

Analogue Drum Sounds For The Beginner

Introduction

Back in the 70's came the analogue drum machine. Just like all the new synthesizers of the time, musicians were amazed at how well they could mimic real instruments. Then came the 80's and with it all the sample drum machines and sample+synthesis synths. Musicians such as Newman, Kraftwerk and the like went sample crazy. But now, just like any fashion, we have come back round to the analogue sounds again. Nearly every pop track in the charts incorporate analogue sounds. Included in there are the infamous sounds of the TR808 and TR909. But why stick with the sounds Roland have blessed us with? Why not create your own?

Sounds as heard on Kraftwerk's Computer World or Vince Clarke's sample CD sound impressive yet seem impossible to recreate unless you have expensive modular synthesizer, but with careful programming they can be created on most (cheaper) mono-synths.

In general

Drum machines literally have a mini-synthesizer for each sound they produce. Each of these mini - synths have the basic elements they need to produce each sound. Sound sounds may only need a noise, voltage controlled amplifier (VCA) and an envelope generator (EG) with just a decay setting to produce a sound, while other more complex sounds might involve a couple of oscillators and other filters and EG's.

By analysing the synthesis elements of each sound, together with some experimentation, a good insight into how to create your own drum sounds can be found.

Because drum sounds are more complex than a straight forward synth sound, the more sound creating modules your synth has (i.e. oscillators, VCAs, EGs, filters, ring mod's etc.), the wider range, and the more 'realistic' your drums sounds will be. Of course you do not want your new sounds to be too realistic, just enough so you can recognise your sound as being a 'snare', 'kick', or 'hihat', type sound, for example. So I'll go through some of the standard drum sounds and give an insight into how many drum machines create their sounds.

Kicks

Kick drum sounds are created by one or by a mix of the following two methods;

a/ with a 'pulse hit' sound, when the resonance is turned to up high, with the filter cut-off at zero, then the cut-off is modulated by the envelope in a quick downward sweep. For this sound to work, you really need a synth with a filter that can be sent into oscillation and that has a 24dB/oct slope. These include most mono-synths, such as the PRO-1, SH101, MC202, Moogs. The filters of Yamaha CS mono-synths, Roland SH09, and most poly-synths tend to be a bit too weak to create decent kicks and thips.

b/ a low note, a sine waveform works best, with a short decay time.

A mix of the two sounds above may work.

Here's an example using the SH101;

TR808 type kick;

VCO mix levels	0
VCF MOD	0
KYBD	0
ATTACK & SUSTAIN	0
FREQ	3
RES	10
ENV	<2.5

DECAY >4 recommended.

To create a TR909 type kick, increase the Decay in the above example.

A kick using the MS20

The MS-20 can produce some devastating kicks with a killer bass end, Very deep with lots of guts, even though it only has a less powerful 12dB/oct filter. Definitely check it out!

VCO 1 & 2 levels	0
LPF & HPF cut-off	0
HPF peak	0
LPF & HPF MG/T.EXT	0
HPF EG2/EXT	0
EG2 Hold	0
LPF cut-off	0
LPF peak	8
LPF EG2/EXT	8
EG 2 Attack	0
EG 2 Decay	2
EG 2 Release	2

Increase LPF peak to 10, LPF EG2/EXT to 10, and a shorter Decay for pulse hits. The MS-20 pulse hits are less zappy than a SH101 but good nonetheless.

Snares

Most drum machine create snare sounds usually involve two oscillators at different pitches, together with white noise going through a high pass filter (HPF) to crisp up the sound. These all go through a VCA modulated by an envelope signal.

Some drum machines have more simpler snare sounds by having individual VCA and envelopes for each of the two oscillators, and the noise.

By balancing the levels of the three sound sources, together with the pitch ratio of the two oscillators, and the HPF cut-off frequency, different snare drum tones can be made.

For a snare sound, a two oscillator monosynth with noise is needed. The MS20 is an ideal solution as it has all this plus a HPF.

If your monosynth only has one oscillator, try sending the resonance into self oscillation (with no envelope sweep) and mixing this in.

Punchy snares are nearly impossible to create with analogue synths, so you may wish to add a 'real' snare sample in the mix.

A snare sound on the MS20

VCO 2 level	0	
LPF & HPF MG/T.EXT	0	
LPF & HPF EG2/EXT	0	
EG 2 hold	0	
EG2 Attack & Sustain	0	
VCO 1 waveform	noise	
VCO 1 level	10	
HPF	4	Adjust this to change the pitch of the snare
HPF peak	8	This changes the volume of the snare's pitch
LPF	8	
LPF peak	6	
EG 2 Decay	0.8	
EG 2 Release	0.8	

Hi-Hats

To create great analogue hihat and cymbal like the TR808 is tricky with monosynths. To put it in the words of the TR808 service manual, the main sound generating source of their metal sounds is "The combined square wave outputs of six Schumitt triggers..."

So forgetting that, I usually use ring modulated type sound. Create a nice metallic discordant and high pitched sound.

Then, set a very short release time on the VCA envelope, and a long decay. To play the closed hihat sound, play staccato notes, and play a long note for closed sounds. Try adding some noise into the sound.

Metallic Hihats on MS20

LPF & HPF MG/T.EXT	0
LPF & HPF EG2/EXT	0
EG 2 hold	0
EG2 Attack & Sustain	0
VCO 1 waveform	any wave except noise (different waves give slightly different tones).
VCO 1 Scale	4'
VCO 1 PW	0-5 (although shouldn't effect sound, it does!)
VCO 2 waveform	RING
VCO 2 Scale	2'
VCO 1 & 2 levels	10
HPF cut-off & peak	0
LFP cut-off	10
LPF peak	0
EG 2 Decay	2
EG 2 Release	0.6

Adjust VCO 2 pitch to get a good discordant sound (try 0 or 10). Reduce VCO 2's level to attenuate discord effect. Play highest note on the MS-20 keyboard. Also try LPF cut-off 7-8 and LPF peak approx 8 for more variations. By adding resonance on the LPF, you are setting up more ringing discordant sounds for more of a metallic sound.

For those more familiar with their MS20...

Set LFP cut-off to 10 and LPF peak to 10.

Patch;

WHITE NOISE	>	VCA IN
VCA OUT	>	EXT SIGNAL IN
MOD WHEEL	>	VCA CONTROL INPUT

This will add noise to the sound (noise on VCO 1 cannot be used as a normal waveform must be selected for good ring mod sounds). Adjust mod wheel to obtain a desirable level of noise mix.

Convincing cymbal sounds are almost impossible to create (I believe even Vince Clarke has given up!).

So if you don't mind unconvincing cymbal sounds, try the hihat sounds above, but with a longer decay and more noise.,

MS20 cymbal

LPF & HPF MG/T.EXT	0
LPF & HPF EG2/EXT	0
HPF cut-off	0
HPF Peak	0
EG 2 hold	0

EG2 Attack 0

VCO 1 waveform	ramp	
VCO 1 scale	4'	
VCO 2 waveform	ramp	
VCO 2 pitch	10	
VCO 2 scale	2'	
VCO 1 level	10	
VCO 2 level	0	although 0, other VCO 2 parameters still effect the sound
LPF cut-off	10	
LPF peak	10	
EG 2 Decay	0	
EG 2 Sustain	3	
EG 2 Release	4	

Patch;

WHITE NOISE	>	VCA IN
VCA OUT	>	EXT SIGNAL IN
MOD WHEEL	>	VCA CONTROL INPUT

Adjust mod wheel to obtain a desirable level of noise mix. Play the highest note on the keyboard. Play fairly short notes. The short Decay gives a percussive hit sound. Once it has settled to the Sustain level, the Release give a ride type cymbal decay. By setting Decay to 2, and Release to 0, you get even more Hi-hat sounds.

Pitched Envelope Sound

Some readers will know this sound from Recoil 'Bloodline' (Depeche Mode's Alan Wilder), track 3, or from Hardcorps 'Metal and Flesh' album.

This sound uses the envelope signal to modulate the pitch in a large downward sweep. This sound is ideal for kick and snare type sounds. Also, at present it is a sound you do not hear much of, so you can be the first to bring it in the top 10!

Unfortunately, not many synths have the ability to produce this sound, a few that can are the PRO-1, Cat, MS10/20.

PRO-1 example

On the modulation matrix; set all TO switches to OFF, except, OSC A FREQ; set to DIR. Set modulation matrix FILT ENV FROM amount to maximum, and switch to DIR.

Turn OSC A's frequency and OCTAVE switch to lowest settings. Either waveform can be used.	
OSC A level	10
OSC B level	0
NOISE/EXT	0
CUT-OFF	0-10
RESONANCE	0
ENVELOPE AMOUNT	0
KEYBOARD AMOUNT	0
Both Attacks, Sustains	0
Both Decays, Releases	5-6

Try different length Amplifier Decays for longer/shorter sounds. The Filter Decay must not finish before the Amplifier Decay, otherwise it will sound to much like a musical note.

Cowbell

These are created by mixing two square wave forms with different frequencies which pass through a band pass filter (BPF).

Set the oscillator frequencies and BPF cut-off to settings that sound best for you. Use a short decay time in the VCA.

Maracas

This is an easy one! Pass white noise through a HPF, then a VCA with a very short decay time.

Toms

This is basically an oscillator swept down by an envelope signal. Some drum machines add a touch of pink noise (LPF'd white noise) with a longer decay time than the oscillator to add artificial reverberation.

Congas

These are created in the same way as the toms, but without the pink noise and different pitch and decay settings.

Hand-claps

Creating good hand claps are beyond the capabilities of most monosynths, and is beyond the scope of this article. But a few pointers follow.

Sampled or analogue hand-claps can be defined as 'the sound of lots of people clapping nearly all at once.' So to create this sound, you need several bursts of white noise close together. The TR808 clap is produced by passing white noise through a band-pass filter. Two envelopes are used on a VCA. One is a repeating saw-tooth shaped envelope, to produce the 'lots of people clapping nearly all at once' sound, the other envelope has a long decay to produce the reverb. Use these principles and you may be able to create a sound on your synth, but most monosynths are not flexible enough to create a good handclap. Otherwise, just a burst of white noise through a HPF may suffice.

Sampling

If you do not have a MIDI-CV converter or many mono-synths, you will have to sample. 8 bit sampling may change sounds containing high frequencies or too much resonance, but 8 bit can sometimes change the sound in useful ways. I once created a reasonable snare sound on my MS20, but once sampled and played back through a Mirage, sounded more realistic! But more than often, it is unrealistic (yet usable) drum sounds you are after. If 16 bit is used, no problem. There is not any real worry of losing any analogue 'feel' unless the sound uses slow LFO sweeps or Sample and hold.

Drum machines such as the TR808 and TR606 create their drum sounds by combining two or more sounds together. So if you are sampling your analogue drum sounds, try mixing several sounds together, e.g., a long TR808 kick (to rattle the floor boards) and say a short pulse hit type (for the percussive effect).

With some careful programming and mixing of sounds, usable kicks and snares can be created, without the need to add any samples of real drums to add power, but add these if your analogue sample still lacks some power.

Running synths live with MIDI-CV converter

By utilising synth inputs such as filter cut-off control, and controlling this from MIDI, several versions of the same sound can be obtained by opening or closing the filter on different beats. If you have lots of analogue synths, running them live is certainly the best solution. It's a great feeling hearing all your percussion coming live from your analogues, knowing you can tweak any sound on the fly as you mix.

Conclusion

Follow the general guidelines I have given and you will have a good insight into how many analogue drum sounds are created. Then experiment for yourself. The more synths and controls you have, the more variety you have.