stretched out over the time needed for 16 steps of the main clock.

It is thus possible to make the DR-2 sequencer play things like quintuplets or heptuplets on certain instruments while other instruments keep playing at the regular clock grid.

There are two polyrhythmic clocks on the DR-2, α and β, next to the main clock, which can be freely assigned to any number of instruments.



[1] $10/16 = 0.625$

- Hold down α or β, and turn SELECT(/BPM) to set the polyrhythm ratio's numerator
- Hold down α or β, and turn VALUE(/SWING) to set the polyrhythm ratio's denominator
- Hold down an instrument button A...F and hit α or β to assign it to a polyrhythmic clock. Repeat to return to the main clock.

This is a second function for the α and β buttons, not to be confused with the α and β drum hits (see §3.13). The polyrhythms are completely unrelated to α/β-modulation!

4.12 Copying pattern bars

All instruments You can very easily copy/paste pattern data between the different bars or pages 01-16/17-32/33-48/49-64 by using the COPY and PLAY buttons.

- Press and keep down the source bar button 01-16/17-32/33-48/49-64, and hit RECORD to copy
- Press and keep down the destination bar button 01-16/17-32/33-48/49-64, and hit PLAY to PASTE

Note that copying pattern bars is also possible using the COPY menu, see §5.6.

Per instrument You can also copy pattern data from a single instrument between the different bars or pages 01-16/17-32/33-48/49-64, by also keeping down an instrument button A...F the moment you're executing the PASTE command.

- Press and keep down the source bar button 01-16/17-32/33-48/49-64, and hit RECORD to copy
- Press and keep down both the instrument button A...F *and* the destination button 01-16/17-32/33-48/49-64, and hit PLAY to PASTE

This way only the pattern data from the instrument(s) from wich you keep the instrument button down are copied between the selected pattern bars, all other pattern data remain in place.

5 Menu Reference

The menu of the Modor DR-2 has 8 main menu items. When the menu button is hit you enter the menu, and the first menu item appears on the upper display line, while a black dot moves from right to left over the screen. By pressing again before it reaches the left side, the next menu item is selected. If you stop hitting ”Menu”, the black dot reaches the left side. You now entered this submenu. Following menus can be entered:

1. LOAD: Load a pattern, song or drumset from internal memory
2. SAVE: Save a pattern, song or drumset to the internal memory
3. NAME: Give the current pattern, song or drumset a name
4. INIT: Initialise the current pattern, song or drumset
5. SONG EDIT: Set or change the pattern numbers in a song
6. COPY: An easy way to copy data between pattern parts or drumset instruments
7. SYSTEM SETTINGS: To set some global system parameters
8. MIDI DUMP: Dump patterns, songs or drumsets, or the complete memory using Midi Sysex messages

Next, after entering a certain menu, data can be selected and altered using the SELECT-encoder and VALUE-knob. Sometimes you need to approve or cancel your choice by using MENU/YES or EXIT/NO. While in the menu, on any moment you can press EXIT/NO to cancel and leave the menu.

The SONG EDIT menu only appears if the DR-2 is in song mode (after pressing the SONG button).

5.1 Load

After entering the Load-menu, you can select a pattern, song or drumset in the synth’s memory using the SELECT- and/or VALUE-control. When loading drumsets, the selected drumset is temporarily loaded into the memory, and can be heard when playing the DR-2[1]. This way you can browse through the available drumsets in memory, while the drumset you were working on does not yet get lost. Next:

- Pressing the EXIT/NO-button cancels the load-operation, exits the menu and restores the active drumset you were working with before entering the menu.

- Pressing the MENU/YES-button finishes the load operation and exits the menu. The active pattern, song or drumset gets replaced by the selected item from flash memory.
- By keeping an instrument button A..F down while pressing MENU/YES at drumset loading, only that single instrument is loaded from the drumset.

5.2 Save

After entering the Save-menu, you can use the SELECT- and VALUE-controls to select a spot in the DR-2's memory to store your pattern, song or drumset, the same way as in the load menu. When saving a drumset, the drumset you select is temporarily loaded in the synth's memory[1] such that you can listen to the drumset that's going to be overwritten, to make sure you don't overwrite the wrong one.

- Pressing the EXIT/NO-button cancels the save operation, and exits the menu.
- Pressing the MENU/YES-button writes the active pattern, song or drumset into the synth's memory on the selected spot and exits the menu. This memory spot is now permanently overwritten.

5.3 Name

In this menu, you can change the name of the current pattern, song or drumset with the Select and Value buttons. Use the VALUE-control to select a character position. With the SELECT-encoder you choose a character.

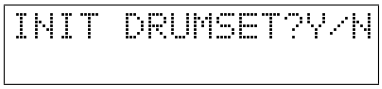
- Pressing the EXIT/NO-button cancels the naming operation and exits the menu.
- Pressing the MENU/YES-button confirms the new drumset, pattern or song name and exits the menu.
- Pressing the α and β-buttons switches between latin characters and numbers, and cyrillic characters.

5.4 Init

In the INIT-menu you can reset or clear the active pattern, song or drumset to start building up new work from scratch:

[1] When LoadPreview is on, see §5.7

- Drumset: restart with classic electronic-style drumset with a bassdrum, claps, hihat, snaredrum, rimshot and cymbal.
- Pattern: restart with a simple 1-bar 4-on-the-floor pattern, a Euclidean pattern (per instrument) or an empty pattern (per instrument)
- Song: restart with an empty song pattern list



Quickly hit the MENU button four times to select the INIT-menu and wait one second to enter it (the black dot reaches the left side of the screen). In pattern mode, use SELECT(/BPM) to select an initialisation procedure. Press the MENU/YES-button to confirm the initialisation and exit the menu, or press the EXIT/NO-button to cancel.

The Euclidean pattern generator and the empty pattern only work on the currently active instruments' pattern line, and not on the whole pattern. The rest of the pattern is left untouched. You can use the A..F buttons to select the active instrument. Check §4.8 to know more about the Euclidean rhythm generator.

5.5 Song Edit

This menu only appears if the DR-2 is in song mode, ie. after the SONG button has been pressed. See §4.5 for an explanation on how to edit the patterns and loop points in a song.

5.6 Copy

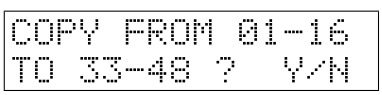
The copy menu offers you three possibilities of copying data between instruments and pattern parts:

- Pattern bars
- Instrument patterns
- Instruments

Pattern bar To copy a pattern bar (sequencer steps 1-16/17-32/33-48/49-64) to another bar:

- enter the COPY menu (5x MENU)
- select the source bar (hit 1-16, 17-32, 33-48 or 49-64 button)
- select the destination bar
- hit MENU/YES to confirm (or EXIT/NO to cancel).

Now, all pattern data are copied from the source bar steps to the destination bar steps. Hit EXIT/NO to exit the menu, or continue with a second copy.

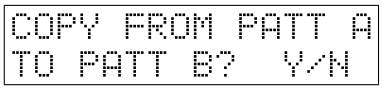


Note that you can also copy pattern bars by keeping the source bar button down while hitting RECORD, and next keeping the destination bar button down and hitting PLAY.

Instrument pattern To copy an instrument pattern A-F (all 64 sequencer steps for a single instrument) to another instrument pattern A-F:

- enter the COPY menu (5x MENU)
- select the source instrument's pattern by holding down PATTERN and selecting A-F
- select the destination instrument's pattern PATTERN + A-F
- hit MENU/YES to confirm (or EXIT/NO to cancel).

Now, the complete pattern line that belongs to the source instrument A-F is copied to the destination instrument, including accents, flams, tuplets, breaks and reverses. Hit EXIT/NO to exit the menu, or continue with a second copy.



Drumset instruments To copy a drumset's instrument A-F (one of the six drum sounds) to another instrument A-F:

- enter the COPY menu (5x MENU)
- select the source instrument by selecting A-F
- select the destination instrument A-F
- hit MENU/YES to confirm (or EXIT/NO to cancel)

Now, the source instrument's sound parameters are copied from the source to the destination instrument. Hit EXIT/NO to exit the menu, or continue with a second copy.

Note that you can also copy instruments by keeping the source button (A..F) down while hitting RECORD, and next keeping the destination button down and hitting PLAY.

5.7 System Settings

In this menu a few global settings can be edited. These parameters act globally and do not depend on the selected pattern, song or drumset. Select the parameter to edit using the SELECT encoder, and change it using VALUE. Leave the menu using the MENU or EXIT/NO switch.

- Midi Channel: The MIDI channel upon which the midi data are received and transmitted [1,16]

- ProgChangeRx: choose if the Modor DR-2 responds to incoming MIDI Program Change messages or not [ON,OFF]
- CtrlChangeRx: choose if the Modor DR-2 responds to incoming MIDI Control Change messages or not [ON,OFF]
- SysexRx: choose if the Modor DR-2 receives or ignores incoming MIDI sysex messages [ON,OFF]
- NoteOffRx: choose if the Modor DR-2 receives or ignores incoming MIDI note-off messages [ON,OFF]
- CtrlChangeTx: choose if the Modor DR-2 sends MIDI Control Change messages when turning a control on the front panel [ON,OFF]
- MidiClockTx: choose if the Modor DR-2 transmits MIDI Clock and Start/Stop messages [ON,OFF]
- NotesTx: choose if the Modor DR-2 transmits the sequencer patterns as MIDI note-on messages [ON,OFF]
- NoteOffTx: choose if the Modor DR-2 transmits note-off messages after the note-ons [ON,OFF]
- LocalControl: choose if the Modor DR-2's sequencer sends its note events to the synthesizer, or only to Midi OUT [ON,OFF]
- ShowCtrlInpt: choose whether incoming MIDI controller messages are displayed on screen or not [ON,OFF]
- Load Preview: With Load Preview ON, you immediately hear the selected drumset when scrolling in the LOAD-menu. With Load Preview OFF, you need to confirm (Y/N) before you're able to hear the loaded drumset. [ON, OFF]
- Safety Mode: Avoid parameters jumping to the new value when turning a knob. With Safety Mode ON, you have to 'go get it' at it's actual value [ON,OFF]
- ParamInstant: Choose if parameter changes when turning a knob are instant, or only become valid at the next drum hit. With ParamInstant OFF, a parameter jumps to it's new value only at the next note after turning a knob [ON,OFF]
- ClkOutput: Select what you want to assign to the CLOCK OUT output, drum triggers A-F, or a 24PPQN or a 48PPQN clock [DRUM A, DRUM B, DRUM C, DRUM D, DRUM E, DRUM F, 24PPQN, 48PPQN]
- MidiCCStart: choose if the Modor DR-2's sequencer can be started and stopped by Control Change #44 [ON,OFF]
- MidiCCEn/Dis: choose if the Modor DR-2's instrument sequancer channels can be enabled/disabled by Control Change #95 [ON,OFF]
- MidiNtEn/Dis: choose if the Modor DR-2's instrument sequancer channels can be enabled/disabled using notes in the C1-B1 octave [ON,OFF]
- OS Version: check the version number of the currently installed operating system.
- Bootloader Version: check the version number of the currently installed bootloader.

5.8 Sysex Dump

A Sysex or "System Exclusive" message is commonly used to send the contents of a synth's memory to an external device for backup or external editing, a so-called "sysex dump". The contents of the memory are put into a long string of data bytes and send

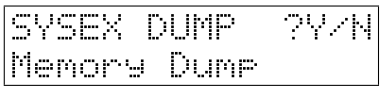
out over MIDI, where an external computer or sequencer can capture and store them. On a later moment, the sysex data can be sent back to restore the DR-2's memory to the situation at the moment of the sysex dump. A way to make backups of the DR-2's memory, or to exchange drumsets, patterns or songs between two Modor DR-2s.

Another use of sysex-messages is to perform firmware updates of a midi device's operating system. Instructions on how to install firmware (OS) updates on the DR-2 are distributed together with the OS-updates.

In the SYSEX DUMP menu you can choose between "Drumset dump", "Pattern dump", "Song dump", and "Memory dump" turning the SELECT-control.

Drumset, Pattern or Song dump With Drumset, Pattern or Song Dump you send out a sysex message containing the current drumset, pattern or song data. Press the MENU-button once, and confirm with MENU/YES (or cancel with EXIT/NO).

Memory dump A Memory Dump creates a very long sysex message containing all of the drumsets, patterns or songs in memory. This way you can create a backup of the complete memory of the Modor DR-2. Turn the SELECT-control to select Memory Dump, press MENU again, and hit MENU/YES to confirm (or cancel with EXIT/NO).



Note that if the Modor DR-2 receives a Drumset, Pattern or Song dump, this is not yet stored permanently in it's memory. If you want to store the data you received, you still have to store them. This is of course different for a full memory dump, where a very large amount of data is sent through midi in a large bulk package. They have to be stored permanently immediatly upon reception of the data.

Note that the Modor DR-2 cannot receive midi bulk memory dumps at any speed. The received data need to be written into flash memory while receiving new data in the mean time. This means that at very high data speeds, some data might get lost.

The sysex messages contain a checksum to detect bad reception, such that you will be informed when something went wrong. Reduce the speed of your sysex program or sequencer if you experience problems with the reception of large sysex dumps.

5.9 Menu overview

```
LOAD
 Drumset
 Pattern
 Song

SAVE
 Drumset
 Pattern
 Song

NAME
 Drumset
 Pattern
 Song

INIT
 Drumset
 Pattern
  4ODFloor
  Euclidean
  Empty
 Song

SONG EDIT

COPY
 01-16 .. 49-64
 PATT A..PATT F
 DRUM A..DRUM F
```

```
SYSTEM SETTINGS
 Midi Channel
 ProgChangeRx
 CtrlChangeRx
 SysexRx
 NoteOffRx
 CtrlChangeTx
 MidiClockTx
 NotesTx
 NoteOffTx
 Local Control
 ShowCtrlInpt
 Load Preview
 Safety Mode
 ParamInstant
 ClkOutput
 MidiCCStart
 MidiCCEn/Dis
 MidiNtEn/Dis
 OS Version
 Bootldr Versn

SYSEX DUMP
 Drumset Dump
 Pattern Dump
 Song Dump
 Memory Dump
```

6 Firmware upgrades

6.1 Firmware upgrade

6.1.1 Why upgrading the firmware?

Every now and then, the DR-2 gets a new firmware upgrade, containing bugrepairs and new features and drum models. It is absolutely worth installing these on your machine.

Don't worry that your DR-2 will become slower or less performant by upgrading the firmware, as you often see on computers, smartphones, etc... There is only 1 version of the DR-2 hardware, and the firmware is explicitly made for it. Firmware upgrades will *not* slow down your DR-2!

6.1.2 Upgrade procedure

Firmware upgrades are carried out by sending a large sysex file to the DR-2. The DR-2 needs to be in a special 'sysex upgrade mode' invoked by booting up while keeping SHIFT+MODEL down.

The firmware sysex files can be found on our website, along with some instruction videos. Check http://www.modormusic.com/downloads.html

Sending sysex files can be done using a sysex handler app. There are also links on our website to a series of sysex handlers for OS X, Windows, Linux and Android. Install a sysex app on your computer or smartphone, and download the upgrade file.

In your sysex handler app, check the Settings or Preferences. The transmission speed has to be set a little bit below maximum on most apps.

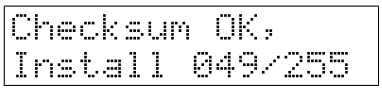
Restart the DR-2 while keeping SHIFT+MODEL down to enter the upgrade mode. The screen now says 'Waiting for Sysex Upgrade...'.

Send the sysex file with the sysex handler's transmission speed a bit below maximum. The screen indicates progress.

And wait... This takes a few minutes. Keep an eye on the screen if no error messages appear. There's a part A (or MCU) and a part B (or DSP), each with their counter.

Installation What happens after succesful reception, depends on the bootloader version:

- Bootloader version 1: the new firmware installs itself, and the DR-2 reboots with the new firmware.



- Bootloader version 2: the DR-2 just reboots with the new firmware, the install screen does not appear.

Error messages If you encounter error messages on the screen, don't panic. Just check the cables, maybe slow down the sysex transmission a little further, and restart from the beginning.

6.2 Bootloader upgrade

6.2.1 Why updating a bootloader?

Together with firmware OS007, also a new bootloader was launched. It is necessary to install this bootloader to avoid losing your work on future firmware upgrades!

A bootloader is a small piece of software, that checks if SHIFT+MODEL is held down. If so, it handles the firmware upgrade procedure, and if not, it jumps to normal operation of the DR-2.

The reason behind the upgrade, is that in OS006 and previous versions, only half of the available flash memory onboard the DR-2 was used to store patterns, drumsets and songs. The other half was used exclusively as temporary storage during the firmware upgrade procedure, and was thus unavailable to store user data.

With the introduction of parameter locks[1] in OS007, this procedure could no longer be held. More flash memory storage was necessary, and so the second half of the flash memory also got occupied by user data. That means that the upgrade algorithm - the bootloader - had to be changed.

So, after installing firmware version OS007 or higher, install the bootloader version 2. If this bootloader isn't installed, (part of) your presets will be lost beyond repair on your next firmware upgrade!

If you want to check your current bootloader version, you can check it in the System Settings menu on OS007 and later.

[1] Parameter locks, see §4.9

6.2.2 Installation

The installation of the new bootloader is simple and straightforward: send the bootloader sysex file to the DR-2. This time, you don't need to launch the DR-2 with the SHIFT+MODEL button combo, the bootloader upgrade has to be done during normal operation.

Just check the SysexRx (Sysex Receive) option in the System Settings, this should be ON.

After reception of the bootloader data, these data are verified to see if everything went correctly, and the bootloader is installed. If an error should appear on screen, just send the bootloader sysex again.

7 MIDI Implementation

7.1 Midi channel

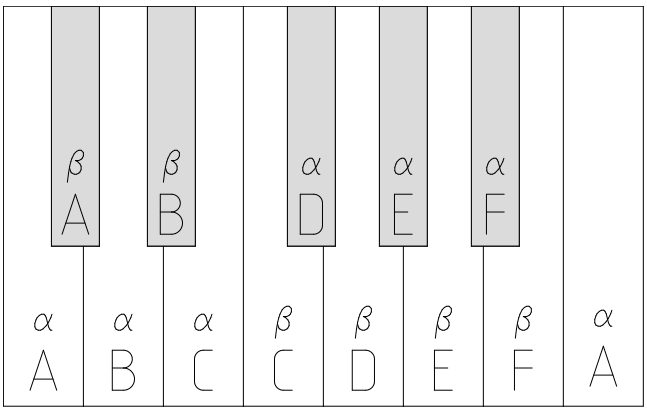
To have your DR-2 working together with other MIDI gear, first set the right MIDI channel in the SYSTEM SETTINGS menu, it's the first item in this menu. Press 6x MENU/YES to enter SYSTEM SETTINGS, use VALUE to set the MIDI channel (1-16).

7.2 MIDI note mapping

Drum triggers Next to the internal sequencer, the DR-2 can also be played by external keyboards, sequencers, drumpads, ... using MIDI note messages. You can also trigger reversing notes and note breaks using note messages.

To trigger the different instruments A-F in their α and β variations, use the notes in the third octave, note numbers 48 to 59:

- Drum A is on C-3 (α) and C#-3 (β)
- Drum B is on D-3 (α) and D#-3 (β)
- Drum C is on E-3 (α) and F-3 (β)
- Drum D is on F#-3 (α) and G-3 (β)
- Drum E is on G#-3 (α) and A-3 (β)
- Drum F is on A#-3 (α) and B-3 (β)



Reverse notes To trigger a note reverse, use the same notes, but in the fourth octave, note numbers 60 to 71:

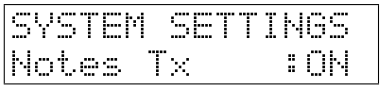
- Reverse drum A using C-4 or C#-4
- Reverse drum B using D-4 or D#-4
- Reverse drum C using E-4 or F-4
- Reverse drum D using F#-4 or G-4
- Reverse drum E using G#-4 or A-4
- Reverse drum F using A#-4 or B-4

Breaks Triggering a note break can be done using the same notes, but in the fifth octave, note numbers 72 to 83:

- Reverse drum A using C-5 or C#-5
- Reverse drum B using D-5 or D#-5
- Reverse drum C using E-5 or F-5
- Reverse drum D using F#-5 or G-5
- Reverse drum E using G#-5 or A-5
- Reverse drum F using A#-5 or B-5

Flams and tuplets Flams and tuplets don't have their own note triggers, they are simply produced by sending the same note several times.

Note transmission You can turn MIDI note transmission ON/OFF in the system settings menu (DEFAULT:ON). When enabled, the DR-2 transmits MIDI note messages that can be recorded in external sequencers or DAWs. This way it is easy to use the DR-2's intuitive internal sequencer to do the basic design of your rhythms, and export them later on to a DAW or sequencer for further external treatment.



Note Off transmission When recording DR-2 MIDI data in a DAW, you can set the Note Off Tx parameter ON. With this setting OFF, the DR-2 does not send MIDI note-off messages, because by default, the DR-2 also doesn't recognize them.

This can however get very annoying in a DAW, as you'll only see very extremely long notes because the DAW expects but doesn't receive corresponding note-offs after a note-on. Put the Note Off Tx parameter ON to avoid this.

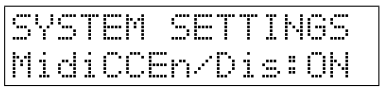
Note Off recognition You can turn MIDI Note Off Recognition ON/OFF in the system settings menu (default:OFF). When enabled, the DR-2 recognises Note Off messages and interprets them as breaks that immediately end the note. However, this can be very annoying when programming a rhythm on a sequencer or DAW, so it's default is OFF. But if you want to, you can enable it.

Remark: don't engage both NoteOffTx and NoteOffRx when recording and playing back from a DAW. You'll only hear very short ticks and clicks.

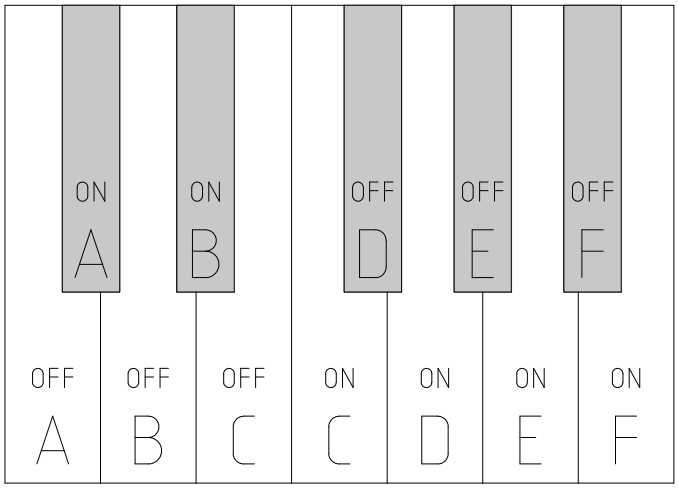
Enable/disable instrument sequencer channels It can be useful to have a way to enable and disable the different instrument's sequencer channels externally by MIDI. You can do this using Control Change CC#95, when the System Setting MidiCCEn/Dis is ON. The channels are turned off/on then following the 6 lowest bits in CC#95's value.

A value of 50 for example, or binary 110010, turns channels F, E and B on, and D, C and A off.

It is not the easiest method however, it can be handier to enable/disable instrument tracks using midi notes. If the System Setting MidiNtEn/Dis is ON, you can use the notes in the C0-B0 octave for this:



- Disable drum A using C-0, enable using C#-0
- Disable drum B using D-0, enable using D#-0
- Disable drum C using E-0, enable using F-0
- Disable drum D using F#-0, enable using G-0
- Disable drum E using G#-0, enable using A-0
- Disable drum F using A#-0, enable using B-0



7.3 MIDI program changes

Program changes can be used to load patterns and drumsets via MIDI, in combination with Bank Select (Control Change CC#0). Bank Select 0, Program Change 0-63 loads Drumsets 1-64. Bank Select 1, Program Change 0-95 loads Patterns 1-96.

Reception of MIDI Program Changes can be disabled in the System Settings menu (ProgChangeRx: ON/OFF). Also the reception of a bank select message CC#0 is enabled/disabled with ProgChangeRx, although it is technically a control change.

7.4 MIDI control changes

Regular control changes In the controller list in §7.6 you can see the mapping of the instrument parameters to MIDI control changes. Both reception (CtrlChangeRx) and transmission (CtrlChangeTx) can be enabled and disabled in the System settings menu. With CtrlChangeTx ON control changes are sent when you turn a knob on the frontpanel. With CtrlChangeRx ON the DR-2 responds to incoming control change messages according to the controller numbers in the controller list in §7.6.

NRPNs Parameters that don't appear in the controller list in §7.6 can still be changed using so-called NRPNs or Non-Registered Parameter Numbers.

MIDI NRPNs require the selection of a parameter first, using control changes 98(LSB) and 99(MSB). Then you can give the selected parameter a value using control change 6 (Data Entry) or control change 96/97 (Data Increment/Decrement). Many

MIDI keyboards and controllers support the use of NRPNs, refer to your keyboard or controller's manual to learn how.

On the DR-2, the MSB (Most Significant Byte) selects the instrument A-F of the parameter you want to control. The LSB (Least Significant Byte) then selects the parameter you want to control.

NRPN MSB	Instrument
0	A
1	B
2	C
3	D
4	E
5	F

NRPN LSB	Parameter
0	Pitch ENV decay
1	Sidechain source
2	Amp attack
3	Amp decay
4	Pitch ENV curve
5	Compressor treshold
6	Compressor attack
7	Amp ENV curve
8	Model
9	Volume
10	Pan
11	Pitch/Tune
12	Pitch ENV amount
13	X parameter
14	Y parameter
15	Z parameter
16	T parameter
17	Velocity volume sensitivity
18	β parameter number
19	β parameter value
20	Velocity parameter number
21	Velocity parameter sensitivity
22	Random parameter number
23	Random parameter sensitivity
24	DEF parameter number
25	DEF parameter sensitivity
26	Gain
27	DEF value
28	Tilt filter
29	Distortion
30	Finetune
31	Click Volume
32	Parametric Equaliser Frequency
33	Parametric Equaliser Gain
34	Parametric Equaliser Q

7.5 MIDI implementation chart

MIDI Implementation Chart v. 2.0			
Manufacturer: Modor Music Model: DR-2 Version: 1			
Date: July 2023			
	Transmit	Recognize	Remarks
1. Basic Information			
MIDI channels	[1-16]	[1-16]	
Note numbers	[48-83]	[48-83]	
Program change	-	[0-96]	
Bank Select response?	-	Yes	
Modes supported			
Mode 1: Omni-On, Poly	-	No	
Mode 2: Omni-On, Mono	-	No	
Mode 3: Omni-Off, Poly	-	Yes	
Mode 4: Omni-Off, Mono	-	Yes	
Multi Mode	-	No	
Note-On Velocity	-	Yes	
Note-Off Velocity	-	No	
Channel Aftertouch	-	No	
Poly (Key) Aftertouch	-	No	
Pitch Bend	-	No	
Active Sensing	No	No	
System Reset	No	No	
Tune Request	No	No	
Universal System Exclusive:			
Sample Dump Standard	No	No	
Device Inquiry	No	No	
File Dump	No	No	
MIDI Tuning	No	No	
Master Volume	No	No	
Master Balance	No	No	
Notation Information	No	No	
Turn GM1 System On	No	No	
Turn GM2 System On	No	No	
Turn GM System Off	No	No	
DLS-1	No	No	
File Reference	No	No	
Controller Destination	No	No	
Key-based Instrument Ctrl	No	No	
Master Fine/Coarse Tune	No	No	
Other Universal System Exclusive	No	No	
Manufacturer System Exclusive	Yes	Yes	
NRPNs	No	Yes	
RPN 00 (Pitch Bend Sensitivity)	No	No	
RPN 01 (Channel Fine Tune)	No	No	
RPN 02 (Channel Coarse Tune)	No	No	
RPN 03 (Tuning Program Select)	No	No	

RPN 04 (Tuning Bank Select)	No	No	
RPN 05 (Modulation Depth Range)	No	No	
2. MIDI Timing and Synchronization			
MIDI Clock	Yes	Yes	
Song Position Pointer	No	No	
Song Select	No	No	
Start	Yes	Yes	
Continue	No	Yes	
Stop	Yes	Yes	
MIDI Time Code	No	No	
MIDI Machine Control	No	No	
MIDI Show Control	No	No	
3. Extensions Compatibility			
General MIDI compatible?	No	No	
Is GM default power-up mode?	No	No	
DLS compatible?	No	No	
Standard MIDI Files	No	No	
XMF Files	No	No	
SP-MIDI compatible?	No	No	

7.6 MIDI controller list

Control	Function	Transmitted	Received	Remarks
0	Bank Select [1]	No	Yes	
1		No	No	
2		No	No	
3		No	No	
4		No	No	
5		No	No	
6	NRPN Data	Yes	Yes	
7		No	No	
8		No	No	
9		No	No	
10		No	No	
11		No	No	
12		No	No	
13		No	No	
14	Drum A Pitch	Yes	Yes	
15	Drum A Pitch Env Decay	Yes	Yes	
16	Drum A Pitch Env Curve	Yes	Yes	
17	Drum A Pitch Env Amount	Yes	Yes	
18	Drum A Volume	Yes	Yes	
19	Drum A Amp Decay	Yes	Yes	
20	Drum A Amp Curve	Yes	Yes	
21	Drum A Pan	Yes	Yes	
22	Drum A X	Yes	Yes	
23	Drum A Y	Yes	Yes	
24	Drum A Z	Yes	Yes	
25	Drum A T	Yes	Yes	
26	Drum B Pitch	Yes	Yes	
27	Drum B Pitch Env Decay	Yes	Yes	
28	Drum B Pitch Env Curve	Yes	Yes	
29	Drum B Pitch Env Amount	Yes	Yes	
30	Drum B Volume	Yes	Yes	
31	Drum B Amp Decay	Yes	Yes	
32		No	No	
33		No	No	
34		No	No	
35		No	No	
36		No	No	
37		No	No	
38		No	No	
39		No	No	
40		No	No	
41		No	No	

[1] CC#0, Bank Select 0: Program Change selects Drumsets, Bank Select 1: Program Change selects Patterns. Reception is disabled/enabled by the ProgChangeRx setting, instead of CtrlChangeRx.

Control	Function	Transmitted	Received	Remarks
42		No	No	
43		No	No	
44	CC Start/Stop [2]	No	No	
45		No	No	
46	Drum B Amp Curve	Yes	Yes	
47	Drum B Pan	Yes	Yes	
48	Drum B X	Yes	Yes	
49	Drum B Y	Yes	Yes	
50	Drum B Z	Yes	Yes	
51	Drum B T	Yes	Yes	
52	Drum C Pitch	Yes	Yes	
53	Drum C Pitch Env Decay	Yes	Yes	
54	Drum C Pitch Env Curve	Yes	Yes	
55	Drum C Pitch Env Amount	Yes	Yes	
56	Drum C Volume	Yes	Yes	
57	Drum C Amp Decay	Yes	Yes	
58	Drum C Amp Curve	Yes	Yes	
59	Drum C Pan	Yes	Yes	
60	Drum C X	Yes	Yes	
61	Drum C Y	Yes	Yes	
62	Drum C Z	Yes	Yes	
63	Drum C T	Yes	Yes	
64		No	No	
65		No	No	
66		No	No	
67		No	No	
68		No	No	
69		No	No	
70	Drum D Pitch	Yes	Yes	
71	Drum D Pitch Env Decay	Yes	Yes	
72	Drum D Pitch Env Curve	Yes	Yes	
73	Drum D Pitch Env Amount	Yes	Yes	
74	Drum D Volume	Yes	Yes	
75	Drum D Amp Decay	Yes	Yes	
76	Drum D Amp Curve	Yes	Yes	
77	Drum D Pan	Yes	Yes	
78	Drum D X	Yes	Yes	
79	Drum D Y	Yes	Yes	
80	Drum D Z	Yes	Yes	
81	Drum D T	Yes	Yes	
82	Drum E Pitch	Yes	Yes	
83	Drum E Pitch Env Decay	Yes	Yes	
84	Drum E Pitch Env Curve	Yes	Yes	
85	Drum E Pitch Env Amount	Yes	Yes	
86	Drum E Volume	Yes	Yes	

[2] If MidiCCStart is ON (System Settings), a value of 0 on CC#44 stops the sequencer, all other values start the sequencer

Control	Function	Transmitted	Received	Remarks
87	Drum E Amp Decay	Yes	Yes	
88		No	No	
89		No	No	
90		No	No	
91		No	No	
92		No	No	
93		No	No	
94		No	No	
95	Instrument Enable/Disable[3]	No	Yes	
96	NRPN Data Increment	No	Yes	
97	NRPN Data Decrement	No	Yes	
98	NRPN LSB (Select Parameter)	Yes	Yes	
99	NRPN MSB (Select Instrument)	Yes	Yes	
100		No	No	
101		No	No	
102	Drum E Amp Curve	Yes	Yes	
103	Drum E Pan	Yes	Yes	
104	Drum E X	Yes	Yes	
105	Drum E Y	Yes	Yes	
106	Drum E Z	Yes	Yes	
107	Drum E T	Yes	Yes	
108	Drum F Pitch	Yes	Yes	
109	Drum F Pitch Env Decay	Yes	Yes	
110	Drum F Pitch Env Curve	Yes	Yes	
111	Drum F Pitch Env Amount	Yes	Yes	
112	Drum F Volume	Yes	Yes	
113	Drum F Amp Decay	Yes	Yes	
114	Drum F Amp Curve	Yes	Yes	
115	Drum F Pan	Yes	Yes	
116	Drum F X	Yes	Yes	
117	Drum F Y	Yes	Yes	
118	Drum F Z	Yes	Yes	
119	Drum F T	Yes	Yes	
120		No	No	
121		No	No	
122		No	No	
123		No	No	
124		No	No	
125		No	No	
126		No	No	
127		No	No	

[3]If MidiCCEn/Dis is ON (System Settings), CC#95 can be used to enable and disable instrument sequencer tracks