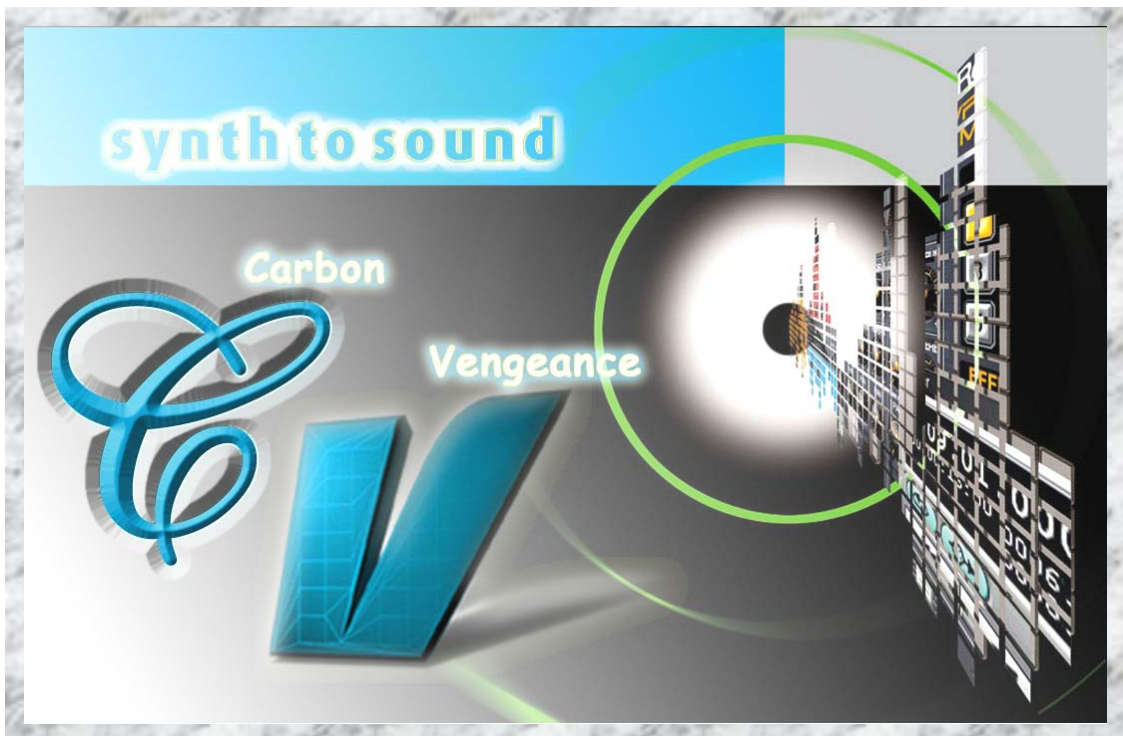


# „Synth to sound“-Script


(May 2005)

Complete outline of the production and mastering of a modern dance track

Hints and tricks about sound design



By Michel Pougin and Manuel Schleis

Sponsor of this script: 

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# 1. The Demonstrator

## 1.1. *Manuel Schleis*



### Production:

- Numerous Releases covering the Trance-/Techno-Genre
- Remixes, amongst others for Groove Coverage, 4Strings, Pulsedriver, Blank & Jones, Yakooza

### Sound Design:

- Access, Waldorf, reFX, Roland
- Own online Soundportal / Forum
- Online Masteringservice
- Soundsets for many up-to-date Synthesizer
- High Quality Sample CDs



### Contact:

[info@vengeance-sound.com](mailto:info@vengeance-sound.com)

[www.vengeance-music.de](http://www.vengeance-music.de), [www.vengeance-sound.de](http://www.vengeance-sound.de)

[www.vengeance-forum.de](http://www.vengeance-forum.de)<sup>1</sup>, [www.vengeance-mastering.com](http://www.vengeance-mastering.com)<sup>2</sup>

### Soon released:



Partypimpz - Baby Give it Up  
Manuel Schleis / Manuel Reuter  
Label: Aqualoop

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<sup>1</sup> The script is available for download here and on [www.carbon-music.de](http://www.carbon-music.de).

<sup>2</sup> The online Mastering Service allows you to send in your audio material and have it mastered professionally against payment.

## 1.2. *Michel Pougin alias Carbon*



### Production / Sound Design:

- Releases within the Trance-/Techno-Genre
- Roland: Patterns, Patches, Rhythm Sets.

### Workshops / Demonstrating:

- Numerous Roland MC-909 Workshops 2002 / 2003
- Numerous Groove Events:
  - DJ Meeting 2001-2005, Techno-Technik-Tour
  - 2000-2002, Frankfurter Musikmesse 2001-2005,
  - Musik-Produktiv Housemesse 2001-2002, and
  - many more.

### Product development:

- Roland MC-909 Function- and Design drafts
- Script author

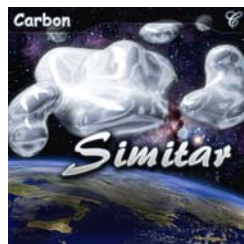


### Contact:

[mail@carbon-music.de](mailto:mail@carbon-music.de)

[www.carbon-music.de](http://www.carbon-music.de)<sup>3</sup>, [www.roland-auf-tour.de](http://www.roland-auf-tour.de)<sup>4</sup>

### Soon released:



Carbon - Simitar

Michel Pougin

Label: Cero-Music

<sup>3</sup> Future releases and sounddesign project will be presented on this page shortly as well as a downloadable version of this script.

<sup>4</sup> Picture Gallery Homepage: Pictures of expositions / workshops / special events. The pictures of the Synth to sound-workshop-tour will soon be available for download on this website as well.

## 2. Production of a modern dance track

In line with this workshop only a small amount of the equipment used in a state of the art record studio is being covered. The Hardware and Software products that are being presented in this workshop are very well suited for the production of a modern dance track however we have to put on record that there certainly are other appropriate products by other manufactures for this genre.

### 2.1. Sequencing

The sequencer is the center stage of every production. It is here that all MIDI and Audio data is administrated. The sequencing software transfers all the relevant data to the connected periphery i.E. external Components, such as Synthesizer and Sampler or the accordant software equivalents. All single MIDI and Audio elements are then arranged into a song.

The most well known sequencers are „Steinberg - Cubase“ (Img. 1) und „Apple - Logic“ .



Img. 1: Arrangement window „Steinberg - Cubase SX 2“  
of the track „Carbon - Similar (Club Mix)“.

### 2.1.1. MIDI and Audio

There is a huge difference between MIDI and Audio: MIDI is a pure control signal where as Audio is a digital Image of a waveform. Since MIDI is used solely as a controlling signal one is able to reach a maximum of flexibility when it comes to composition as there is no original material based on samples that we are dependant of. Therefore it is no problem at all to change parameters like pitch, length, velocity of your soundsource. You can take it even further and copy a bassline part (set into the offbeat) and use this as a hihat part.

There are advantages to Audio as well of course: You can use effect plugin's (*i.E filter, reverb, delay, chorus, flanger, phaser, trigger gate, equalizer, limiter, compressor and many more*) on your audio material whereas with MIDI you are forced to use hardware effect units. With regard to parameter settings and the graphical automation features it is the most comfortable way to use Audio.

### 2.1.2. Folders and Groups

A tidy mind is half the battle. A well known phrase which is true for music production as well. When it comes to complex productions with lots of automated paramters and vocal elements it is indeed very important to keep track of all your folder- and subgroups or you will get lost.

i.E. you can summarize all percussion instrumens such as clap, closed hihat, open hihat, cymbal etc into one foldergroup 'Percussion'. These structures is helping you to free some space in your arrangement window and makes working much more convenient. Subgroups are improving the handling of song elements that belong together (*i.E. Vocals*). You can summarize a five track vocal phrase with main, doubling, third up, third down and octave up to one subgroup. The benefits are clear, if you are changing the volume of the subgroup, the volume proportion of the single tracks stays unchanged. Analogical it is very reasonable to put effects on a subgroup rather than inserting effects on each single track.

## 2.2. *Effects: Insert or Send?*

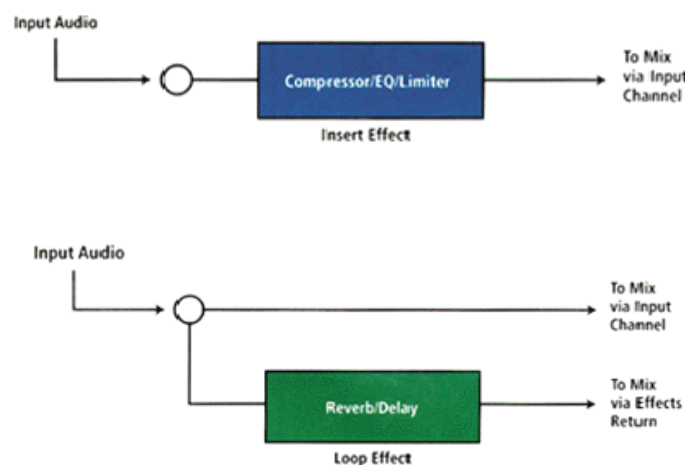
This section covers the two effect types considering the cubase mixer as example. The common send effect described in the following paragraph can be realised on all conventional mixing desks with an auxiliary section (*send and return*).

The following image (*Img. 2*) shows the pathway of the insert and send effect signal. The first graph shows the signal path of a insert effect. The input signal goes through the effect processor (*displayed as a blue box*) and leaves the processor with the corresponding effect.

The original source signal has been replaced with the effected signal. If there is a wet/dry option amongst the effect parameters the proportion of the applied effect can be altered to your liking (0-100%).

An insert effect can only be used for one mixer channel. Typical representatives of insert effects are: *Limiters, compressor, equalizer and distortion*.

The bottom graph is describing the signal path of a send effect. The input signal is split and one part gets routed through the effect processor (*displayed as a green box*). The input signal however gets passed on without being influenced by the effect processor as well. The advantage of using a send effect is that the effect signal can be added to the original source over different mixer channels. The wet/dry proportion is volume variable from 0 to 100 %. This method is very cpu friendly since you only have to host the effect once and it can be applied to as many tracks/mixer channels you like. Typical send effects are: *Reverb, delay and chorus*.

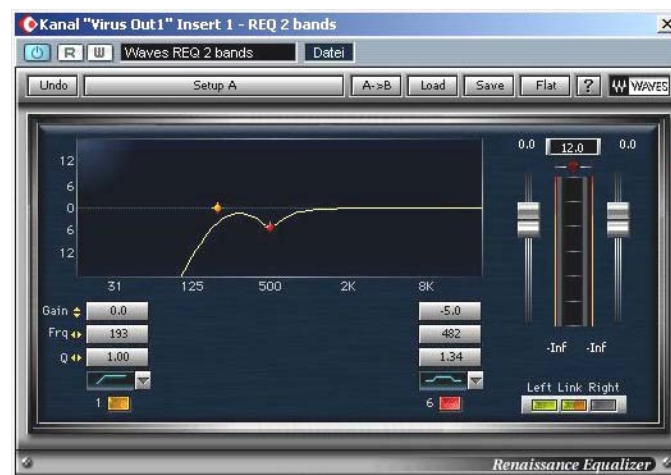


*Img. 2: Top: Signal path „Insert Effect“. Bottom: Signal path „Send Effect“.*



### 2.3. *Correct Equalizing: Differentiation of sound elements within the frequency spectrum*

The equalizer (*Img. 3*) is one of the most important tools for production. In order to mix a track 'clean' and with enough pressure it is necessary to separate the single sound elements (*Bassdrum, Bass, Leadsound, Pads etc*) within the frequency spectrum.

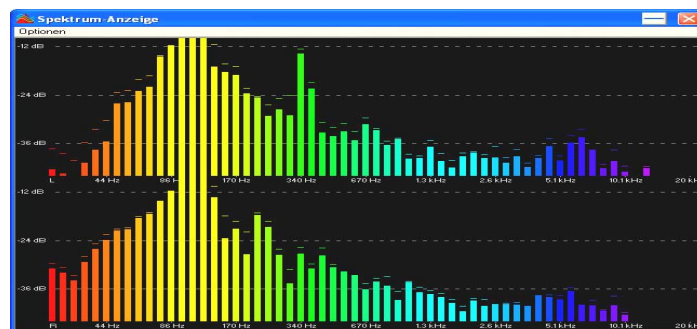
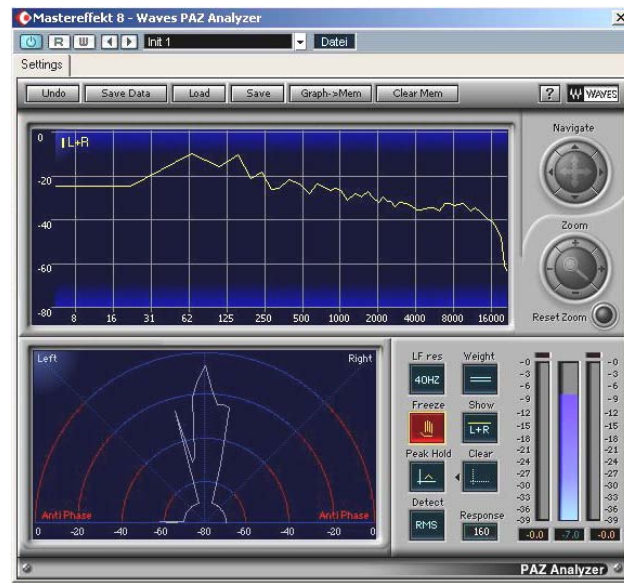


*Img. 3: „Waves - Renaissance Equalizer REQ 2 band“  
with a applied Lowcut at 150 Hz and drawdown at 500 Hz.*

This is accomplished by cutting away frequencies that are interfering with frequencies of other sound elements. Doing this we create a very specific region within the frequency spectrum for each different sound element to make it more present within the mix.

An example of a differentiation of the sound elements within the frequency spectrum (*Img. 4*) is presented in the following chart (*Char. 1*). The listed limit values are benchmarks for the Trance-genre and can be altered to your liking and for other music genres.





Img. 4: Top: „Waves - PAZ Analyzer“, Bottom: „Steinberg WaveLab - Spectrum-Analyzer“. The x-coordinate lists the frequency in Hz, the ordinate the intensity in db.

Frequency range	Instrument / Filter
< 20 Hz	Lowcut
20 Hz - 150 Hz	Bassdrum
60 Hz - 250 Hz	Bass
200 Hz - 10000 Hz	Vocals
250 Hz - 650 Hz	Percussion
250 Hz - 12000 Hz	Leadsound
250 Hz - 2500 Hz	Pad / Background
400 Hz - 16000 Hz	OHH / CHH / Crash / Ride
> 20000 Hz	Highcut

Char. 1: Differentiation of the sound elements within the frequency spectrum (Trance-Genre).

## 2.4. *Soundsynthesis: Hardware vs. Software*

What is better: Hard- or Software ? Both have their pros and cons that we are going to illustrate in the following chapter.

### 2.4.1. **Hardware vs. Software**

Hardware is offering a solid case with many knobs and faders. Thus tweaking your own sounds is very convenient as you have access to all parameters with the provided knobs and faders. A keyboard version is indispensable for those who have learnt to play the piano. In addition to the solid hosting hardware synthesizer's are more reliable and stable than their software counterparts which are constrained to nerve-wracking computer crashes caused by games and internet use. Famous and well-liked hardware synthesizer's within the Trance-Genre are: *Access - Virus C*, *Roland - JP8080* and *Waldorf - Q Rack* (Img. 5).



*Img. 5: The fabulous three:*

*Left: Access - Virus C, middle: Roland - JP 8080,  
right: Waldorf - Q Rack.*

Talking about the advantages of software we have to mention that software is more cost effective than hardware and since hard drives are growing bigger every day memory problems are past history since you can save your patches and samples to your hard drive. VST Instruments can easily be integrated into a software sequencer so that all plugin's and automation data can be used effortlessly. Since software does not have to be run through cables and external mixing desks there is absolutely no loss of quality caused by A/D conversions. A popular software synthesizer within the Trance-Genre is: *reFX - Vanguard* (Img. 6).



*Img. 6: A popular software synthesizer within the Trance-Genre is: reFX - Vanguard*

## 2.4.2. Fusion of Hardware and Software

A new trend has appeared. Developer's are trying to create products that use the best of both worlds. A hardware unit being controlled by software which can simultaneously be integrated as a VST instrument within software sequencers.

i.E.: Access - Virus TI, Access - Virus Powercore, Roland - VariOS (Img. 7).



*Img. 7: Hardware controlled by Software: Middle: Roland – VariOS.*

*Hardware that can be used as a VST instrument: Left: Access - Virus TI, right: Access - Virus Powercore.*

## **2.5.      *Serious Pressure: Sidechain-Method***

***[i.E. Benni Benassie - Satisfaction]***

How do you make the bassdrum/kick really punchy and crisp? This is one of the most common asked questions regarding the production of trance tracks. It is not just the creative and musical skills that decide if a track is being signed by a label but first in line it is the above-board quality of a production. Pressure and brilliance are two of the most important aspects for that matter.

### **2.5.1.    Sidechaining**

In chapter **2.3** we have introduced the equalizer as an essential tool to separate single sound elements of a song, i.e. the bassdrum, within the frequency spectrum in order to give it more space to breathe in a mix.

In order to make the bassdrum more present within a track we are using sidechaining. Sidechaining is THE method to give the kick the necessary pressure. Other than with eqing, where we are giving the kick its own defined range within the frequency spectrum by cutting away frequencies of interfering song elements, sidechaining will free up space for your kick by decreasing the volume of all other song elements (within the range of milliseconds) as soon as the kick sounds. This effect is also known under the name of 'pumping'. As soon as the kick sounds all other elements are practically pumped away depending on the compressor settings.

Sidechaining paired with the right equalizing gives the track the necessary pressure. We are presenting the use of sidechaining and its typical 'pumping' on the basis of '*Benassi - Satisfaction*'.

## 2.5.2. Compressor-Settings

Sidechaining is realised with two compressor's that feature a send and receive function. We are using the „db - Dynamics Processor“ (Img. 8).



Img. 8: Compressor „db - Dynamics Processor“ with send- und receive-function.

Left: send A, right: receive A.

The 'db - Dynamics Processor' is put on the kick track. The settings however are all neutral (*knobs to zero*) as the kick should only be used as the trigger of the second compressor who is sitting on the pad track. The only setting that should be made to the kick compressor is 'Send A' (Img. 7 left). Analogous the setting for the pad compressor is 'Receive A' (Img. 7 right). The threshold knob of the second compressor is now controlling the intensity with which the kick is ducking away the pad. This parameter can be set to extreme positions resulting in an intended pumping of the pad sound or be set to more subtle values in order to give more space to the kick as the volume of the pad sound is being decreased while the kick sounds.

## 2.6. A popular effect: Triggerrate (Slicer) for Pads and Vocals

In the course of this workshop we are going to use the Freeware Effect-PlugIn „MG Audio - Triggerrate“ (Img. 9).



Img. 9: Freeware Effect-PlugIn „MG Audio - Triggerrate“.

The triggerrate effect also known as slicer became famous through trance classics like 'Legend B - Lost in Love' from 1994 or through 'Push - Universal Nation' from 1998.

In both tracks THE most infamous triggerrate/slicer sequence was used: The 'sequence A'.

This effect originated from the early beginning of the techno age and was realised only through MIDI volume control messages (0 and 127). Nowadays plugins like 'MG Audio - Triggerrate' have integrated these MIDI volume control messages and have redeemed us from the control change chaos.

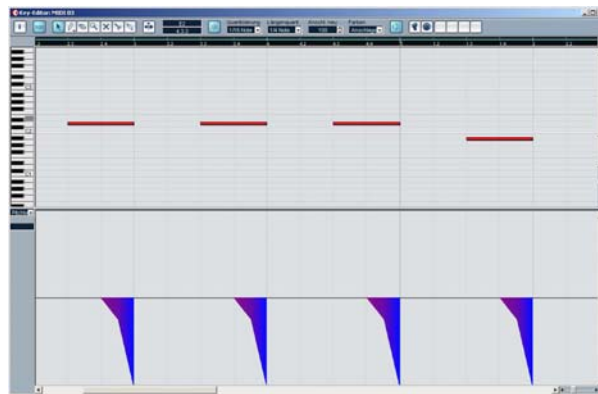
Sequences like the 'sequence A' can , as a matter of course, also be realised by setting a lot of note on/off control messages. However this is where most synthesizer's start to click due to their envelope parameters. The most comfortable way is to record the MIDI sequences to Audio and to realise the desired effect with the use of triggerrate/slicer effect plugins. You can avoid the infamous filter clicking of the JP 8080 this way.

## 2.7. *Pitch Bass [i.e. Cosmic Gate]*

Cosmic Gate has made it famous: The pitch bass. One of the most common questions on online boards is how to program such basses. Most of the time the best solution is the easy one:

The pitch bass is made with a simple MIDI pitchbend control change command.

You choose the related MIDI pitchbend command in your sequencer and draw to lines, as shown below, as far as -1 octaves (*Img. 10*).



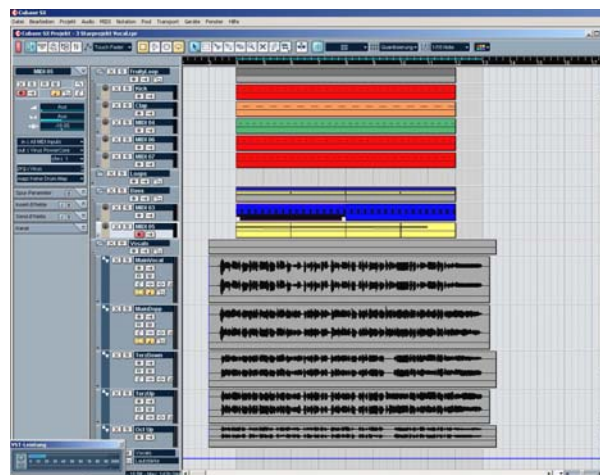
*Img. 10: Pitch Bass realised with MIDI pitchbend control change commands.*



## 2.8. *Correct use of vocals: Main vocal, doubling, third, octet , subgroups, effects [i.E. Cascada - Miracle]*

The important thing about vocals is the quality of the recording. This is where one should only use high quality components (*Preamp, microphone, maybe vocal both*). One should always record multiple takes/tracks of the same phrase (*Doubling*) and harmonic takes/tracks of this phrase (*third, octet etc.*) (*Img. 11*).

The best take of the original track is usually used as the main vocal. The main vocal has a higher volume than the rest of the tracks, those are only for background support and filling of the vocal arrangement. Spreading those background tracks will give you a nice stereo effect.



*Img. 11: Multiple vocal takes/tracks  
(Main Vocal, Doubling, Third up, Third down, Octet).*

To create a clearly laid out arrangement it is very convenient to store all vocals in one folder track and additionally to group the vocals. If you change the volume of the created subgroup the volume proportions among the single tracks are not going to change. Further - more it is reasonable to put effects on the subgroup instead of inserting effects on each track separately.

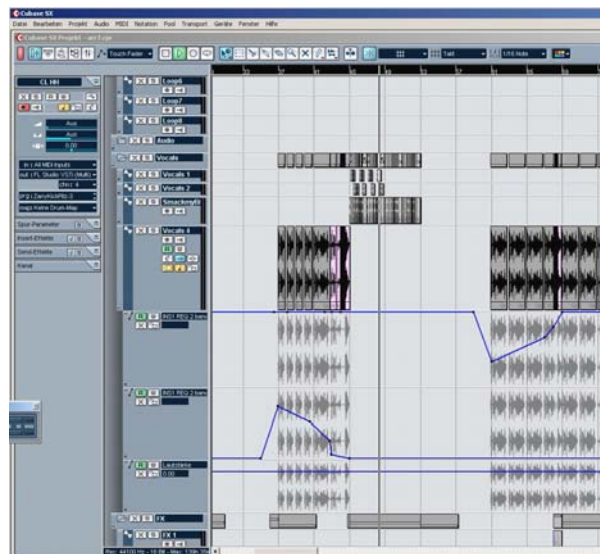
Effects like reverb and delay are used to generate more atmosphere to the sound source.

As usual less is more when it comes to reverb. A small good sounding room should be the preference. The send amount should not exceed 1/5. Eq settings should be made with a lowcut, an increase of the higher frequencies and some small corrections to the mid frequency range. Further it is very important to strongly compress the vocals to increase the voice comprehensibility.

To spice up your vocals you can use the 'MG Audio: Triggergate' (*Img. 9*) which we have introduced in chapter 2.6. The best effect is attained when using the plugin in on long vowels. You can then automate the effect (*see chapter 2.9*).

## 2.9. Automating PlugIn Paramters

All effect parameters can be automated. To create an automation track the plug in has to be set to W (*write*) and the sequencer track has to be set to rec (*record*). Now all knob and fader movements are recorded. The playback of the record data is achieved by setting the plugin to R (*read*). The created curves and line gradients (*Img. 12*) of the automation track can of be altered arbitrary after recording.



*Img. 12: Curves / Line gradients of automated plugin data.*

## 2.10. Mastering: Which PlugIns in which order?

*[i.E. Partypimpz - Baby give it up (Club Mix)]*

### 2.10.1. Retrospection

Taking the example 'Partypimpz - Baby give it up (Club Mix)' (*Img. 13*) we are going to clarify all elements previously introduce (*2.1 to 2.9*) and finally we are going to analyse the mastering chain.



*Img. 13: Arrangement of “Partypimpz - Baby give it up (Club Mix)”.*

### 2.10.2. Mastering-Chain

The most essential relevance while mastering a track is the order of the plugin building blocks. In the course of this workshop we are going to use the 'UAD-1 Studio Pak' (*Img. 14*). Here we are successively building up the chain with equalizer, multiband compressor, limiter and analyzer (*Char. 2*).

Very often though people tend to underestimate the function of the analyzer. After several hours of production the human ear is overstrained and the concentration is decreasing. One tends to start mixing incorrectly. That's where the analyzer is helping you out since its values are not getting forged. In order to put the analyzer to its best use it is recommended to study actual tracks with the analyzer to get a feeling for the right curve (*cue word 'ski-jump'*).

The conclusion to this section is: First equalizing and compression, then limiter and finally the analyzer.



Img. 14: „UAD-1 Studio Pak“ - DSP card with plugins.

Order	PlugIn	Function
1.	Equalizer	rough EQing: Lowcut at around 25Hz, Highcut at around 19kHz.
2.	Multiband compressor	Compression of the single frequency bands.
3.	Equalizer	For the finetuning: a small banded decrease of interfering frequencies.
4.	Limiter	Reduction -3db
5.	Analyzer	For optical control: „Waves - PAZ Analyzer”

Char. 2: Sucessive build of the single plugin blocks.

### 3. Summary

At first sight the current market is offering a huge intransparent supply of studio equipment. The hardware, software and plugin jungle is preventing many of us from producing creatively. Best solution is to gather information from music magazines, internet, attending workshops or by talking to other producers.

The most important criteria when buying equipment should always be: 'What do I really need to accomplish my target'. Quality is more important than quantity. Easily saying: Less is more. Hardware and software is appropriate if it is giving you qualitative results and a comfortable and flexible working flow.

The most expensive equipment is not always the better choice. Everyone who is keeping themselves informed will assert that the market is delivering many high quality products that are cheaper than others whilst providing the same or even better features. The introduced 'MG Audio - Triggergate' is actually a freeware plugin and a top of the line effect.

„All roads lead to Rome“ - it is important to find your own way. What may be right for others may not always be the right way for you. The slogan goes: Get informed, go test and only use your personal favourites that deliver the most flexible and comfortable results to you.

At this point we would like to address the all known software piracy issue. Often you hear verdicts like: 'I am going to buy the software when I am making money with it'. What about entertainment software (*Games*) like Far Cry, Unreal Tournament or Counter Strike? Do we only buy this software when we are making money of it as well? Generally it is understandable that a user wants to test drive to see if it suits his expectations, but if he likes it he should obtain an official licence for it. This is supporting the product development and will reduce the cost of the product if the demand is sufficient.

Given the technical possibilities, especially through the development of computers and software, it is possible to produce songs solely with a computer and in a remarkable quality. Thus there are more and more people that would like to enter the world of music production.

The fact that the variety of software and the possibility to produce music cost effectively at home has led to many users losing the focus and the essence of making music - music itself. Nowadays there are algorithms that create melodies and harmonies for you but it's much better if you understand which notes and harmonies can be used or combined. It's essentially easier to use harmonies and melodies efficiently if you have a musical background of some sort than just lapsing into trial and error. Therefore we recommend attending a classical music training with lots of harmonics (*i.e. piano or keyboard lessons*). You do not have to master an instrument to be a good producer but some sort of musical knowledge should be present.

Music should generate an atmosphere and draw in the attention of the listener. Music can express feelings and emotions. Thus one listens to different music depending on the mood he is in. There are different types of songs that you listen to when mourning than on a weekend if you are very happy. The atmosphere and mood can be altered with the use of major or minor. They let a song appear sad or joyful. The corresponding use of sounds and effects, as well as the type of playing the instruments can further create such moods. You never should let this fundamental knowledge out of sight when making music. It is among talent, creativity and knowhow the most important aspect of musical production.

## 4. Addendum

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*English translation by Oliver Imseng*

### 4.1. Glossary

Amplifier	A component which changes the volume of a sound according to the control signal. This signal usually is generated by a envelope.
Arpeggiator	A component that separates an incoming MIDI chord into its single notes and repeats it rhythmically. The user can specify different patterns ( <i>i.E. sequence A</i> ) in order to cover a wide application area. Typical parameters are octave range, direction, speed and note length. Some arpeggiators feature pre programmed and customizable rhythm patterns.
Attack	Parameter of a envelope. Attack is a term for the rising curve of a envelope from the 0 to the maximum amplitude. The attack phase begins right after the input of a trigger signal, <i>i.E.</i> pressing a key on keyboard.
AUXway	AUX stands for auxilliary 'way', and means helper 'way', or additional 'way'. Each mixing desk has got a least one AUX 'way'. It is located behind the channel fader also called 'post'. Most mixing desks offer the opportunity to grip the signal before the faders which is called 'pre'. There is a send and return for each AUX 'way' with symmetrical input connectors. You can connect an effect processor in between. The proportion of the applied AUX signal is controlled by a knob.



Bandpass-Filter	A bandpass filter is only passing through frequencies around its middle frequency. Everything above or below is getting damped.
Bypass	Muting an effect processor. Only the unchanged original signal is played back.
CC	<p>Control Change. These important MIDI messages are making it possible to fully change the sound behaviour of a tone generator.</p> <p>The message consists of two parts:</p> <p>First the controller number: This number (0-127) defines what is being affected (<i>i.E. Cutoff</i>). Second, the controller value: This value (0-127) defines how strong the modification is going to be.</p>
Cutoff	<p>Filter frequency. The filter frequency is an important characteristic of filters.</p> <p>A lowpass filter is damping singal parts above this frequency.</p> <p>Everything below is passed unaffected.</p>
Decay	Parameter of an envelope. Decay stands for the decreasing curve of a envelope right after reaching its maximum value. The decay phase instantaneously connects to the attack phase. It ends as soon as the envelope has reached its programmed sustain value.
Dry	Signal without applied effects.
Dur	<p>Appelation of the hard or male tone gender within the range of tonal music.</p> <p>A Dur key (=major) is characterized by the keynote through the intervals great third, great sixth and great seventh.</p> <p>The keynote of a major key's triad is called a major triad.</p> <p>Example: <i>C-major-chord: c, e, g.</i></p>
Envelope	Envelope.
EQ	Equalizer.

**Filter**

A filter is a building block which blocks or passes signal parts depending on its frequency. The most important characteristic of a filter is the filter frequency. The most important forms are lowpass, highpass, bandpass and band-stop. A lowpass filter damps all signals above the cut-off frequency. A highpass filter analogically all signals below it. A bandpass filter only passes parts around the region of the middle frequency. The bandstop accordingly only damps parts around the region of the middle frequency. The filter type which is most used is the lowpass filter.

**Gate**

The term 'gate' is used in different correlations within audio engineering. A 'gate' can be opened or closed. Technically speaking: Active or inactive. The 'gate' is a building block within a device that passes or blocks a signal depending on general conditions. This is used for noise gates which pass only signals with a defined minimum level to avoid hissing in between signals. In correlation with analog synthesizers the 'gate' is used as a control signal that can be active or inactive. I.E. the keyboard of such a synthesizer. When pressing a key two separated signals are being sent: CV and Gate. The control voltage 'CV' defines the pitch of the pressed key. The gate signal is active as long as the key is pressed, afterwards it switches back to inactive immediately. The signal can be used to trigger an envelope which controls the VCA of a synthesizer. In the course of this workshop we have also introduced the triggergate (*MG Audio: Triggergate*) which chops up an existing signal (*i.e. a pad or lead sound*) rhythmically. The most well-known triggergate sequence is: *Sequence A*.

Highpass-Filter	A highpass filter is damping all signal parts below a filter frequency. Signals above this frequency remain unaffected.
Envelope	<p>An envelope generates a chronologically modifiable control signal. It is used to modulate a sound sculpting block within a certain time interval.</p> <p>i.E.: An envelope can modulate the filter frequency of a lowpass filter. Thus the filter opens and closes temporally. The envelope is started through a trigger signal, most often a MIDI note. The classic envelope consists of 4 separate adjustable phases: <i>Attach</i>, <i>Decay</i>, <i>Sustain</i> and <i>Release</i>. That is where its name is coming from; <i>the ADSR envelope</i>.</p> <p>When a trigger signal has been received the envelope is running through the Attack and Decay phase until it reaches the programmed Sustain level. The Sustain level is being hold until the trigger signal is terminated. Afterwards the envelope switches to the Release phase which decreases the level until it reaches the set minimal value.</p>
Insert Effect	<p>Within an insert effect the signal runs through the effect processor and leaves it with the applied effect. The original source is replaced with the effected signal. If the effect features a dry/wet parameter the proportion of the applied effect can be varied arbitrarily from 0 to 100 %. Insert effects can only use one mixer channel. Typical representatives are: <i>Limiters</i>, <i>compressors</i>, <i>equalizers</i> and <i>distortion</i>.</p>
LFO	Low frequency oscillator.
MIDI	MIDI is the abbreviation of „ <i>Musical Instrument Digital Interface</i> “. It was developed during the eighties by Roland in order to combine different electronic instruments of different builds and manufacturers with each other. MIDI presented giant leap forward as there has not been any other standard that combined sound generators by then. From now on it was possible to connect all devices with each other through the same cables.

The basic approach was following: One sender is always connected with one or more receivers. If a computer should be used to play a synthesizer then the computer is the sender and the synthesizer is the receiver. It is because of this set up that all devices, with a few exceptions, have two or three connectors :

*MIDI In, MIDI Out and in some cases MIDI Thru.* The device which is sending is passing the information over its MIDI Out to the periphery. The MIDI Thru connector has a special function. It enables the sender to reach multiple receivers. It repeats the incoming signal and passes it to the other device without changing it. An additional equipment can then be connected to this port. Using this method a chain is built connecting one sender with multiple receivers.

Naturally it is desirable to let the sender address each single device separately. This involves correctly setting the MIDI channels (1-16) and all related parameters.

MIDI Channel	An important component of most of the messages. The receiving device is only reacting to the incoming message if its receive channel is identical with the send channel of the message, thus enabling a directed transmission of information to a receiver. The MIDI channels available are 1 to 16. Furthermore a device can be set to Omni / All in order to receive on all 16 channels simultaneously.
MIDI Clock	The MIDI clock message defines the tempo of a track related to its timely appearance. It is used to synchronize time-dependant procedures.
Minor	Denomination for the soft or female tone gender within the range of tonal music. Compared with major keys the minor key usually is defined starting

with the root key of a small third (*C-minor: c-es, in major: c-e*). The triad which is generated on the basis of a minor key is the Major triad.  
i.E. *C-minor triad: c, es, g*.

Mute	Mute functions of mixer channels etc.
Note on / off	This is the most important MIDI message. It defines the pitch and the velocity of a sound. The arrival time of this message is the beginning of the sound at the same time. The pitch is the result of the sent note number which lies in the range from 0 to 127. The velocity is found in the range of 1 to 127 as the value 0 for velocity stands for 'Note off' ( <i>The sound/note is switched off</i> ).
Pan	Panning. Describes the panorama position of the sound within the stereo field.
Part	Mixer track / Mixer channel
PC	Program Change. MIDI message used to switch sound programs ( <i>patches</i> ). You can choose a program number between 0 and 127.
PB	Pitchbend is a MIDI message. Although the pitchbend message is functionally equal to the control change messages it is defined as a own message type. The primary cause for this is that the pitchbend message is transmitted with a much smoother resolution than normal controllers. The reason why this has been separated is that the human hearing is extremely sensible to pitch changes.
Receive	Receiving ( <i>i.E. MIDI Data</i> )
Release	Parameter of an envelope. Describes the decreasing speed which brings the envelope to its minimal value by the time the trigger signal is terminated. The release phase however is started independently and is not linked

to where the envelope is at the current point of time, meaning it is also triggered during the attack phase of the signal.

Resonance	The resonance is an important filter parameter. It emphasizes a small area around the filter frequency which raises the volume of all frequencies in that area. Resonance is a very favoured method of sound manipulation. If the resonance is raised too strong the filter starts to self oscillate and is generating a relative clean sinus oscillation.
Send	Sending ( <i>i.e</i> MIDI messages).
Send Effect	A send effect splits the incoming signal and passes one part through the effect processor ( <i>Img. 2</i> ) while the other part is passed without being affected. The advantage of using an effect as a send effect is that you can apply the effect to different signals on different mixer channels. The effect proportion is hereby alterable (0-100%). This method is saving cpu performance since the effect only has to be hosted once and can be applied on as many tracks as you like. Typical send effects are: <i>Reverb, delay and chorus (see AuxWay as well)</i> .
Sustain	Parameter of an envelope. Sustain describes the hold level of the envelope which is reached after the signal has passed the attack and decay phase. The level is hold until the trigger signal is terminated.
SysEx	System exclusive data. Enables the access to the innermost of a MIDI device. It enables access to data and functions that can't be represented with another MIDI message. Exclusive means that these data parameters are only valid for one certain type of equipment. Therefore each device has its own system exclusive data. The most commonly used application area for this data type are the transmission of memory contents ( <i>Backups / Updates</i> ) and the complete device control through a

computer. Older synthesizers like Roland JD800 are receiving and sending no control change data like cutoff filter movements. It is however possible to send the CC message to the MIDI device via SysEx. Since SysEx messages are big data packets most systems can't keep up with the huge traffic load and eventually crash. Therefore it is recommended to record the MIDI part to Audio and to apply effects like the cutoff filter with corresponding plugins.

Sidechain	Used to control a compressor with an external signal. The sidechain is a silent channel of the dynamic processor which is only used for control purposes. The dynamic processor regulates the input signal with its VCA ( <i>Voltage Controlled Amplifier</i> ), not in connection with the input signal itself but in connection to the sidechain signal. If the sidechain signal falls below the threshold of a gate, it will close independently from the input signal. Many gates allow the user to insert any other signal processors into the sidechains ( <i>i.e. a filter</i> ). Many of them already feature a filter within their sidechain path.
Threshold	Threshold of a compressor. It regulates the intensity of the compressor.
Lowpass filter	Often found filter form within synthesizers. Damps all signal parts above a set filter frequency. Everything below remains unaffected.
Trigger	A trigger signal is used to activate certain events. The nature of the trigger signal can be differential. A MIDI note or an audio signal can both act as a trigger signal for example. The activated event can



be manifold as well. It is often used to active an envelope.

Volume	Describes the volume of a sound at the output stage.
VST	Virtual Studio Technology
Wave	A wave is a digitally stored image of a single oscillation cycle. Therefore a wave is identical with a sample that has been looped after exactly one single oscillation cycle.
Wet	Signal with applied effects.

## 4.2. *Bibliography*<sup>5</sup>:

### *Literature, links and other information*

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- <sup>15</sup> [www.rolandmusik.de](http://www.rolandmusik.de), *Homepage of the script sponsor*, **1997**.

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<sup>5</sup> Sorted according to the year of publication.

<sup>6</sup> Future releases and sound design project will be presented on this page shortly as well as a downloadable version of this script.

<sup>7</sup> The online Mastering Service allows you to send in your audio material and have it mastered professionally against payment.

<sup>8</sup> Here you can find another discussion about the Synth to sound- (STS) Tour. Post questions, feedback, laud or constructive criticism.

<sup>9</sup> Here you can download this script as well.

<sup>10</sup> Picture Gallery Homepage: Pictures of expositions / Workshops / Special events. The pictures of the Synth to sound-workshop-tour will soon be available for download on this website as well.