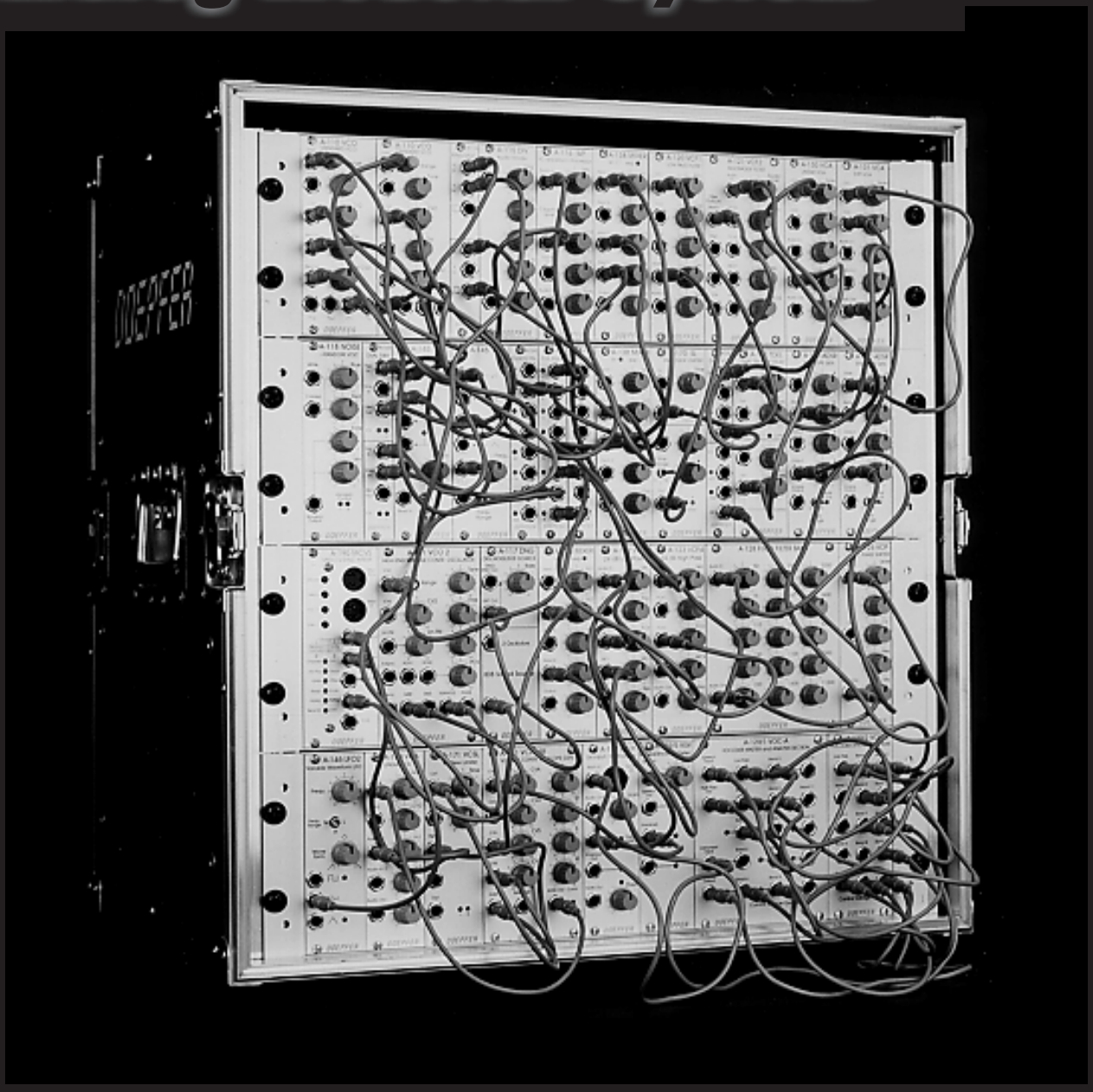
A-100

Analog Modular System



DOEPFER

A-100 is a Modular Analog Synthesizer System built in the style of the big modular systems of the seventies.
The renaissance of analog synthesizers in the last few years shows that analog sound generation has its qualification besides sampling and digital synthesis and creates sounds that are available in no other way. In addition to the specific sound of analog oscillators and filters, this system offers manifold ways of modulations, not being restricted to conventional types.
In a modular system there is no inherent difference between modulation and sound sources. For instance, the frequency of an oscillator or filter may be modulated „slowly“ with a low frequency oscillator in the usual manner or „fast“ with another audio oscillator to produce non-harmonic FM sounds. Moreover, a modular system offers an enormous variety of interconnections between the modules, almost without restrictions - provided that enough modules are available.
Of course, a modular system doesn't just have advantages. Creative work with an audio construction kit like this takes time and practice, especially to start with. Anyone who wants to be able to check out all its available sounds at the press of a button will be very disappointed with a modular system. Each unique sound has to be puzzled out, and may never be exactly repeated. Nor are there any fixed rules for connecting the various modules. A modular system is an open system, in which practically anything is possible, and that's where the fun really starts. Diversity and experimentation - and sometimes lateral thinking - are the keys to its power. Although the user manuals for each module are very comprehensive, they can't substitute entirely for a general overview and knowledge of analog synthesis. Some very good specialised books have been written on the subject (e.g. Allen Strange, Electronic music - systems, techniques and controls, W.C.Brown Company Publishers, Iowa, ISBN 0-697-03602-2), and although some may be out of print, it's crucial to find one or two of them, and learn from them. With that, the whole world of modular systems will open up to you, and you'll suddenly appreciate their fascination and sheer sonic power.
But even if you have a lot of time, you should acquire some theoretical previous knowledge.
However, if you have cleared all these hurdles, the fascinating world of a modular system will appear to you, and you will understand the musical attraction of analog sound synthesis very soon.
Of course we hope that these remarks will not get you off the A-100. But we think that some clarifying words in advance are better than dissatisfied customers, being left in the dark about a product.
At this point we also hope for your understanding that the low prices of the A-100 modules cannot include a detailed personal guidance in analog sound synthesis with modular systems or in how to connect and adjust modules for obtaining a specific sound.
The complete A-100 operation manual is included if you order one of the basic systems or the mini system. If you purchase single modules or empty frames you have to order the operation manual additionally. Single modules do not contain the manual and manuals for single modules are not available in printed form (only the complete A-100 manual). But on our web site you will find all manuals in pdf format for print out.

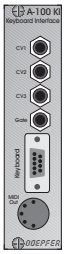
The following pages show detailed information about the A-100 modules available at present (as of summer 2006). If you need additional information please visit our internet web site www.doepfer.com. Here you will find a more detailed description of each module, user's manuals (pdf files) and sound examples.
Also if you want to stay informed regarding new A-100 modules, we recommend to visit our web site now and then as you will find here current information about new A-100 modules and other products.

The A-100 manual is available in German or English language. Please tell us whether you need the German or English version when you order.
The A-100 basic systems and frames are available for 230V or 115V mains voltage. Please specify the version you need. Otherwise we deliver 230V versions.

A-100 Keyboards

still in planning stage

Two A-100 keyboards with CV and Gate outputs are planned for 2005: a keyboard with standard keys and a keyboard with touch sensitive metal plates. Both keyboards can be used as stand alone devices with external 9V power supply and in/outputs at the keyboard or in combination with an A-100 frame. In this case a multicore cable is used to power the keyboard from the A-100 frame and the Gate, CV and Midi outputs are available at an A-100 front panel. Six buttons with assigned LEDs and a three digit display are used to adjust the keyboard parameters, e.g. assign and retrigger mode, transpose, Midi channel and so on. The Midi output is intended in the first place to drive the A-100 keyboard/sequencer controller that is in the planning stage.



Controls

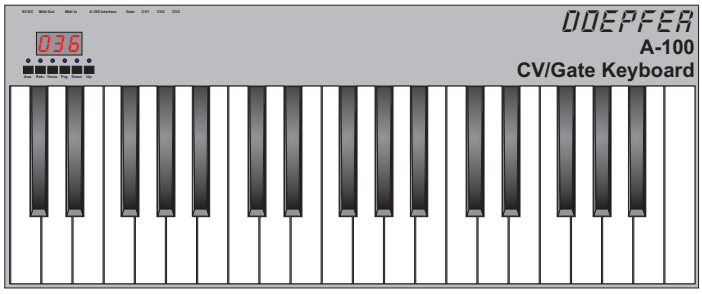
- Keyboard (2, 3, 4 or 5 octaves)
- 6 buttons
- 6 LEDs

In/Outputs

- Gate Out
- CV Out 1,2,3 (normal keyb.)
- CV Out 1,2 (touch keyb.)
- A-100 Interface
- 9V DC
- Midi Out

CV/Gate Keyboard

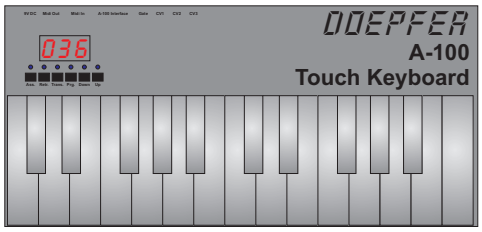
still in planning stage



The keyboard with standard keys will be probably equipped with Gate, CV1 (pitch), CV2 (velocity), CV3 (after touch) and Midi out. The electronics inside the keyboard can be used in combination with 2, 3, 4 or 5 octave keyboards. But only one version (probably 4 octaves) will be available with a suitable metal case. The other versions will be available only as OEM products without housing and the housing has to be built by the customer. A controller box with 2 wheels and a joy-stick is also in the planning stage. The box will have the same depth and height as the keyboard case and can be probably mounted next to the

Touch Keyboard

still in planning stage

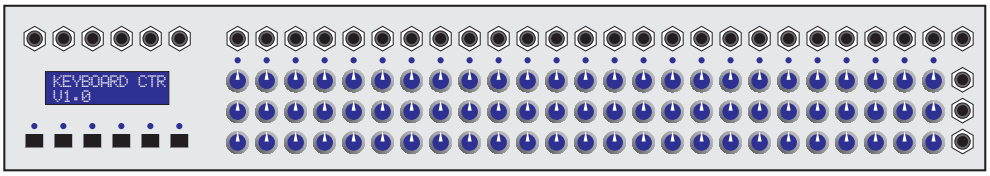


The touch version of the keyboard will be equipped with probably 25 metal plates (2 octaves) that respond to the touch of a finger (no moving parts). A pressure sensor below the keys measures the pressure applied to the metal plates. The touch keyboard will be probably equipped with outputs for Gate, CV1 (pitch), CV2 (pressure) and Midi. Due to the nature of the keyboard velocity measurement is not possible. Suitable supports to mount the keyboard case into a 19" rack at different positions and angles are planned.

Preliminary information without obligation ! Details about the final versions of the keyboards are available on our web site

A-100 Keyboard/ Sequencer Controller

still in planning stage



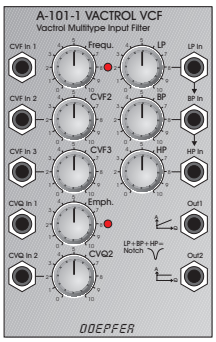
This is a very preliminary sketch of the planned keyboard/sequencer controller and should be treated only as a discussion base. The final version will certainly differ from this first draft. The main idea is to have several rows of controls available (rotary potentiometers and/or encoders) that can be used in different ways. With cyclical addressing of the steps normal sequences can be generated. With addressing of the steps by the controlling keyboard completely different functions are possible: e.g. assignment of several different voltages to each key of the controlling keyboard e.g. to create free tunings, or using the keys to turn on/off the sequencer steps. If rotary encoders are used virtual tracks will be possible. In this case dditional displays are required to show the track number, the value of the currently addressed step and other track parameters.

A-101-1

Width:
16 HP
Current:
30 mA

*(the 101-X numbers are used for **vactrol** modules.*

Details about vactrols can be found on our web site)



VACTROL Steiner VCF

A special multitype filter based on an idea by Nyle A. Steiner from 1974 with three separate inputs (!) and one common output for the three filter types low, high and band pass, voltage controlled frequency and resonance (up to self oscillation) with vactrols, 2 LEDs for frequency/resonance control, normalled input sockets with separate attenuators for each input, consequently three different or the same audio signal can be used as filter input, with the same signal for all inputs different filter types including notch are possible

Controls

- Frequency
- Frequ. LED
- CVF2
- CVF3
- Resonance
- Res. LED
- CVQ2
- LP Level
- BP Level
- HP Level
- Res/Level

In/Outputs

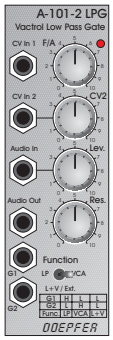
- CVF1
- CVF2
- CVF3
- CVQ1
- CVQ2
- LP In
- BP In
- HP In
- Out 1
- Out 2

A-101-2

Width:
8 HP
Current:
20 mA

*(the 101-X numbers are used for **vactrol** modules.*

Details about vactrols can be found on our web site)



VACTROL Lowpass Gate

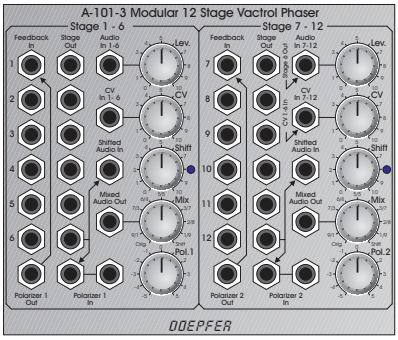
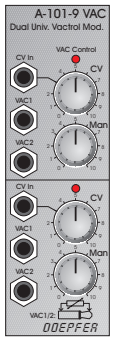
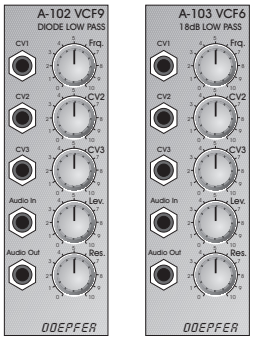
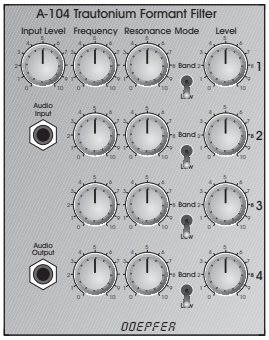
the combination of a low pass and VCA; 3 modes: low pass / low pass + VCA / VCA; mode selectable with toggle switch or two gate inputs; controlling elements for frequency resp. amplification are so-called vactrols; control LED for frequency resp. amplification; manual and CV controlled frequency/amplification (two CV inputs, one with attenuator); manually adjustable resonance for low pass (no self oscillation); audio input with attenuator (distortion possible)

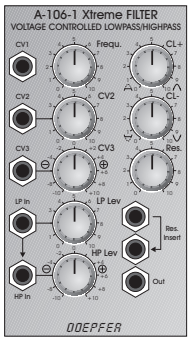
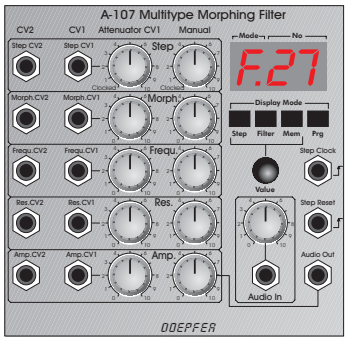
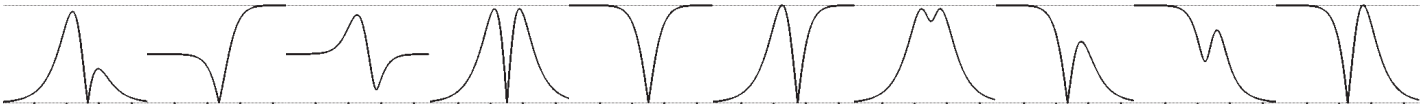
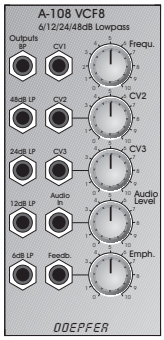
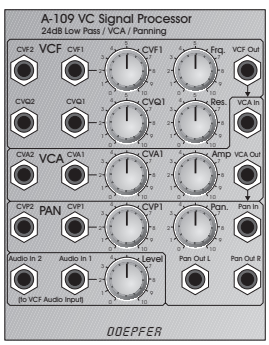
Controls

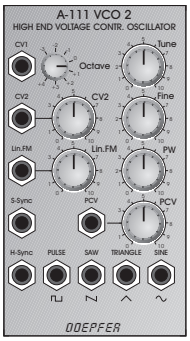
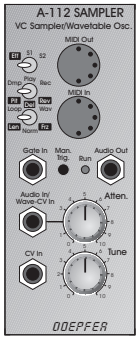
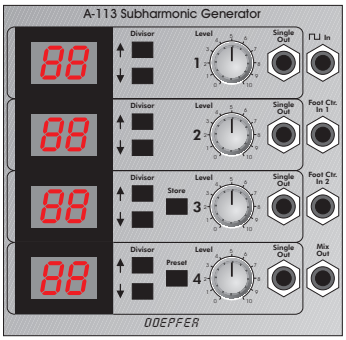
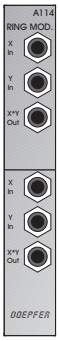
- F/A
- F/A LED
- CV2
- Level
- Resonance
- Function LP/VCA/Both

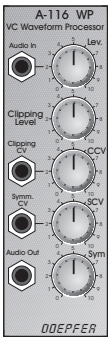
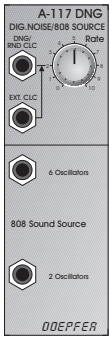
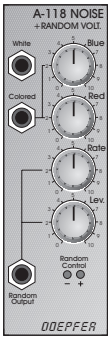
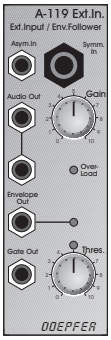
In/Outputs

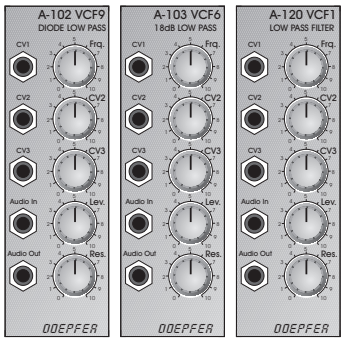
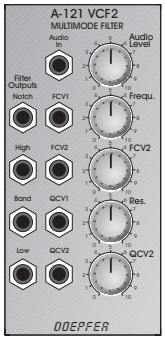
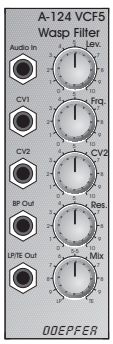
- CV In 1
- CV In 2
- Audio In
- Audio Out
- Function Gate 1
- Function Gate 2

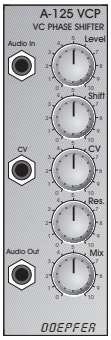
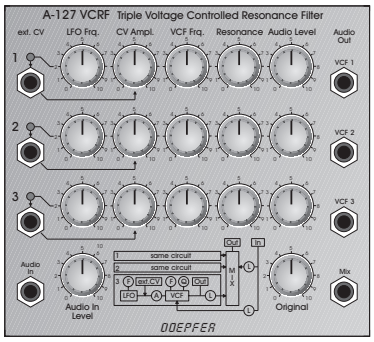
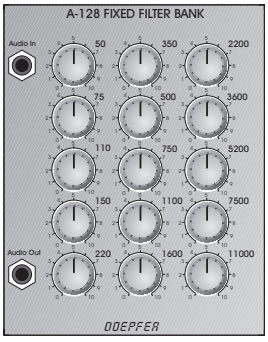
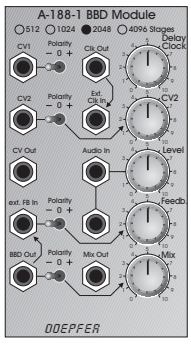
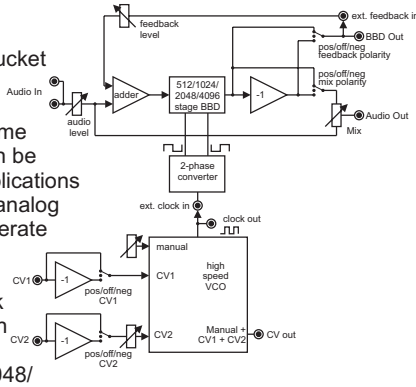
Module	Sketch	Description	Controls	In/Outputs
A-101-3 **Width:** **30 HP** **Current:** **50 mA** *(the 101-X numbers are used for **vactrol** modules.* *Details about vactrols can be found on our web site)*	 *Detailed information including sound examples is available on our web site www.doepfer.com*	**Modular Vactrol Phaser** modular 12-stage voltage controlled phase shifter; separate feedback inputs and audio outputs for each stage; as all inputs and outputs are free patchable completely new phaser and filter functions are possible (e.g. multiple feedback or forward loops for multiple resonance peaks or for insertion of other modules, e.g. VCA or VC polarizer); 12 vactrols as phase shifting elements; separate vactrol control for stages 1-6 and 7-12 with manually and voltage controlled phase shift; LED display for each group; two mixers (original/shifted signal); two polarizers for positive/negative feedbacks; normalled sockets (= two separate 6-stage phasers with adjustable positive/negative feedback)	• Level 1 + 2 • CV 1 + 2 • Shift 1 + 2 • Shift LED 1 + 2 • Mix 1 + 2 • Polarizer 1 + 2	• Audio In 1-6 / 7-12 • CV In 1-6 / 7-12 • Shifted Audio In 1 / 2 • Mixed Audio Out 1 / 2 • Polarizer In 1/2 • Polarizer Out 1/2 • Stage Out 1-12 • Feedback In 1-12
A-101-9 **Width:** **8 HP** **Current:** **~ 50mA**		**Universal Vactrol Module** Two identical sub-units, each containing two voltage controlled resistors realized with so-called Vactrols, the resistors can be used to replace any variable resistor (potentiometer, fader) in any circuit thus introducing voltage control for the parameter in question, can be used for A-100 parameters (e.g. A/D/R of A-140 and A-143-2, A/D of A-143-1, frequency of A-104, Delay/Width of A-162, clipping of A-106) but even for external devices like effect units, wah-wah pedals, guitar stomp boxes, radio tuning and many more	for each sub-unit: • CV (polarizer) • Manual • LED control	for each sub-unit: • CV In • Vactrol 1 (variable resistor output) • Vactrol 2 (variable resistor output)
A-102 **A-103** **Width:** **8 HP** **Current:** **30 mA**		**A-102: Diode Lowpass** description see A-120 **A-103: 18 dB Lowpass** description see A-120		
A-104 **Width:** **20 HP** **Current:** **30 mA** **(as all 12X numbers are used up the 10X numbers are used for new filters)**		**Trautonium Formant Filter** four independent manually controlled band pass/low pass filters as used in the ***Mixtur Trautonium*** (see also A-113), controls for each filter: frequency (about 40Hz ~ 8kHz), resonance, mode (switch) and output level, each filter can be switched to low pass, band pass or off, common audio input and output, common input level control (also used as distortion control as the audio input is very sensitive) A similar filter module with voltage control of the filter frequencies is the A-127.	• Input Level for each filter: • Frequency • Resonance • Mode (switch) • Level	• Audio In • Audio Out
A-105 **Width:** **8 TE** **Current:** **30 mA** *(as all 12X numbers are used up the 10X numbers are used for new filters)*		**24 dB SSM Low Pass** 24dB low pass built with special circuit SSM2004; same controls as the CEM-based A-122 but different sound and resonance behaviour; the special feature of the 4 pole low pass SSM2044 is the patented so-called "true open loop design that delivers a characteristic fat sound not available from other devices" (extract from SSM2044 data sheet) This chip was used in synthesizers made by Korg, Sequential, Emu, Fairlight and PPG; voltage controlled resonance; sensitive audio input (distortion possible)	• Audio Level • Frequency • FCV2 • Resonance • QCV	• Audio In • FCV1 • FCV2 • QCV • Audio Out

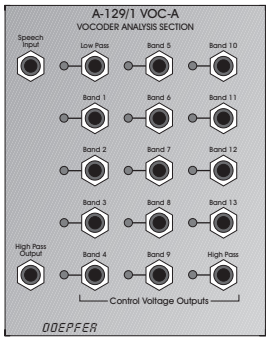
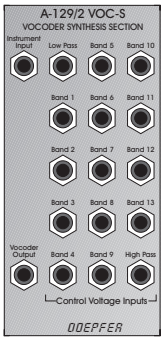
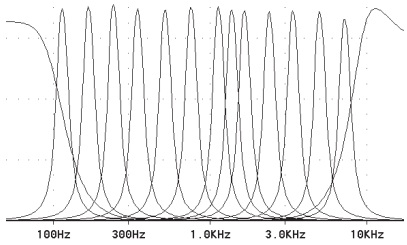
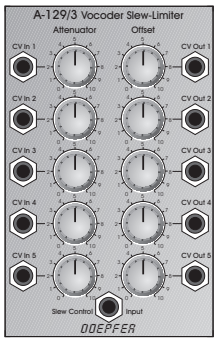
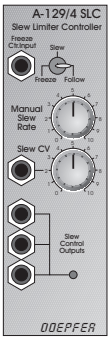
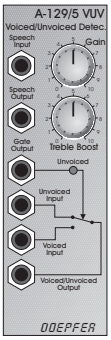
Module	Sketch	Description	Controls	In/Outputs
A-106-1 **Width:** **14 TE** **Current:** **30 mA** *(as all 12X numbers are used up the 10X numbers are used for new filters)*		**X-treme Filter** a very special filter that has it's origin the MS20 filters. Can be used as a 12dB low pass and 6dB high pass simultaneously with two different audio inputs and a common output. Sensitive audio inputs for distortion effects. The positive/negative limiting can be adjusted manually (CL+/CL-, incl. option for ext. vactrol connection). Two different CV inputs: one with attenuator, one with polarizer. The low pass audio input is normalled to the high pass input which is equipped with a polarizer to obtain filters similar to band pass and notch by adding or subtracting the low and high pass input shares. Resonance control up to self-oscillation, resonance insert feature to insert other modules into the resonance path. All in all the A-106 it is a very unique and strange filter and has a lot of life of its own. Much more detailed information incl. sound examples is available on our web site.	• Frequency • CV2 • CV3 • Audio Level LP • Audio Level HP • Clipping+ • Clipping- • Resonance	• CV1 • CV2 • CV3 • Audio In LP • Audio In HP • Resonance send • Resonance receive • Audio Out
			More detailed information about the module including sound examples is available on our web site	
A-107 **Width:** **26 HP** **Current:** **200 mA** *(as all 12X numbers are used up the 10X numbers are used for new filters)*		**A-107: VC Multitype Morphing filter** completely new filter design that makes available 36 different filter types, e.g. 6/12/18/24dB low pass, 6/12/18dB high pass, several band pass, notch and all pass filters, as well as some new filters that have no names so far. The frequency response curves of some filters are shown in the sketch below. The filters can be arranged in filter chains with 32 steps each. It is possible to pass through the filter sequence of each chain manually or with an external control voltage. Alternatively a Clock signal can be used to trigger the advance to the next step of the chain. 64 free programmable filter chains are available. The morphing time (i.e. the time required to go from one filter to the next filter of the chain) is manually and voltage controlled too. Consequently it is possible to "switch" (morphing time = 0) or to "morph" between filters in a chain (max. about 10 seconds). There is one limitation: the 36 filter are arranged at two groups with 18 filters each. Morphing is possible only within one group. Between filters of group 1/2 only "hard" switching is possible. Of course all standard filter functions are available: frequency and resonance control manually and by an external control voltage (2 CV inputs available, one with attenuator). For the 18 filters of group 1 self oscillation is possible. The filters of group 2 do not support self oscillation. On top of this a final VCA with manual and CV control is available. This VCA can be used e.g. to compensate different audio levels (e.g. morphing from low pass to high pass will cause a level change for high or low frequency settings). Selecting a single filter, programming and selecting the filter chains is carried out with a 3-digit display, 4 buttons and a rotary encoder. More detailed information about the module (with frequency response curves, sound examples, patch examples, complete user's manual) is available on our web site www.doepfer.com	• Manual Step • Step CV • Manual Morph. • Morph. CV • Manual Frequency • Frequency CV • Man. Res. • Resonance • Man. Ampl. • Amplitude CV • Prg Buttons • Value encoder • 3 digit display	• Step CV • Morph. CV • Frequ. CV • Resonance CV • Amplitude CV • Audio In • Audio Out • Step Clock
			More detailed information about the module including sound examples is available on our web site	
				
	Examples of some unusual filter types of the A-107 (standard filters like low/high/bandpass are not shown)			
A-108 **Width:** **12 HP** **Current:** **40 mA** **(as all 12X numbers are used up the 10X numbers are used for new filters)**		**6/12/24/48 dB Low / Band Pass** complete new filter design based on Moog's transistor ladder but with 8 filter stages, internal 6...48dB slope low pass and band pass available, the low pass outputs with 6, 12, 24 and 48 dB slope are connected to four jack sockets (factory setting), by changing the internal jumper settings other stages (e.g. 18dB or 36dB) can be selected as outputs, resonance control including self-oscillation, external feedback input for insertion of other A-100 modules (e.g. VCA or phaser), in combination with A-135 and A-144 a filter with VC slope 6...48dB can be realized	• Frequency • CV2, CV3 (Attenuators) • Audio Level • Emphasis (Resonance)	• 6dB Low Pass • 12dB Low Pass • 24dB Low Pass • 48dB Low Pass • Band Pass • CV1 • CV2 • CV3 • Audio In • Feedback In
A-109 **Width:** **20 HP** **Current:** **30 mA** **(as all 12X numbers are used up the 10X numbers are used for new filters)**		**Voltage Contr. Signal Processor** combined module that contains a 24 dB Low Pass with voltage controlled resonance, a VCA and a VC panning unit; the VCF is a standard 4 pole low pass filter with voltage controlled resonance; resonance ranges from 0dB up to self oscillation; the main VCA has a combined exponential/linear control scale; manual control and 2 CV inputs (one with attenuator) for each of the 4 parameters: frequency, resonance, amplification and panning; normalled sockets for standard VCF - VCA - PAN configuration; built with Doug Curtis' CEM3379; low cost replacement for three separate VCF/VCA/Panning modules	VCF: • Audio Level • Frequency • Resonance • CVF • CVQ VCA: • Amplitude • CVA Panning: • Pan • CVP	VCF: • VCF In 1 + 2 • CVF1, CVF2 • CVQ1, CVQ2 • VCF Out VCA: • VCA In • CVA1, CVA2 • VCA Out PAN: • PAN In • CVP1, CVP2 • Pan Out 1 + 2

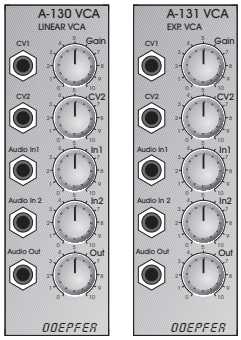
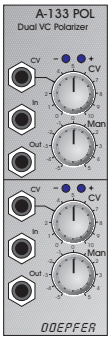
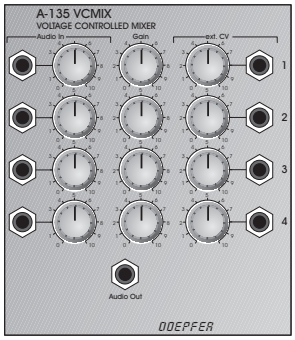
Module	Sketch	Description	Controls	In/Outputs
A-110 **Width:** 10 HP **Current:** 70 mA		**Standard VCO** voltage controlled oscillator (standard version); 4 waveforms: rectangle with adjustable pulse width 0...100% (including pulse width modulation), sawtooth, triangle, sine; hard sync input; 2 CV inputs: CV1 (1V/Oct.), CV2 with attenuator, 5-position range switch (5 octaves), Tune control, frequency range about 1Hz...5kHz; 2 CV inputs for pulsewidth (one with attenuator) *Difference to High-End VCO:* frequency range, waveforms not 100% ideal (musically not a disadvantage in every case), no linear FM input, no soft sync input	• Range (5-step rotary switch) • Tune • CV 2 • Pulse Width • PW CV2	• CV 1 • CV 2 • PW CV1 • PW CV2 • SYNC • Rectangle • Saw • Triangle
A-111 **Width:** 14 HP **Current:** 40 mA		**High-End VCO** same features as A110, but with these improvements: frequency range 1 : 50,000; improved waveforms; linear FM input; soft sync input, 2 pitch controls (Tune and Fine), 8-position range switch (8 octaves) *The module will be manufactured as long as the special integrated VCO circuit (CEM3340) is available.*	• Range (7-step rotary switch) • Tune • Fine • CV 2 • Pulse Width • Pulse Width CV • linear FM	• CV 1 • CV 2 • PCV • Hard Sync • Soft Sync • linear FM • Rectangle • Saw • Triangle • Sine
A-112 **Width:** 10 HP **Current:** 50 mA		**8 Bit Sampler/Wavetable Oscillator** sampling module with 8 bit resolution, 2x 64kB sampling/wavetable memory (2 pages), 5 octaves pitch range, MIDI dump, dump program for PC, sound library and wavetable generator available via internet for free modes: • Sampler with pitch CV, record/play/dump • Wavetable oscillator with pitch CV and second CV for passing through the 256 wavetables (each table has 256 byte) • Effects (normal/reverse delay, harmonizer, pitch shift)	• Tune • Attenuator Audio/CV2 • manual Trig. • Gate (LED) • 3 switches for mode control *More detailed information about the module including sound examples is available on our web site*	• CV1 (tune) • Audio In / CV2 (Wavetable) • Audio Out • Gate In • MIDI In • MIDI Out
A-113 **Width:** 26 HP **Current:** 30 mA **and** **100 mA @+5V** **(5V supply required !)**		**Subharmonic Generator** 4 separate so-called subharmonics (this term was first used in the Trautonium by Oskar Sala), relation of the frequency of each subharmonic is adjusted with up/down buttons in the range 1...24 and is displayed with 2-digit LED displays, rectangle master frequency input (e.g. from A-110/111), sawtooth output, single and mix output, two gate inputs to switch between 4 different “mixtures”, 50 user defined presets with 4 different mixtures, detailed information regarding A-113/ Trautonium is available on our web site www.doepfer.com	• 4 x 2-digit LED display • 4 x Up/Down (8 buttons) • Preset (button) • Store (button) • 4 x Level **additional +5V power supply required (see accessories) !**	• Master Frequ. In (Rectangle) • 4 x Single Out • Mix Out • Gate 1 In • Gate 2 In
A-114 **Width:** 4 HP **Current:** 40 mA		**Dual Ring Modulator** 2 separate ring modulators; a ring modulator generates the product X*Y of two audio input signals X and Y (four quadrant multiplier); consequently the output signal contains the sum and the difference of the input frequencies; used for generating the typical ring modulator and frequency transforming sounds, normally used in combination with 2 VCOs but also in combination of a VCO with an external signal (e.g. via A-119)		• per ring modulator: • • X In • Y In • X • Y Out

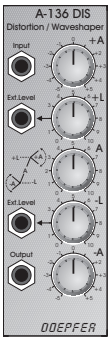
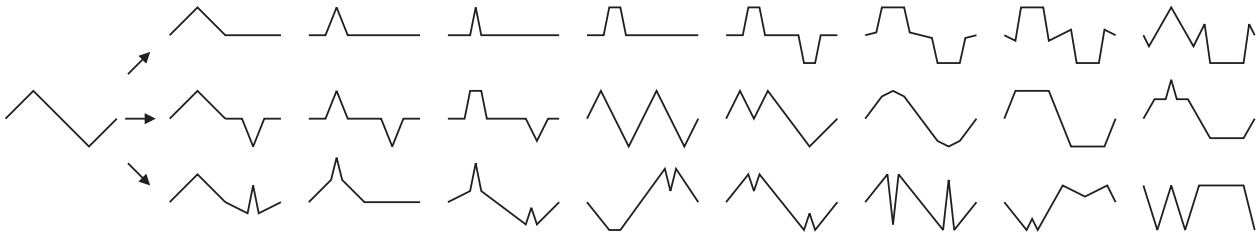
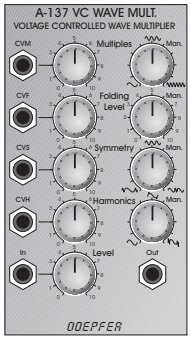
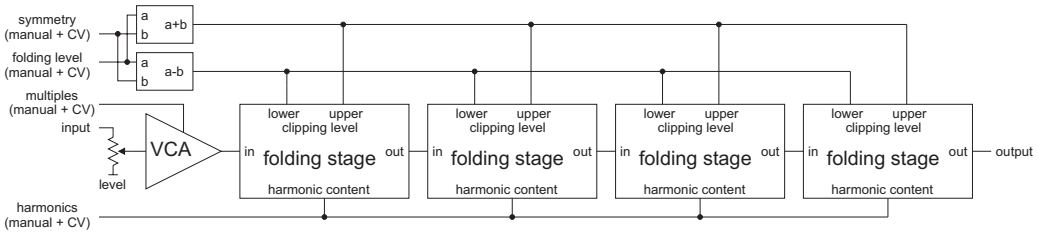
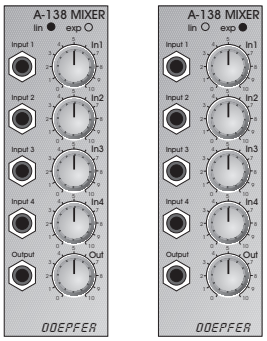
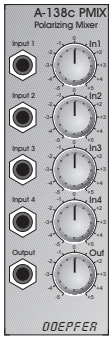
Module	Sketch	Description	Controls	In/Outputs
A-115 **Width:** **8 HP** **Current:** **20 mA**		**AUDIO DIVIDER** frequency divider for audio signals; preferable the rectangle output of a VCO is used as input but in combination with A-119 even clean monophonic external audio sources can be used; mixer for original (= input signal) and the next four octaves below (outputs = symmetrical rectangles); typical application: generating sub-octaves for powerful bass sounds, alienation effects for external audio sources, for strange inharmonic effects even non-monophonic signals can be divided (e.g. polyphonic or noise, preferable from the digital noise generator A-117)	• Orig. • F / 2 • F / 4 • F / 8 • F / 16	• In • Out
A-116 **Width:** **8 HP** **Current:** **20 mA**		**WP - VC Waveform Processor** dynamic waveform processing by clipping and asymmetrical amplification of clipped and unclipped signal; manual control and modulation inputs for clipping level and symmetry; application: generating new waveforms with dynamic variation of the waveforms via clipping and/or symmetry control inputs The A-116 is similar to the A-136 but has only two voltage controlled modification parameters (clipping and symmetry). However these are voltage controlled in contrast to the A-136.	• Level • Clipping Level • Clipping CV • Symmetry CV • Symmetry	• Audio In • Clipping CV • Symmetry CV • Audio Out
A-117 **Width:** **8 HP** **Current:** **20 mA**		**DNG / 808 - Digital Noise / Random Clock / 808-Source** digital clock generator with adjustable frequency (spectrum); high frequency = noise, low frequency = random pulses (like "Geiger-Counter"); typical application: 2nd noise generator with different sound, effect sounds, random clock pulses 808 Source with ROLAND TR 808 sound generator (6 fixed square pulse oscillators) for the typical sounds Cow Bell, Cymbal and Hi-Hats; output with 2 oscillators (Mix 2) and 6 oscillators (Mix 6)	• Rate / Spectrum	• Noise / Clock Out • Ext. Clock In • Mix 2 • Mix 6
A-118 **Width:** **8 HP** **Current:** **20 mA**		**Noise / Random** standard analog noise generator (noise derived from transistor) with white and colored noise outputs red and blue level of colored noise adjustable random voltage output rate (i.e. variation speed) and level adjustable	• Red Level • Blue Level • Random Rate	• White Noise • Color Noise • Random
A-119 **Width:** **8 HP** **Current:** **30 mA**		**External Input / Envelope Follower** input module for including external audio signals into A-100 sound processing symmetrical input (stereo jack ¼ “) with input level control envelope follower with gate generator (e.g. for triggering ADSR generator from external audio) adjustable gate threshold application: including external audio signals into A-100, especially for sound modification with filters, VCA's, phasers, etc.	• Audio Level • Threshold	• Audio In (¼ " Stereo jack) • Audio Out • Envelope • Gate

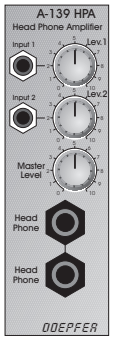
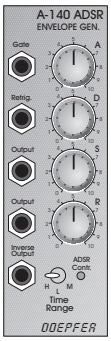
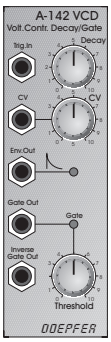
Module	Sketch	Description	Controls	In/Outputs
A-102 **A-103** **A-120** **Width:** **8 HP** **Current:** **30 mA**		All 3 filters are based on the so-called ladder principle (invented by Bob Moog) but with different types of electronic parts that are responsible for the special sound of each filter **A-120: 24 dB Low Pass 1** original Moog transistor ladder with 24 dB/oct slope **A-103: 18 dB Low Pass 1** modified Moog transistor ladder as used e.g. in TB-303 **A-102: Diode Low Pass 1 (VCF 9)** ladder with diodes instead of transistors as used e.g. in EMS filters For all modules: 3 CV inputs for filter frequency, 2 with attenuators, audio input with attenuator, resonance up to self oscillation	for all modules: • Audio Level • Frequency • Resonance • CV 2 (attenuator) • CV 3 (attenuator)	for all modules: • Audio In • CV 1 • CV 2 • CV 3 • Audio Out
A-121 **Width:** **12 HP** **Current:** **30 mA**		**12 dB Multimode Filter** voltage controlled 12 dB multimode filter with 4 simultaneous outputs: low pass, high pass, band pass and notch; resonance (emphasis) adjustable up to self-oscillation; manual control, one modulation input with attenuator, one modulation input without attenuator for both filter frequency and filter resonance (i.e. voltage controlled resonance); built with Doug Curtis' CEM3320, in combination with A-135 and A-144 "morphing" between the four filter outputs is possible	• Audio Level • Frequency • FCV 2 • Resonance • QCV2	• Audio In • FCV 1 • FCV 2 • QCV1 • QCV2 • Low Pass • Band Pass • High Pass • Notch
A-122 **Width:** **8 HP** **Current:** **20 mA**		**24 dB Low Pass 2** another low pass filter with 24 dB/oct slope but with a distinctly different sound and resonance behaviour compared to A105 or A-120; the A-122 is built with a CEM circuit and works with the so-called OTA principle (like most of the Oberheim filters); resonance is adjustable up to self oscillation; manual frequency control and two frequency modulation inputs (one with attenuator); manual control and one modulation input with attenuator for resonance (i.e. voltage controlled resonance); audio input with attenuator.	• Audio Level • Frequency • FCV2 • Resonance • QCV	• Audio In • FCV1 • FCV2 • QCV • Audio Out
A-123 **Width:** **8 HP** **Current:** **20 mA**		**24 dB High Pass** high pass filter with 24 dB/oct slope, distinctly different sound and resonance behaviour compared to the high pass filters of A-107, A-121 or A-124; the A-123 is built with a CEM circuit (CEM3320) and works with the so-called OTA principle (like most of the Oberheim filters); resonance is adjustable up to self oscillation; manual frequency control and two frequency modulation inputs (one with attenuator); manual control and one modulation input with attenuator for resonance (i.e. voltage controlled resonance); audio input with attenuator	• Audio Level • Frequency • FCV2 • Resonance • QCV	• Audio In • FCV1 • FCV2 • QCV • Audio Out
A-124 **Width:** **8 HP** **Current:** **40 mA**		**Wasp Filter (VCF 5)** 12dB multimode using the "strange" filter circuit of the "EDP Wasp" (analog synthesizer with black/yellow case built end of the seventies); this design "abuses" digital inverters as analog operational amplifiers leading to distortions and other "dirty" effects that generate the specific sound of this filter ; band pass ouput, low/notch/high pass output with adjustable relation of low and high pass signal (if both signals appear one obtains a notch filter); resonance control (but no self oscillation)	• Audio Level • Frequency • CV2 • Resonance • Mix (relation between low and high pass)	• Audio In • CV 1 • CV 2 • Band Pass Out • Mix Out

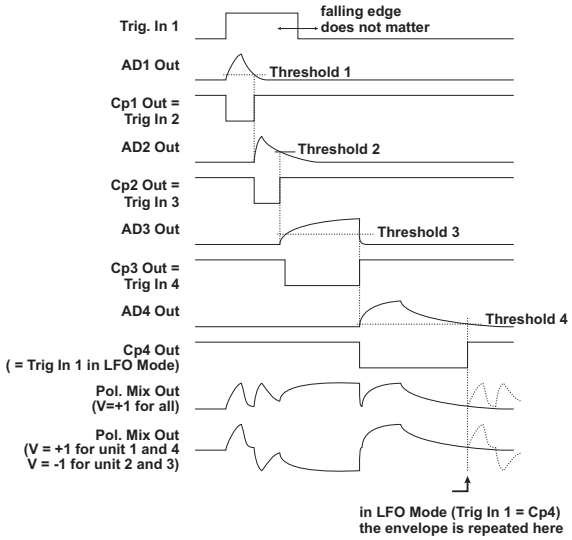
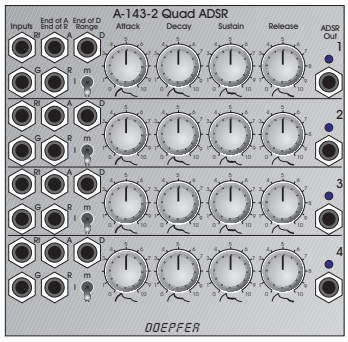
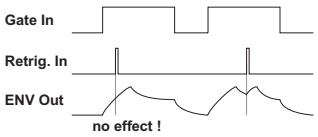
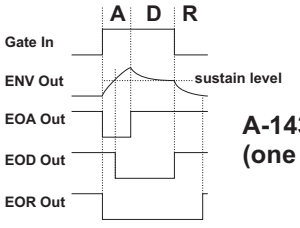
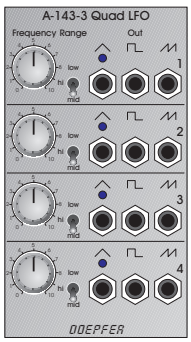
Module	Sketch	Description	Controls	In/Outputs
A-125 **Width:** **8 HP** **Current:** **20 mA**		**Voltage Controlled Phaser VCP** voltage-controlled phaser with resonance; manual control and modulation input for phase shift; manual controls for resonance and ratio between original and phase shift signal in combination with the Shepard Generator A-191, VC Mixer A-135 and four A-125 so-called baberpole phasing effects can be realized (up or down going never ending phasing) For a Vactrol based Phaser see A-101-3	• Audio Level • Phase • CV2 • Resonance • Signal Ratio	• Audio In • CV 1 • CV 2 • Audio Out
A-126 **Width:** **8 HP** **Current:** **80 mA**		**VCFS Voltage Controlled Frequency Shifter** analog frequency shifter, shift range about 50Hz...5kHz, manual shift control (knob) and via external control voltage (with attenuator), audio outputs for shift up, shift down and mix, mix control: up/down relation for mix output, overload led, audio output without effect (same level as shift outputs) applications: robot voices, changing the pitch of voices (male -> female, female -> male), frequency shifting sound effects (similar to ring modulator)	• • Level • Shift • CV • Mix • Overload LED	• Audio In • Audio Out (no effect) • CV • Down Out • Up Out • Mix Out
A-127 **Width:** **28 HP** **Current:** **100 mA**		**Voltage Controlled Resonance Filter** 3 x bandpass with VC frequency (40...10kHz) controls for resonance and audio level, LFO for each filter with controls for frequency (0,05...20Hz) and level, ext. CV input (instead of LFO), single audio outputs, common audio input with level control, original level control, mixed audio output (original + 3 x band pass), sensitive audio inputs for distortion effects, applications: complex free running filter sweeps, resonance simulation, vocoder-like effects, MIDI controlled triple filter (with A-191)	per band pass: • LFO Frequ. • LFO/VC Ampl. • VCF Frequ. • Resonance • Level • (jumper for optional low pass instead of band pass) common: • Audio In Level	per band pass: • ext. CV In • Audio Out (Single) common: • Audio In • Audio Out (Mix)
A-128 **Width:** **20 HP** **Current:** **20 mA**		**Fixed Filter Bank** 15 band pass filters with fixed frequencies (50 Hz, 75 Hz, 110 Hz, 150 Hz, 220 Hz, 350 Hz, 500 Hz, 750 Hz, 1.1 kHz, 1.6 kHz, 2.2 kHz, 3.6 kHz, 5.2kHz, 7.5 kHz, 11.0 kHz); amplitude controllable for each band pass	per band pass: • Amplitude (15x)	• Audio In • Audio Out
A-188-1 **X: 128 stages (*)** **Y: 256 stages (*)** **A: 512 stages (*)** **B: 1024 stages (S)** **C: 2048 stages (S(** **D: 4096 stages (*)** **(*) = available while stocks last** **(S) = standard product, no limitations** **Width: 14 HP** **Current: 50 mA**	 We recommend to visit our website www.doepfer.com for more details and sound examples.	**BBD Module** very complex BBD (bucket brigade device) module with a lot of parameters and extreme clock/delay range, can be used for standard applications like flanging, chorus, analog delay but even to generate Very extreme and strange sounds especially at low clock settings, available with different BBD circuits (128/256/512/1024/2048/ 4096 stages, also suitable for Karplus-Strong synthesis, contains essentially a high speed VCO for the BBD clock and the BBD circuit with several mixing, normalling and polarity switching features 	• Delay Clock • CV1 Polarity • CV2 Polarity • CV2 Level • Audio Level • Feedback Polarity • Feedback Level • Mix Polarity • Mix (Original/BBD)	• CV1 In • CV2 In • CV Out • Clock Out • Clock In (normalled to Clock Out) • Audio In (2x) • BBD Out • Feedback In (normalled to BBD Out) • Mix Out

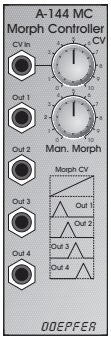
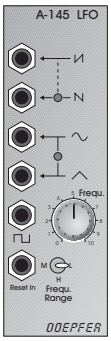
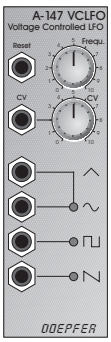
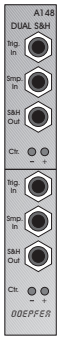
Module	Sketch	Description	Controls	In/Outputs
A-129/ 1 + 2 **Width: 32HP (20 HP+12HP)** **Current: 180 mA (1+2)**	 	**Modular Vocoder Subsystem** The A-129 modules form a modular vocoder subsystem. The basic modules of the vocoder are the Analysis section (A-129/1) and the Synthesis section (A-129/2). The A-129/1 analyses the spectral contents of an incoming speech signal with 15 filters (1 low pass, 13 band passes,1 high pass) and outputs 15 corresponding control voltages. In the basic patch these are used to control the 15 CV inputs of the Synthesis section A-129/2. As audio input of the A-129/2 normally an instrumental sound (e.g. VCO, noise or complex instrument signal, but no speech) is used. In this way, each frequency band in the instrument signal has the dynamics of the corresponding band from the speech signal. The pattern of the speech signal is thus re-constructed from the tonal raw material of the instrument signal - the instruments seems to “speak”. The audio output of the A-129/2 is the Vocoder output. This is the basic patch of the vocoder. The modules A-129/1 and 2 are available only together as the A-129 basic vocoder modules. The basic patch can be extended by the optional modules A-129/3, 4 and 5.	**designed in cooperation with KRAFTWERK** A-129/1: • 15 x output control LED A-129/2: • -	A-129/2: • Audio In • High Pass Out • 15 x CV Out A-129/2 • Instrument In • 15 x CV In • Vocoder Out
			 **Frequency response of the 15 filters**	
A-129/ 3 **Width: 16 HP** **Current: 40 mA**		**Attenuator / Offset Generator / Slew Limiter (optional)** Five separate units with CV offset generator, CV attenuator and Slew Limiter (Slew Limit function requires A-129/4) Applications: vocoder as filter bank, emphasize or attenuation of certain filters, slew limiting function (i.e. slow filter transisitons up to freezing), for maximum configuration three A-129/3 are required (15 channels) *This module is not limited for vocoder applications but can be used for many other offset/attenuate applications in the A-100 system !*	• 5 x Attenuator • 5 x Offset	• 5 x CV In • 5 x CV Out • Slew Control Input (from A-129/4)
A-129/ 4 **Width: 8 HP** **Current: 30 mA**		**Slew Limiter Controller SLC** **(optional)** module for controlling the slew limiter function of A-129/3, continuous control of slew rate of A-129/3 from follow (i.e. no slew) via different slew settings up to freeze, freeze/slew/follow switch, manual slew control and slew CV input with attenuator, freeze control input (on/off), 3 slew control outputs to control up to 3 A-129/3.	• Manual Slew Rate • Freeze/Slew/ Follow (switch) • Slew CV • Control LED	• Slew CV In • Freeze In • 3 x Slew Control Out (to A-129/3)
A-129/ 5 **Width: 8 HP** **Current: 30 mA**		**Voiced/Unvoiced Detector** **(optional)** pre-amplifier with voiced/unvoiced detector and electronic switch to switch between two different instrument signals dependent on the speech type (voiced/unvoiced), if the speech signal is unvoiced the unvoiced input signal is transmitted to the audio output (normally connected to the audio input of the A-129/2), otherwise the voiced input is transmitted, adjustable treble boost for better voiced/unvoiced recognition	• Gain • Treble Boost • Unvoiced LED	• Speech In • Speech Out • Gate Out • Voiced In • Unvoiced In • Voiced/ Unvoiced Out

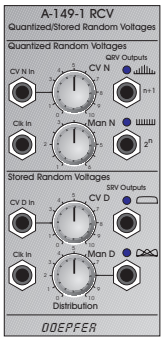
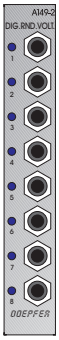
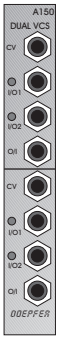
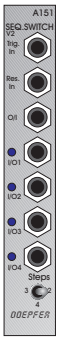
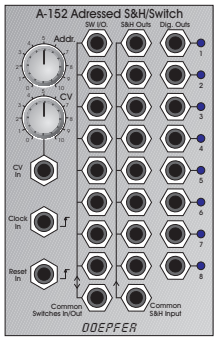
Module	Sketch	Description	Controls	In/Outputs
A-130 **A-131** **Width:** **8 HP** **Current:** **20 mA**		**VCA - Voltage Controlled Amplifier** voltage controlled amplifiers to control the loudness or volume of an audio (or even control) signal with a control voltage (e.g. from an envelope generator or LFO) A-130 : linear characteristic A-131 : logarithmic characteristic 2 audio inputs with attentuators; 2 control voltage inputs (one with attenuator); manual control for initial gain; output attenuator (to adjust the output level if the module is the last module connected to an mixer/amplifier)	• Audio In 1 • Audio In 2 • Gain • CV 2	• Audio In 1 • Audio In 2 • CV 1 • CV 2 • Audio Out
A-132 **Width:** **4 HP** **Current:** **20 mA**		**Dual Low Cost VCA** 2 simple linear low cost VCAs, e.g. for level control of modulation signals (e.g. ADSR or LFO); suitable as well for non-critical audio applications (e.g. high level signals from VCOs, noise or sample module); when offset and attenuation of the control signal is required one channel of the A-129/3 can be used for this purpose.		each VCA: • CV 1 • CV 2 • Signal In • Signal Out
A-133 **Width:** **8 HP** **Current:** **30 mA**		**Dual Voltage Controlled Polarizer** special dual voltage controlled amplifier that enables both positive and negative amplifications; negative amplification means in this context that the signal is inverted; main application: processing of control voltages, e.g. ADSR or LFO; amp.range: ~ -2.5....0....+2.5; amp. can be adjusted manually (Man control) and by an external control voltage with attenuator (CV); the present amplification is displayed with two LEDs: one for positive and one for negative amplifications (not a signal display but amplification diplay, similar to A-134); another module with polarizing function is 138c.	each Polarizer: • CV • Man • + LED • - LED	each Polarizer: • CV In • Signal In • Signal Out
A-134 **Width:** **8 HP** **Current:** **40 mA**		**PAN - Voltage Controlled Panning** manual or voltage controlled panning via two CV control inputs (one with attenuator), 2 LEDs for panning display, two panning types available: • input panning: panning between 2 input signals, the output appears at the mix output • output panning: distributing one input signal to two outputs (left and right output)	• Tune • Attenuator Audio/CV2 • manual Trig. • Gate (LED) • 3 switches for mode control	• CV1 (tune) • Audio In / CV2 (Wavetable) • Audio Out • Gate In • MIDI In • MIDI Out
A-135 **Width:** **22 HP** **Current:** **50 mA**		**Voltage Controlled Mixer** quad voltage controlled mixer made of 4 independent linear VCA's with one common output. For each VCA the following inputs and controls are available: audio and control voltage input both with attenuator, gain (pre-amplification). Applications: voltage controlled mixing of up to 4 audio signals with separate control voltages. In connection with the Morphing-Controller A-144 the soft fade-over of 4 audio signals with only one control voltage is possible. A-135 also simplifies Shepard applications (A-191) as for each Shepard channel one VCA is required.	For each VCA: • Audio In • Gain • CV In	For each VCA • Audio In • CV In common: • Audio Out

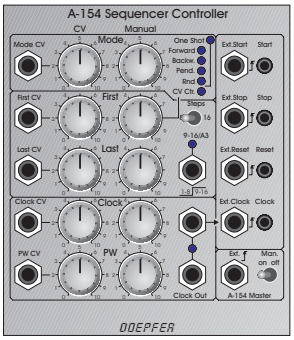
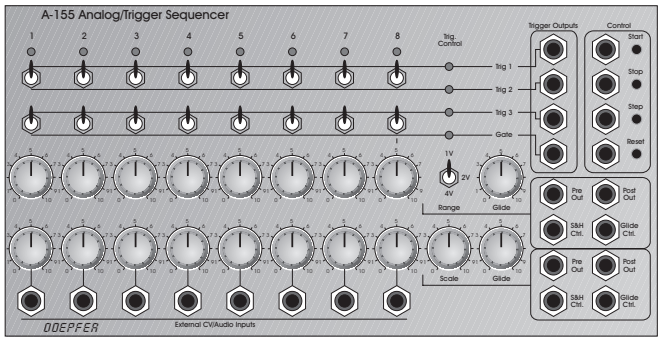
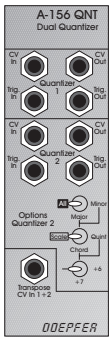
Module	Sketch	Description	Controls	In/Outputs
A-136 **Width:** 8 HP **Current:** 30 mA		**Distortion / Waveshaper** Distortion and waveshaping module with extensive control possibilities. The incoming signal is internally divided into 3 components: • positive component with adjustable clipping level • negative component with adjustable clipping lev. • original signal The 3 parts are mixed to the module output with adjustable amplification (positive and negative) for each component. Different settings of the 5 parameters enable a lot of very complex and extreme waveform modifications: from simple soft or hard clipping to completely altered waveforms	• Tune • Attenuator Audio/CV2 • manual Trig. • Gate (LED) • 3 switches for mode control	• CV1 (tune) • Audio In / CV2 (Wavetable) • Audio Out • Gate In • MIDI In • MIDI Out
				
	Examples for the A-136 function when using a triangle as input signal			
A-137 **Width:** 14 HP **Current:** 40 mA		**Voltage Controlled Wave Multiplier** multiplies the waveform of an audio signal (e.g. VCO triangle) within one period by *folding* and generates additional harmonics (kind of "*inverse low pass*"); the period time and consequently the pitch remains unchanged (in contrast to frequency multiplication with A-196); for all 4 parameters manual controls and CV inputs are available: *Multiples:* number of waveform multiplications within one period *Harmonics:* Adding more harmonics (similar to filter resonance) *Level/Symmetry:* value/symmety of upper/lower folding level	• Multiples (Man + CV) • Folding Level (Man + CV) • Symmetry (Man + CV) • Harmonics (Man + CV) • Input Level	• CV Multiples • CV Folding Level • CV Symmetry • CV Harmonics • Audio In • Audio Out
	More detailed information with graphical explanation, sound examples, patch examples and user's manual is available on our web site www.doepfer.com			
A-138 a/b **Width:** 8 HP **Current:** 10 mA		**Mixer** mixer with 4 inputs for Audio and CV signals; available in two versions: • A-138 a: linear potentiometers; mainly for mixing of CV signals • A-138 b: logarithmic potentiometers; mainly for mixing of Audio signals output with attenuator (to adjust the output level if the module is the last module connected to an mixer/amplifier) Offset option for control 1 (generates DC offset provided that no plug is inserted into input 1), can be deactivated with internal jumper	• Input 1 • Input 2 • Input 3 • Input 4 • Output	• Input 1 • Input 2 • Input 3 • Input 4 • Output
A-138c **Width:** 8 HP **Current:** 20 mA		**Polarizing Mixer** four channel mixer, that allows to add or subtract four incoming voltages to the output signal with adjustable level (in the middle position of the corresponding control the amplification is zero; counterclockwise: signal is subtracted, clockwise: signal is added to the output sum); output control works in the same way; control In1 works as a DC offset generator (about -5V...+5V) provided that no patch cord is plugged into socket In1. Applications: mixing control voltages (e.g. ADSR, LFO) or audio signals with fixed phase relations Voltage controlled version of a polarizer: A-133	• Input 1 • Input 2 • Input 3 • Input 4 • Output	• Input 1 • Input 2 • Input 3 • Input 4 • Output

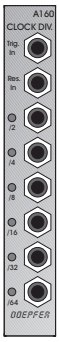
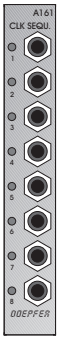
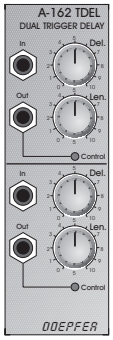
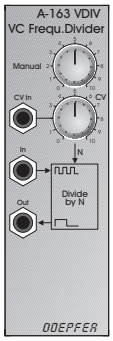
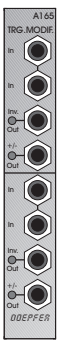
Module	Sketch	Description	Controls	In/Outputs
A-139 **Width:** **8 HP** **Current:** **max. 100 mA**		**Stereo Headphone Amplifier HPA** 2 inputs with level control for each input and common loudness control for both outputs, 2 stereo outputs (1/4“ jack sockets), 2x1.5W max. power, 2x 8 Ohm min. impendance	• Level 1 • Level 2 • Master level	• Input 1 • Input 2 • Headphone (2x)
A-140 **Width:** **8 HP** **Current:** **20 mA**		**ADSR - Envelope Generator** envelope generator with 4 controls for attack, decay, sustain and release; gate and re-trigger input (for multiple A-D-phases while gate is on); 3-step switch for 3 time ranges (from a few milliseconds up to many minutes); double normal and one inverted output envelope display with LED	• Attack • Decay • Sustain • Release • Range (3-step switch) • Control LED	• Gate • Retrigger • Normal Out 1 • Normal Out 2 • Inverse Out
A-141 **Width:** **14 HP** **Current:** **30 mA**		**VC ADSR - Voltage Controlled Envelope Generator** voltage-controlled envelope generator with 4 controls for attack, decay, sustain and release; each parameter can be controlled manually as well as per control voltage at the corresponding CV input (with attenuator); gate and re-trigger input (for multiple A-D-phases while gate is on); envelope display with LED	• Attack • Decay • Sustain • Release • Attack CV • Decay CV • Sustain CV • Release CV • Control LED	• Attack CV • Decay CV • Sustain CV • Release CV • Gate • Retrigger • Out
A-142 **Width:** **8 HP** **Current:** **40 mA**		**VCD - Voltage Controlled Decay / Gate** simple voltage-controlled envelope generator with only one parameter: decay from the envelope signal a gate signal (normal and inverted) with adjustable threshold is derived, consequently one obtaines additionally a gate signal with voltage controlled duration, with two A-142 a voltage controlled trigger delay can be realized	• Decay • CV • Threshold • Envelope LED • Gate LED	• Trigger In • CV • Envelope Out • Gate Out • Inverse Gate Out

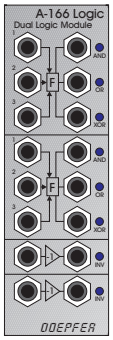
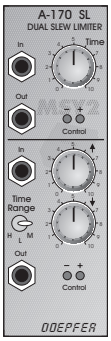
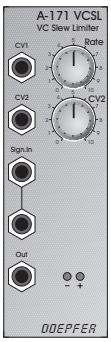
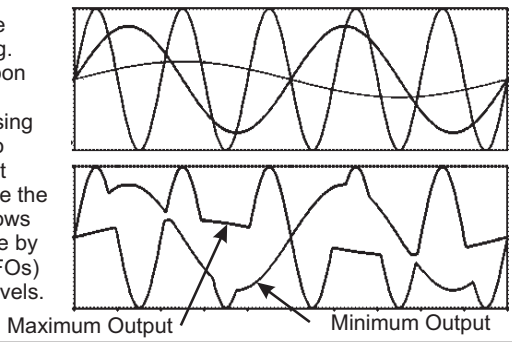
Module	Sketch	Description	Controls	In/Outputs
A-143 Multiple Modulation Sources				
A-143-1 **Width:** 28 HP **Current:** 70 mA		**Complex Envelope Generator (Quad Attack-Decay Generator/LFO)** four independent Attack-Decay generators that can be switched into LFO mode too, "end of attack (EOA)" output and comparator (CP) output with adjustable threshold, the sub-units are daisy-chained (CP outputs are normalled to the trigger input of the succeeding stage via normalled sockets), polarizing mixer for all AD/LFO signals, each AD generator/LFO can be used even separately, if the normalled sockets are interrupted, LED displays for envelope and comparator out	Each Sub-Unit: • Mode switch (AD/LFO) • Attack • Decay • Mix (Polarizer) • Comparator Threshold • Envelope/LFO (LED) • Comparator Out (LED)	Each Sub-Unit: • Trig In • EOA Out • Comparator Out • Envelope/LFO Out Module: • Mix Out
			More detailed information about the module is available on our web site	
	 **A-143-1 Working principle**			
A-143-2 **Width:** 26 HP **Current:** 70 mA		**A-143-2 Quad ADSR Generator** four independent ADSR envelope generators, each sub-unit is equipped with • gate and retrigger inputs • "end of attack" output (EOA) • "end of decay" output (EOD) • "end of release" output (EOR) • 3-position range switch medium/high/low • Attack, Decay, Sustain and Release Control • envelope LED display The gate inputs of all sub-units are normalled: Gate 1 ➜ Gate 2 ➜ Gate 3 ➜ Gate 4	• Range l/m/h • Attack • Decay • Sustain • Release • Envelope Control (LED)	• Gate In • Retrigger In • EOA Out • EOD Out • EOR Out • Envelope Out (ADSR Out)
	 **A-143-2 Retrigger Function**	 **A-143-2 Working principle (one sub-unit)**		
A-143-3 **Width:** 14 HP **Current:** 70 mA		**Quad LFO** four simple low-cost standard LFOs with frequency ranges from ~ one minute/cycle in low range up to moderate audio (some kHz) in high range, each of the four completely independent units is equipped with: • 3-position range switch medium/high/low • triangle output • rectangle output • sawtooth output • LED display	• Range low/high/mid • Frequency • LFO display (LED)	• Triangle Out • Rectangle Out • Sawtooth Out

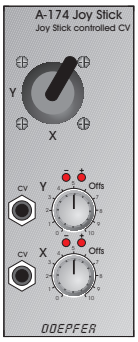
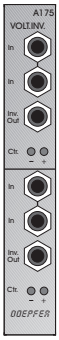
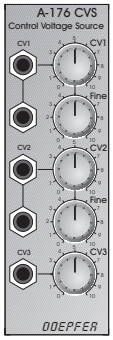
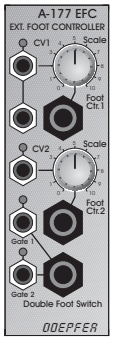
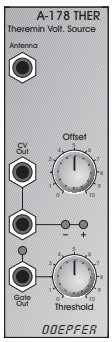
Module	Sketch	Description	Controls	In/Outputs
A-144 **Width:** **8 HP** **Current:** **40 mA**		**Morphing Controller** control voltage modifier, in the first place used in combination with the voltage controlled mixer A-135, from an increasing input voltage four displaced triangle output voltages are derived, when these outputs are connected to the CV inputs of an A-135 one obtains a fading over of the four A-135 audio inputs ("morphing"), morphing can be controlled manual and modulated with an external CV (e.g. from LFO, ADSR, Random, MIDI-to-CV, Theremin, sequencer) with attenuator. Applications: voltage controlled morphing of 4 audio sources in combination with A-135	• Manual • CV (attenuator)	• CV In • CV Out 1 • CV Out 2 • CV Out 3 • CV Out 4
A-145 **Width:** **8 HP** **Current:** **30 mA**		**LFO** modulation oscillator with 5 waveforms: • triangle • rectangle (symmetrical) • sine • rising and falling sawtooth (sawtooth has twice the frequency of the other outputs) reset input for triggered wave start at zero 3-step switch for 3 frequency ranges, from some minutes up to audio range (max. 5kHz); 2 LED's for frequency display of triangle/sine/rectangle and sawtooth	• Frequency • Range (3-step switch) • 2x control LED	• Reset In • Triangle • Sine • Rectangle • Saw Up • Saw Down
A-146 **Width:** **8 HP** **Current:** **20 mA**		**LFO 2** modulation oscillator with these waveforms: positive rectangle, symmetrical (around 0-line) rectangle, sawtooth/triangle; waveform control for continuously adjusting either the waveform from saw up to saw down over triangle or simultaneously the pulse width of the rectangle; 3-step switch for 3 frequency ranges, from some minutes up to audio range (max. 5kHz); 2 LED's for frequency display of pulse and sawtooth/triangle	• Frequency • Range (3-step switch) • Waveform • 2x control LED	• pos. rectangle • sym. rectangle • sawtooth / triangle
A-147 **Width:** **8 HP** **Current:** **40 mA**		**VC LFO** voltage-controlled modulation oscillator with 4 waveforms: triangle, square, sine and saw up; frequency can be controlled manually and via external control voltages at the two CV inputs (one with attenuator); 3 LEDs for display of triangle/sine, square and sawtooth	• Frequency • CV 2 • 3x LEDs	• CV 1 • CV 2 • Triangle • Sine • Square • Saw Up
A-148 **Width:** **4 HP** **Current:** **20 mA**		**Dual S&H** 2 separate sample & hold units for generating staircase-type control voltages in combination with other modulation sources (e.g. LFO, Random, ADSR, Theremin); the signal at the sample input is sampled and stored with each trigger signal (positive edge); output voltage display with 2 LED's (positive/ negative) voltage range for the sampled signals is -8...+8V	each S&H • + / - Control (2x LED)	each S&H: • Trigger In • Sample In • S&H Out

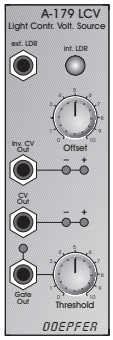
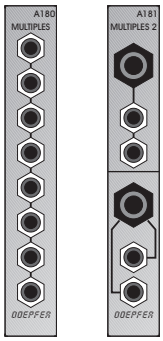
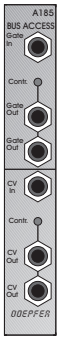
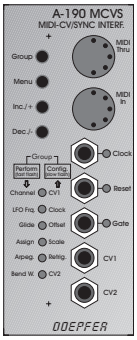
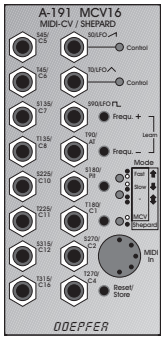
Module	Sketch	Description	Controls	In/Outputs
A-149-1 **Width:** 12 HP **Current:** 40 mA		**Quantized/Stored Random Voltages** generates four analog random control voltages in the range 0...+5V generated in different ways. Advance to the next value is triggered by the rising edge of the corresponding clock input. *Quantized Random Voltages*: 2 outputs "*N+1*" and "2^{N}"; N is an integer number in the range 1...6 that can be adjusted with the manual control (Man N) and an external control voltage CVN, grid: 1V (N+1) resp. 1/12V ((2^{N}) *Stored Random Voltages*: one output with *even voltage distribution* and second one with *adjustable voltage distribution probability (D).* The distribution probability D is adjusted by a manual control (Man D) and an external control voltage CVD, 256 possible states for both outputs	• CVN • Man N • QRV N+1 (LED) • QRV 2^{N} (LED) • CVD • Man D • SRV 1 (LED) • SRV 2 (LED) *More detailed information about the module is available on our web site*	• CVN In • QRV Clk In • QRV N+1 Out • QRV 2^{N} Out • CVD In • SRV Clk In • SRV 1 Out • SRV 2 Out
A-149-2 **Width:** 4 HP **Current:** 40 mA		**Digital Random Voltages** extension module for A-149-1, generates 8 digital random voltages (i.e. only low/high states like a gate signal) controlled by the *Quantized Random Voltages* section of the assigned A-149-1 and correspond to the 8 digital outputs of the shift register that is used to generate the Quantized Random Voltages (for detailes please refer to the A-149-1 manual). Useful e.g. to create random rhythmical sequences. A-149-2 requires an A-149-1 and has to be assembled right to the A-149-1	• Out 1...8 (8x LED)	• Out 1...8
A-150 **(Version 2)** **Width:** 4 HP **Current:** 30 mA		**Dual VCS - Voltage Controlled Switches** 2 voltage controlled switches (change-over type); each switch has a control input, a common output/input and 2 separate input/outputs (bidirectional function, i.e. in's and out's are interchangeable); 2 LED's display the active input/output; digital level of the control signal determines switch position ('low': I/O 1 connected to common O/I, 'high': I/O 2 connected to common O/I); voltage range for the switched signals is -12...+12V (valid only for A-150 version 2)	per VCS: • I/O 1 (LED) • I/O 2 (LED)	per VCS: • CV • O/I • I/O 1 • I/O 2
A-151 **(Version 2)** **Width:** 4 HP **Current:** 20 mA		**Sequential Switch** „electronical rotary switch" with one common input/output and 4 single outputs/inputs (bidirectional function, i.e. in's and out's are interchangeable); each trigger pulse advances switch to the next position; display of the active I/O by 4 LED's; reset input ('high' resets to I/O 1); voltage range for the switched signals is -12...+12V (valid only for A-151 version 2), the number of steps can be limited to 2, 3 or 4 with a three-position toggle switch (only for version 2) applications: automatic switching of modulation sources, VCO waveforms, filter outputs of multimode filter, audio sources or control voltages, rotary switching of one (audio-) source to four output channels, waveshaping and many more	• Steps (switch) • I/O 1 (LED) • I/O 2 (LED) • I/O 3 (LED) • I/O 4 (LED)	• Trigger In • Reset In • Common O/I • I/O 1 • I/O 2 • I/O 3 • I/O 4
A-152 **Width:** 16 TE **Current:** 40 mA		**Voltage Addressed S&H/Switch** a control voltage (manually and CV) defines an address 1...8 that is used to address three different subunits: 8-fold Sample&Hold, elektronical rotary switch, digital output. **S&H:** The voltage at the common S&H input is passed on to the addressed S&H output and stored at this output as soon as a new address is generated. **Switch:** The common terminal is connected to the currently addressed terminal (bi-directional). **Digital out**: The currently addressed output is high (~ +12V) and the corresponding LED is on. The remaining 7 outputs are low. Instead of CV controlled addressing even Clock/Reset control is possible. CV has to remain unchanged in this mode.	• Address (manual) • CV Address • 1...8 (8 LEDs) *More detailed information about the module is available on our web site*	• Address CV In • Clock In • Reset In • Common Switch In/Out • 8 x Switch Out/In • Common S&H In • 8 x S&H Out • 8 x Digital Out

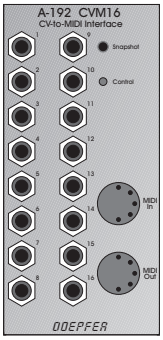
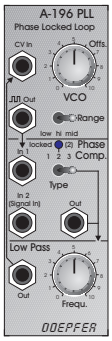
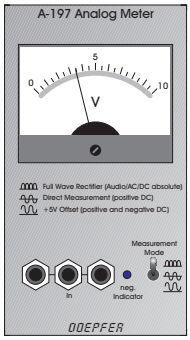
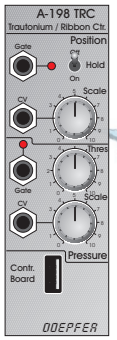
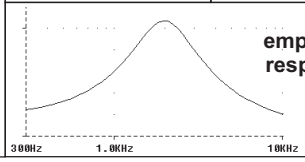
Module	Sketch	Description	Controls	In/Outputs
A-154 **Width:** **22 TE** **Current:** **60 mA**		**A-154: Sequencer Controller** Expansion module for the sequencer A-155 for additional functions: • running modes: forward, backward, pendulum, random and voltage controlled addressing • all modes even as "one shot" available (exept CV adressed mode) • LED display of selected mode • manual/voltage controlled mode selection • voltage controlled first/last step • in the *voltage controlled addressing* mode the active sequencer step is defined by the first step section, manual and voltage control of step position in this mode • internal voltage controlled clock generator with manual tempo and CV controlled tempo (with attenuator), clock display with LED, the internal clock is normalled to the clock input of the control section, if the CV input of the clock unit is connected to one of the CV outputs of the A-155 the time for each step can be adjusted separately, even jumps (step skipping) are possible as beyond a certain level the clock unit generates an immediate jump (i.e. a very short clock signal), for this skipping function e.g. the gate row of the A-155 can be used. • manual and CV controlled pulsewidth (PW) of the clock generator, this function allows gates with different length for each step (but with the same tempo), one of the CV rows of the A-155 can be used for this feature or external modulation sources like LFO or random CV. • 8/16 step mode: the "16 step" mode requires two A-155 and at least one voltage controlled switch A-150 to switch between the CV/trigger/gate outputs of the first (1...8) and second A-155 (9...16). The A-150 is controlled by the A3 output of the A-154. • A-154 master switch: switches between A-154 control of the A-155 and the "old" A-155 control	• Manual Mode • Mode CV • Mode Display (6 LEDs) • Manual First/Addr. • CV First/Addr. • Manual Last • CV Last • Manual Clock • CV Clock • Manual PW • CV PW • 8/16 Step (switch) • 9-16/A3 (LED) • Clock (LED) • Start,Stop,Step Reset (buttons) • A-154 Master (switch)	• Mode CV • First/Addr. CV • Last CV • Clock CV • PW CV • 9-16/A3 Out • 2 x Clock Out • Start, Stop, Reset, Step (input sockets) • A-154 Master (socket)
A-155 **Width:** **50 HP** **Current:** **100 mA**	**Analog and Trigger Sequencer**  • Sequencer generating analog control voltages and trigger signals • 8 steps with LED display of the current selected step • 3 trigger rows + 1 gate row controlled by 2 rows of 8 three-position switches (1-0-1) • LED displays for the 3 trigger rows and the gate row • 2 analog rows with 8 potentiometers • S&H and Glide features for the analog rows with ext. control inputs for S&H on/off and Glide on/off • analog row 1 with fixed ranges 1V/2V/4V (especially for VCO control) • analog row 2 with variable range knob and optional 8 external inputs instead of fixed voltages (suitable for audio or control signals) • pre and post S&H/Glide analogue outputs • manual (button) and external (jack sockets) control of Start, Stop, Step and Reset		• 8xStep-LED • 3xTrigger LED • 1xGate LED • 2x8 Trigger switch • 2x8 analog step • 2xGlide Time • 1xRange (switch) • 1xRange (knob) • Start button • Stop button • Step button • Reset button	• 8xCV/Audio-In • Start In • Stop In • Reset In • Step In • Trig. 1 Out • Trig. 2 Out • Trig. 3 Out • Gate Out • Pre Out 1 • Pre Out 2 • Post Out 1 • Post Out 2 • S&H In 1 • S&H In 2 • Glide In 1 • Glide In 2
A-156 **Width:** **8 HP** **Current:** **50 mA**		**Dual-Quantizer** 2 quantizers in one module, first quantizer semitone mode (=1/12V quantizing steps), the second quantizer has some special modes: chromatic/major/minor/ major chord/minor chord selection (optionally also for quantizer 1 via jumper), common transpose input for both quantizers, especially designed for A-155 expansion, but also suitable for other CV input signals, e.g. Ribbon/Trautonium Controller, Theremin, Light-controlled CV, Random, LFO, Foot controller CV and so on for glissando and arpeggio like effects	• 3 mode switches	• CV In 1 • CV Out 1 • Trig In 1 • Trig Out 1 • CV In 2 • CV Out 2 • Trig In 2 • Trig Out 2 • CV Common (Transpose)

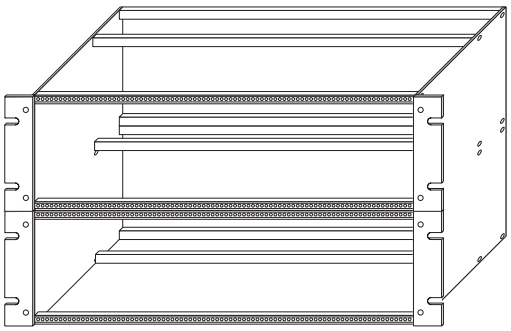
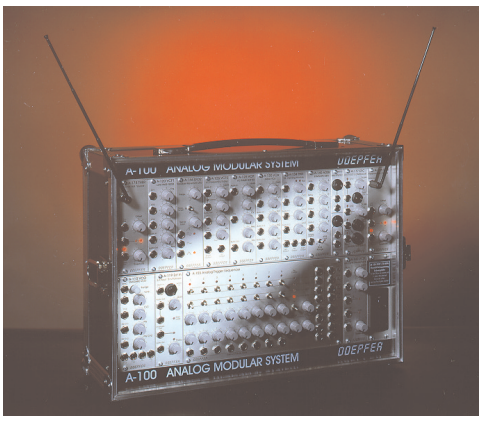
Module	Sketch	Description	Controls	In/Outputs
A-160 **Width:** **4 HP** **Current:** **40 mA**		**Clock Divider** frequency divider for clock signals, if lower (i.e. divided) clock frequencies are required in the system for synchronising purposes; especially for rhythmic sounds, the clock input may be supplied from a MIDI-to-SYNC interface (for MIDI synchronised timing) or from LFO output; a pulse at the reset input resets all outputs to zero (e.g. reset or start/stop output from MIDI-SYNC interface)	• /2 (LED) • /4 (LED) • /8 (LED) • /16 (LED) • /32 (LED) • /64 (LED)	• Trigger In • Reset In • /2 • /4 • /8 • /16 • /32 • /64
A-161 **Width:** **4 HP** **Current:** **20 mA**		**Clock Sequencer** expansion modul for A-160; supplies 8 single step outputs (step 1...8) which are advanced to the next step in the rhythm of the A-160 clock signal; A-160 is required and must be placed side by side with the A-161; typical application: sequential rhythmic control of ADSR (A-140) or AR generators (A-170)	• 1 (LED) • 2 (LED) • 3 (LED) • 4 (LED) • 5 (LED) • 6 (LED) • 7 (LED) • 8 (LED)	• Out 1 • Out 2 • Out 3 • Out 4 • Out 5 • Out 6 • Out 7 • Out 8
A-162 **Width:** **8 HP** **Current:** **40 mA**		**Dual Trigger Delay** 2 separate trigger delay units; for each unit the delay time and gate time (width of the gate pulse at the output) are adjustable in the range of about 0 ... 10 sec; output display with LED A voltage controlled version of the trigger delay can be realized with two A-142 VC Decay modules	per Delay: • Delay Time • Length • Control (LED)	per Delay: • In • Out
A-163 **Width:** **8 HP** **Current:** **40 mA**		**A-163 Voltage Contr. Divider** frequency of the input signal (e.g. rectangle from a VCO) is divided by an integer factor N (1 . . . 20). N can be adjusted manually and modulated with an external control voltage (e.g. LFO, ADSR, Random, Theremin, sequencer) with attenuator. Output waveform is symmetric rectangle. In contrast to A-113 the dividing factor of the A-163 is voltage controlled. Applications: dynamic voltage controlled frequency division of audio signals (you will find more details regarding frequency division of audio signals in the A-113 information).	• Manual N • CV (attenuator)	• CV In • Audio In (rectangle) • Audio Out
A-164		**Manual Gate Module** (planning stage)		
A-165 **Width:** **4 HP** **Current:** **20 mA**		**Dual Trigger Modifier** 2 separate trigger modifiers; each with 2 connected inputs for logic signals (gate, clock, trigger) and 2 outputs; the first output provides the inverted signal ('low' is changed into 'high' and vice versa); the second output generates short trigger pulses for each rising and falling edge of the input signal; 2 LED's for display of output signals	per Modifier: • LED for inverse output • LED for +/- pulse output	per Modifier: • 2x In • Inverse Out • +/- Out

Module	Sketch	Description	Controls	In/Outputs
A-166 **Width:** **8 HP** **Current:** **40 mA**		**Logic Module** Dual logic module with 3 inputs per unit, the logic states of the 3 inputs are linked together in 3 ways: AND, OR and EXOR (exclusive OR). The three functions are available simultaneously at three outputs with LED display of the output states. Additionally two inverter sections are avaliable to obtain the inverted functions (NAND, NOR and NEXOR). Applications: combination of digital signals of the A-100 (e.g. gates, clocks, triggers), e.g. to obtain "gated" clocks or certain rhythmic patterns	each unit: • AND (LED) • OR (LED) • EXOR (LED) each inverter • LED	each unit: • IN1 • IN2 • IN3 • AND (OUT) • OR (OUT) • EXOR (OUT) each inverter: • IN • OUT
A-167 **Width:** **8 HP** **Current:** **20 mA**		**Analog Comparator** compares analog voltages and derives a gate signal; internally the module generates the voltage k1*(+In) - k2*(-In) + Offset (available at the output *analog sum*) and und sets or resets the gate output depending on the result of this internal voltage (>0V or <0V). k1 and k2 represent the manual attenuators. A LED shows gate state. The Gap control is used to adjust a so-called "hysteresis" (i.e. the difference between on and off level). As soon as the Gap control is turned up the switching levels for on and off state fall apart. Appl.: gate gener. from analog signals, ADSR-LFO	• + In • - In • Offset • Gap • Function (LED)	• + In • - In • Analog Sum • Comp. Out • Inv. Comp. Out
A-170 **Width:** **8 HP** **Current:** **20 mA**		**Dual Slew Limiter SL** 2 separate slew limiters (portamento controllers, AR generators) • unit 1: one common control for rise/fall time (about 0 ... 10 sec.); • unit 2: two separate controls for rise and fall time and may be used as a simple AR envelope generator (input = gate); time range of unit 2 is switchable in 3 ranges applications: portamento, AR generator	**Unit 1:** • Time • 2x Control-LED **Unit 2:** • Rise Time • Fall Time • Time Range • 2x Control-LED	**Unit 1:** • In • Out **Unit 2:** • In • Out
A-171 **Width:** **8 HP** **Current:** **20 mA**		**Voltage Controlled Slew Limiter VCSL** slew limiter with voltage controlled slew rate (portamento controller, AR generator), slew time (about 0.01 ... 10 sec.) can be adjusted manually as well as per control voltage at the CV inputs (one with attenuator), 2 control LEDs for display of rise/fall	• Slew Time • CV 2 • 2x Control-LED	• CV 1 • CV 2 • 2x Signal In • Out
A-172 **Width:** **4 TE** **Current:** **10 mA**		**A-172: Max/Min Selector** The module permanently picks the maximum resp. minimum voltage out of the four input signals and outputs these voltages to the maximum resp. minimum jack socket. The main application of the module is the processing/mixing of control voltages, e.g. random voltages, ADSR, LFO, S&H, ribbon CV, theremin-CV and similar - or the generation of new VCO waveforms by using the outputs of a VCO as A-172 inputs. To adjust offset and amplitude for each input independently we recommend to combine the module with the A-129-3. The sketch shows the basic principle of the max/min module by means of three sine waves (e.g. three LFOs) with different frequencies and different levels. +/- LED display for each output 	• Max display (- LED / + LED) • Min display (- LED / + LED)	• In 1 ... 4 • Max Out • Min Out

Module	Sketch	Description	Controls	In/Outputs
A-174 **Width:** **10 HP** **Current:** **40 mA**		**Joystick** spring-loaded X/Y cross potentiometer (so-called joy stick) that generates 2 independent control voltages, max. voltage difference about 7V (i.e. -3.5 ... +3.5V for symmetrical adjustment) for each output the voltage offset (zero setting) can be adjusted, 2 LEDs for positive/negative display of the output voltages. If the spring is removed for one direction the joy stick is no longer spring-loaded for this direction (as the spring is destroyed when removed this cannot be re-established !), a high quality joy stick made by ALPS is used	• Joystick • X-Offset • Y-Offset • -Y (LED) • +Y (LED) • -X (LED) • +X (LED)	• CV Y • CV X
A-175 **Width:** **4 HP** **Current:** **20 mA**		**Dual Voltage Inverter** 2 separate inverters for analog voltages (e.g. a voltage of +5 V is changed to -5 V, a voltage of -3 V is changed to +3 V, etc.); each inverter has two connected inputs and one output; 2 LED's at each output display output voltage (positive/negative)	per Inverter: • + / - LED's	per Inverter: • 2 x In (connected) • Inverse Out
A-176 **Width:** **8 HP** **Current:** **20 mA**		**Control Voltage Source CVS** provides 3 manually adjustable control voltages, 2 of them having an additional "fine" control (e.g. for exact tuning of VCO frequency)	• CV 1 • CV 1 fine • CV 2 • CV 2 fine • CV 3	• 2x CV 1 • 2x CV 2 • CV 3
A-177 **Width:** **8 HP** **Current:** **30 mA**		**External Foot Controller Module EFC** interface for connection of external controllers, inputs for 2 continous foot controllers (e.g. Doepfer FP5) and 1 double foots switch (e.g. Doepfer VCP2), adjustable scale (range) for the continous foots controllers, LED displays for CV and Gate outputs applications: foot control of any CV (e.g. filter frequency, loudness, panorama) or Gate/Clock, in combination with the A-113 foot controlled switching of the subharmonic mixtures	• Scale 1 • Scale 2 • CV1 (LED) • CV2 (LED) • Gate 1 (LED) • Gate 2 (LED)	• Foot Ctr. 1 In • 2 x CV 1 Out • Foot Ctr. 2 In • CV 2 Out • Double Foot Switch In • Gate 1 Out • Gate 2 Out
A-178 **Width:** **8 HP** **Current:** **60 mA**		**Theremin Module THER** control voltage module which generates a voltage that depends upon the distance between the Antenna and the hand of the user, used to control e.g. VCO, VCA, VCF or any other parameter in the A-100 which is voltage controlled, distance range about 30cm, gate output with adjustable theshold (e.g. for triggering envelope generator), adjustable CV offset (zero), price includes telescope antenna, to obtain exact intervals (semitone, major/minor, chords) a quantizer (A-156) is recommended, to simulate the original Theremin 2 x A-178, 1 x A-110 and 1 x A-130 are required	• CV offset • Gate threshold • 2xCV LED (pos./neg.) • Gate LED	• Antenna In • 2x CV out • Gate out

Module	Sketch	Description	Controls	In/Outputs
A-179 **Width:** **8 HP** **Current:** **60 mA**		**Light Controlled CV Source LCV** control voltage module similiar to Theremin (A-178) but the generated control voltage depends upon the illumination of the built-in light sensor, instead of the internal sensor an external sensor (LDR) may be connected via cable. In this case the internal sensor is turned off. Functions very similiar to A-178, but additional inverted CV Output with control LEDs available	• Light sensor • CV Offset • Threshold • 2xLED • norm. CV Out (pos./neg.) • 2xLED • inv. CV Out • (pos.(neg.) • Gate LED	• ext. Sensor In • CV Out • inverted CV Out • Gate Out
A-180 **Width:** **4 HP** **Current:** **0 mA** **A-181** **Width:** **4 HP** **Current:** **0 mA**		**A-180: Multiples 1** A-180 Multiple 1: 8 connected jacks may be divided into 2 x 4 jacks optionally **A-181: Multiples 2** 1/4“ - 3.5mm multiple, 2 separate multiples with one 1/4“ and two 3.5mm jack sockets, one is wired mono, the second stereo		A-180: • 8 x 3.5 mm jack sockets A-181: • 2 jacks 1/4“ • 4 jacks 3.5mm
A-185 **Width:** **4 HP** **Current:** **30 mA**		**Bus Access Module BAC** provides access to the Gate and CV signals of the system-bus (input as well as output); active module with signal-refreshing amplifiers (e.g. when using a common system bus with multiple base frames) Applications: feeding CV and Gate from one frame to another (e.g. CV and Gate from an A-190 to another frame), avoiding signal losses if many CV consumers are connected to the same bus (e.g. many A-110 or A-111 on the same bus)	• Gate (LED) • CV (LED)	• CV In • 2 x CV Out • Gate In • 2 x Gate Out
A-188-1		**BBD Module** (see A-128 ff.)		
A-190 **Width:** **10 HP** **Current:** **10 mA** **and** **50 mA @+5V** **(5V supply required !)**		**MIDI-CV/Gate/Clock Interface** • first CV outputs with 12 bits resolution for VCO CV, controlled by MIDI note on and pitch bend • second CV output with 7 bits resolution for control applications, controlled by MIDI velocity or controller or after touch (adjustable) • Gate output, controlled by note on/off, retrigger on/off option • Clock and Start/Stop output controlled by MIDI clock/start/stop/continue • all parameters are adjusted with the controls at the front panel (even scale, no trimmers) • MIDI controlled LFO and glide (software)	• Audio Level • Frequency • CV 2 • CV 3 **additional +5V power supply required (see accessories) !**	• Audio In • CV 1 • CV 2 • CV 3 • Audio Out
A-191 **Width:** **12 HP** **Current:** **30 mA** **and** **50 mA @+5V** **(5V supply required !)**		**MIDI-CV Interface/Shepard Generator** **MIDI-CV Interface:** 13 CVs controlled by fixed MIDI events (pitch bend, after touch, modulation, volume ...), adjustable MIDI channel, 3 LFO outputs (triangle, saw, rectangle) of a MIDI synchronized LFO, frequency adjustable, special version for combination with A-192 (16 controllers) available **Shepard Generator (2nd function)**: modulation oscillator with 8 phase-shifted triangle and sawtooth signals for “barberpole” effects (infinite rising / falling of pitches, filterings, phasings in conjunction with the corresponding VCOs / VCFs / VCPs / VCAs), frequency and mode (up, down, mixed) adjustable	• 4 push buttons: Freq. Up Freq. Down Shep. Mode MIDI / Shep. • 5x LEDs **additional +5V power supply required (see accessories) !**	• MIDI In • 16x CV Out

Module	Sketch	Description	Controls	In/Outputs
A-192 **Width:** 12 HP **Current:** 100 mA		**A-192 Voltage-to-MIDI Interface** converts 16 control voltages 0...+5V into MIDI controllers (= modular version of Pocket Control), 128 different sets of MIDI controllers (presets) available via DIP switch on the pc board. MIDI-In, MIDI-Out/Thru with merging, snapshot button, LED control. For details please refer to the description of Pocket Control on our web site. Applications: conversion of control voltages into MIDI controllers, e.g. Theremin/Light/Sequencer/ Foot-Contr./LFO/Random-to-MIDI or as Midi Interface for Vocoder (A-129/1 -> A-192 -> MIDI-Equipment -> A-191 special version -> A-129/2).	• Snapshot (push button) • Control (LED) • Preset (DIP switch on the pc board, module has to be removed for access)	• 16 x CV In (0...+5V) • MIDI In • MIDI Out/Thru
A-196 **Width:** 8 HP **Current:** 30 mA		**PLL (Phase Locked Loop)** Linear VCO with so-called phase locked loop circuit (PLL); where the frequency of the internal VCO tries to follow the frequency of an external signal. Internal construction: VCO + phasen detector (frequency comparator) + low pass that smoothes the output of the detector and feeds the VCO with this voltage. The internal signal are normalled via the switching contacts of the sockets but even available as in/outputs. The functions of the module are very complex and not very easy to understand for beginners because of the closed loop system with several parameters. Beside the "classic" PLL application the module invites to experiment by changing all the PLL parameters (filter frequency of the low pass, detector type, VCO range) to find out the results. Even the insertion of other modules is possible. E.g. with the A-163 voltage controlled frequeny multiplication is possible (sort of VC harmonics). Inserting a VC slew limiter allows voltage control of the "delay" time or "portamento" of the internal VCO. Applications: special sound effects, frequency multiplication, generation of clock signals for graphic VCO (e.g. high speed VCO für A-155) or switched-capacitor filters	VCO: • Offset • Range Detector: • Type Low Pass: • Frequency	VCO: • CV In • Out Detector: • In 1 • In 2 • Out Low Pass: • Out
Detailed information about the module including sound and patch examples is available on our web site				
A-197 **Width:** 14 TE **Current:** 50 mA (with backlight) 10 mA (without backlight)		**Analog Meter** display of DC/AC voltages by means of an illuminated moving coil meter with mirror scale; display range 0...+10V; 3 different measuring methods selected by a toggle switch: direct mode: direct display of the incoming signal, used for positive control voltages, e.g. ADSR, MIDI-to-CV, Gate Offset Mode: +5V are added to incoming voltage (0V input = +5V read out), used for bipolar control voltages, e.g. LFO Rectifier: signal is rectified, used for audio signals or AC voltages. DC voltages can be measured too but the display shows the absolute value (e.g. same readout for +3V/-3V). A LED lights up in case of a negative signal. The measuring input is available as a triple multiple.	• Meter • Mode (toggle switch) • Negative Display (LED)	• In (3-fold Multiple)
A-198 **Module** **Width:** 8 HP **Current:** 40 mA Available even as stand alone MIDI version with some additional features: **MIDI Ribbon Controller R2M**	 **Manual ca. 600 x 30 x 30 mm** The complete unit consists of manual and module.	**A-198 Trautonium/Ribbon Manual** play manual modeled on the Trautonium; made of a very sensitive position sensor that is activated by touching the sensor with the finger. It generates a voltage that is changed by moving the finger. Below the position sensor the pressure sensor is located. It is much less sensitive and generates a voltage that depends upon the pressure generated by the finger. For both voltages the scale can be adjusted and two gate signals are derived (with adjustable threshold for the pressure section). For the position section a hold function is available (switch). If this is activated the voltage is held some time after removing the finger. No gate signal is generated in the hold mode!	Position: • Scale • Hold on/off • LED (Gate) Pressure: • Scale • Threshold • LED (Gate)	• Position CV • Position Gate • Pressure CV • Pressure Gate • Manual
A-199 **Width:** 10 HP **Current:** 80 mA		**A-199 Spring Reverb** electronically simulated reverb by means of 3 spiral springs, characteristic sound based on the mechanical properties of the springs (delays, resonances, frequency range, sensitivity to mechanical shocks), "dense" reverb due to the 3-springs Feedback: signal can be fed back to the input, even “spring self-oscillation” available, option for inserting ext. modules (VCA, VCF, phaser, frq.shifter...) into the feedback loop; Emphasis: enables the adjustment of the accentuation of middle frequencies around ~2kHz; Mix: relation between original and reverb signal	• Level (input level) • Feedback • Emphasis • Mix 	• Audio In • Feedback In (normalled “switched” socket) • Reverb Out • Mix Out

Product	Sketch	Description
A-100 G6 **A-100 G3** **Width:** **2 x 84 HP (G6)** **1 x 84 HP (G3)** **Current:** **650 mA @+/-12V (Source)**		**Basic Frames 6U or 3U / 84HP** • Specifications for both frames: empty 19“ rackmount cases (subracks), width about 482 mm, depth about 240mm, including bus board(s), power supply +/-12 V/ 650 mA, mains inlet, fuse and power switch, rear, top and bottom covers, incl. all mechanical parts, completely assembled and tested, for plug-in of the desired modules • 6U: 2 x 3 U (about 264 mm), 2 x 84 HP effective width (about 2 x 426.7 mm), 2 bus boards, 1 back panel 3U (blind), 1 back panel 3U with power supply, used for A-100 basic system 1 and 2 • 3U: 1 x 3 U (about 132 mm), 1 x 84 HP effective width (about 426.7 mm), 1 bus board, 1 back panel 3 HU with power supply, used for A-100 mini system
A-100P **Width:** **1 x 84 HP +** **1 x 76 HP** **Current:** **650 mA @+/-12V (Source)**	 Theremin/Sequencer system with two A-178 in the upper row and an A-155 in the lower row.	**Portable Suitcase Version 6U** portable version of A-100G6, measures: about 460 mm (width) x 330 mm (height) x 210 mm (depth), same specification as A-100G6 but built into a suitcase (flightcase design), available in 2 versions: 1. Mains inlet at the front side: because of the power input (8 HP width) at the front only 76 HP are available in the lower row. For this version the mains inlet is protected during transportation. 2. Mains inlet at the rear panel: for this version the 84 HP are available even in the lower row. But for this version the mains inlet is not protected during transportation. No audio processing modules (e.g. VCO, VCF, VCA, VCP, VCFS, Ring Modulator, Spring Reverb) should be mounted near the power supply but only control voltage modules (e.g. ADSR, LFO, S&H, Slew Limiter, Trigger Delay, Sequencer, Quantizer, Clock Divider, MIDI-Interfaces). And the PSUII is strictly recommended for the suitcase version. The picture shows a Theremin/Sequencer application with two A-178 in the upper row and an A-155 in the lower row. Special suitcase versions are available upon request (e.g. double suitcase with 168 HP and 12U each, 8 bus boards, 4 A-100PSUII).
A-100 BUS	**Bus board:** one assembled and tested bus board, e.g. for customers who own a 19“ frame and need a bus board for A-100 modules, includes cables for connection to +/-12V power supply but no mechanical parts (e.g. screws, spacers, nuts, washers)	
A-100 NT12	**12 V Power supply:** assembled and tested power supply +/-12V@ 650mA, please specify 230V or 115V version, does not include cables, mains inlet, power switch, fuse and mounting material (screws, spacers, nuts, washers)	
A-100 PSU2	**12 V Power supply II** with higher output (+/-12V@ 1200mA) and ring core transformer for lower mechanical and electrical hum noise, please specify 230V or 115V version, does not include cables, mains inlet, power switch, fuse and mounting material	
A-100 AD5	**5V Low-Cost Adapter:** +5V@100 mA plug-in module; this module can be plugged into a free socket on the bus board; for modules which require +5V (e.g. A-113, 190, 191), the current is taken from the 12V supply !	
A-100 MNT	**Miniature Power supply and bus bord:** +/-12V @ 100mA and +5V @ 50mA power supply with integrated bus board with 4 connectors, especially for applications with only one or a few modules (max. 100mA, max. 4 modules), requires an AC/AC adaptor with 7...9V AC output (not DC !!!), available with or without AC/AC adapter (only version for 230V mains voltage available)	
A-100 B2/4/8	**Blind front panels:** B2: 2 HP, B4: 4 HP, B8: 8 HP	
A-100 B84	**Blind back panel** 3U / 84 HP	
A-100 B84P	**Back panel with mains inlet for power supply mounting:** 3U/84HP with mounting holes for 12V power supply, mains inlet with power switch, fuse holder and wires to connect the power supply, without power supply, please specify supply type (NT12 or PSUII) and 115V/230V version (because of fuse and printing)	
A-100 C...	**Patch cords:** available in different length, with 2 mono plugs 3.5 mm C30: 30 cm (black), C50: 50 cm (grey), C80: 80 cm (red), C120: 120 cm (blue), C200: 200 cm (green)	
A-100M	**Mounting fee (for one module)** fee for mechanical mounting of one module, connection to the bus board and testing within the system	
A-100 OPM	**Operating Manual:** complete A-100 manual, containing all modules, ring folder with operating instructions for all existing modules (with application examples); is included without additional charge in the 3 basic systems, but has to be purchased separately if single modules or user aranged systems are ordered, available in German or English	
A-100 SM	**Service Manual:** contains all schematics, part lists, adjustment rules and technical comments of the modules described in this prospectus (no future modules included), available only in German language (the service manual will not be translated to English), but most of the informations (schematics, parts list, components overlay and so on) are international. The service manual is purchased only to A-100 customers !	

Products in shaded areas are suitable for qualified personnel only because of electrical safety (dangerous mains voltage 115V / 230V).

A-100 Basic Systems

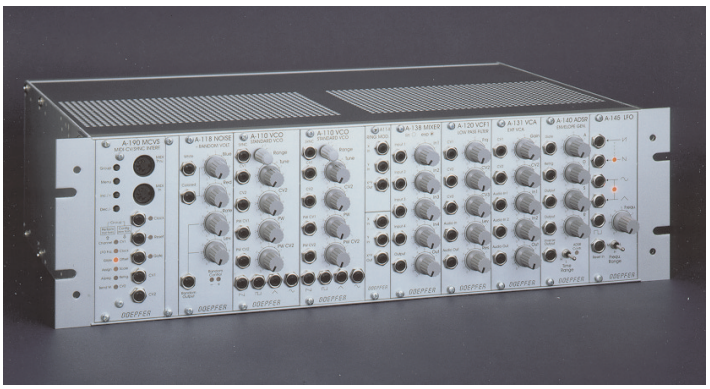
There are no fixed rules for which and how many modules are required in an analog modular system. If you are a beginner, you might have problems in finding the right combination of modules for a basic system. Thus, we have arranged some system packages to start with, containing the modules in the table on the right. The main difference between the basic systems 1 and 2 is the MIDI interface. System 1 is not equipped with a MIDI interface. If you want to control this system with MIDI you need an external MIDI-to-CV interface (e.g. MCV24). System 2 contains the MIDI interface A-190 instead of the two modules A-150 (Dual VCS) and A-162 (Dual Trigger Delay).

The modules are completely mounted into a 6U base frame and each system contains 30 cables (mixed lengths). The basic systems 1 and 2 are available also as portable suitcase versions (see picture on page 17). Because of the 8HP power input the suitcase versions contain one module less (system 1: no A-162 / system 2: no A-170).

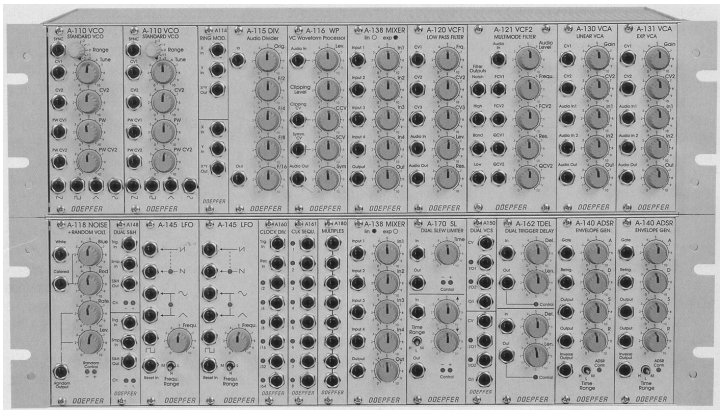
You will save some money compared to the regular prices when you purchase one of the basic systems! The purpose and function of the other modules not included with the basic systems will become clear while you are working with the A-100 system, and you will realize the missing modules for your application very soon. If you want to expand the basic systems you need an empty frame (A-100G6 or A-100G3, see page 17) and the desired additional modules and patch cords.

We also offer a minimal „Entry System“ with MIDI interface containing the modules in the lower table on the right mounted into a 3U base frame. 15 cables (mixed) are included.

The special prices are valid **for these three combinations only** (no exchange of modules).



A-100 Mini System



A-100 Basic System 1

Quantity Basic System 1 (A-100BS1)	Quantity Basic System 2 (A-100BS2)	Quantity Mini System (A-100BSM)	Module	Function	HP
2	2	2	A-110	VCO	20
1	1	1	A-114	Ring Modulator	4
1	1	-	A-115	Audio Divider	8
1	1	-	A-116	Waveform Processor	8
1	1	1	A-118	Noise/Random	8
1	1	1	A-120	24dB Low Pass	8
1	1	-	A-121	Multimode Filter	12
1	1	-	A-130	VCA lin.	8
1	1	1	A-131	VCA exp.	8
1	1	-	A-138a	Mixer lin.	8
1	1	1	A-138b	Mixer exp.	8
2	2	1	A-140	ADSR	16/8
2	1	1	A-145	LFO 1	16/8
-	1	-	A-146	LFO 2	8
1	1	-	A-148	S&H	4
1	-	-	A-150	VCS	4
1	1	-	A-160	Clock Divider	4
1	1	-	A-161	Clock Sequencer	4
1	-	-	A-162	Trigger Delay (*1)	8
1	1	-	A-170	Slew Limiter (*2)	8
1	1	-	A-180	Multiples I	4
-	1	1	A-190	MIDI-CV/Gate/Sync	10
-	1	1	AD5	5V Adapter	-
-	1	1	BP2	Blind panel 2HP	2
(*1) not included in the suitcase version of Basic System 1					
(*2) not included in the suitcase version of Basic System 2					

Suggestions for other systems are available on our web site www.doepfer.com, e.g. sound processing systems (for sound processing of external audio sources), expansion systems (expansion for the basic systems), Trautonium systems, Theremin systems, Vocoder systems, Sequencer/Sampler systems and many more. If you want to plan your specific system we ask you to pay attention to the remarks on the following pages.

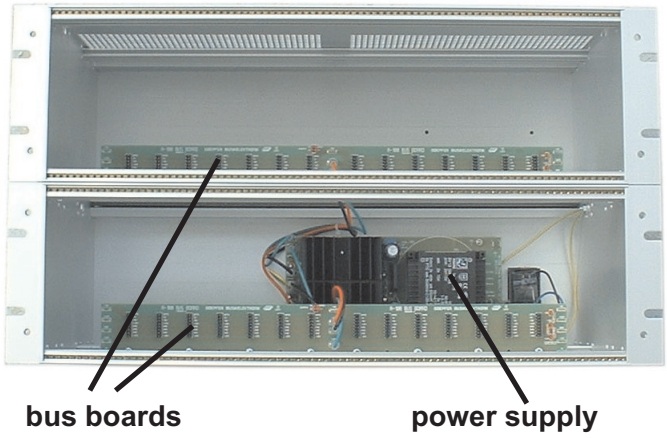
A-100 Planning

In the following you find some information concerning the construction of the A-100. When you order one of the basic systems you will not have to deal with these details. But if you want to put together your own specific A-100 system this information will help you for your planning. For this mechanical and electrical aspects have to be taken into account. The mechanical aspects refer to the width of the modules, the electrical aspects to the power consumption of the modules. If you want to built your own system a bit technical experience is required. Otherwise we ask you to order the system ready assembled according to your given data.
On our web site we have some files available for download that make the A-100 planning a bit easier: an Excel ™ file for automatic calculation of total current and total width of the desired modules, two picture files with all A-100 front panels (one as pixel pictures, the other as vector graphics in Corel Draw ™ format)

Mechanical aspects

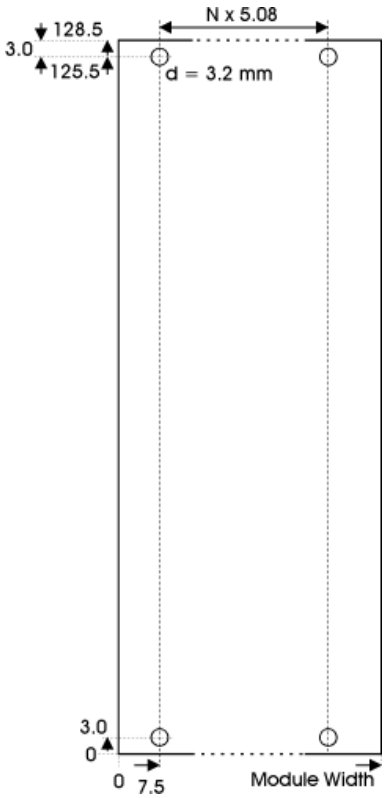
The construction of the A-100 modular system is based on the international standard **19" rack system** (DIN 41494 / IEC 297-3 / IEEE 1001.1). First of all an empty frame with power supply and bus boards is required. This can be filled with the desired modules. The **standard 6U frame (A-100G6)** consists of two sections each 3U high, tied together by 6U side panels (see picture on the right side). It contains two bus boards, the standard power supply with +/-12V@650mA (or alternatively the power supply II with +/-12V/1200mA and ring core transformer), the main electrical supply socket and all interconnections between these parts. A small **3U frame (A-100G3)** is available too (only one bus board). The 6U version is available as portable suitcase version too.
Module **front panels** are all 3U high (1U = 1.75 inch = 1.75" = 44.45mm, 3U = 133.4 mm). The final height of the front panels is a bit less than 133.4 mm as the rim of the mounting rails has to taken into consideration. Consequently the final height is 128.5 mm for all A-100 front panels. Their width is measured in HP (HP = horizontal pitch, 1 HP = 5.08 mm or 1/5 inch or 1/5"). The actual width of a front panel is a few tenth of a mm less than the calculated value (i.e. multiple of 5.08 mm resp. multiple of 1/5") to have a little bit tolerance to assemble the panels. The table below shows the actual widths for the most common front panel measures and the position of the mounting holes relative to the front panel edges. For the front panels up to 10 HP normally 2 mounting holes are sufficient (one below, one above). From 10 HP normally 4 or even more mounting holes are used. The horizontal distance of the mounting holes has to be a multiple of the HP grid, i.e. a multiple of 5.08 mm resp. 1/5" (= N x 5.08 in the sketch below). To assemble the modules in the frame M3x6 oval-head screws with cross recess (DIN7985) are used. The front panels are made of 2 mm anodized aluminium.

A-100G6



Module width overview

width [HP]	calculated width [mm]	actual width [mm]
1	5,08	**5,00**
2	10,16	**9,80**
4	20,32	**20,00**
8	40,64	**40,30**
10	50,80	**50,50**
12	60,96	**60,60**
14	71,12	**70,80**
16	81,28	**80,90**
20	101,60	**101,30**
21	106,68	**106,30**
22	111,76	**111,40**
28	142,24	**141,90**
42	213,36	**213,00**

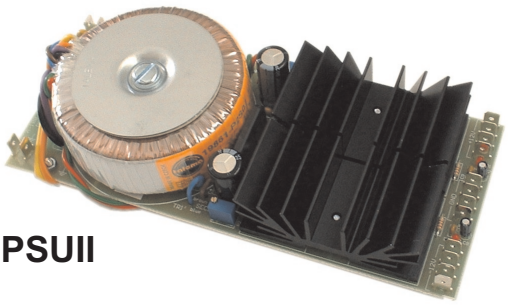


Module dimensions and positions of the mounting holes

The rack system has a **usable width** of **84 HP** (= 426.4 mm). Individual **modules** can be fitted in any chosen layout into the 19" frame. If the modules don't use up the entire 84 HP, then the spaces have to be covered with **blanking panels** due to safety and EMC reasons. We offer blind panels with 1, 2, 4 and 8 HP. In the description for each module (e.g. A-110) the width of the module in HP measures can be found.
For the A-100G6/G3 we use frames from the German company ProMa (www.proma-technologie.de). But frames from other manufactuerer that meet the 19" standard can be used normally as well. If you want to built your own frames or if you need additional accessories you may order directly from ProMa. But you can get all parts from us as spare parts too.

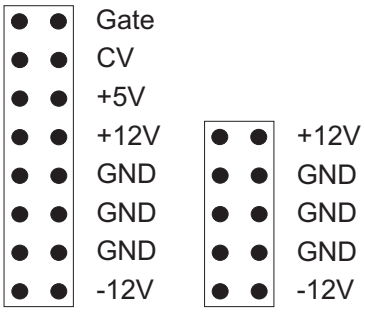
Electrical aspects

The A-100 modules require the power supply voltages +12V and -12V, some modules also need +5V (see module descriptions, e.g. A-113, A-190, A-191). The voltages are generated by the A-100 power supply and distributed to the bus boards. Two types of power supplies are available: the standard power supply (A-100NT12) with 650mA and the enhanced power supply II (A-100PSUII) with 1200mA and ring core transformer for lower mechanical and electrical noise.



A-100PSUII

Each bus board is equipped with 14 double row pinheaders with 16 pins. The following signals are assigned to the bus board pin headers: -12V, GND, +12V, +5V, internal CV and internal Gate.
Each module is equipped with dual row pin header (10 or 16 pins). The connection between a module and the bus board is made with a 10 or 16 pin flat cable, having socket connectors pressed on each end. 10 pin cables only lead -12V, GND and +12V, the 16 pin cables also lead +5V, CV and Gate.



The signals +5V, CV and Gate are used by only some of the modules (see module description for details). CV and Gate are not required unconditionally since these signals may be supplied via front panel connectors too. These bus signals are supported only by VCOs, envelope generators and Midi-CV/Gate interfaces.
For each module, the assembled flat cable required for connection to the bus is included; cables for front panel connections (patch cords) are not included and have to be ordered separately.
The number of required power supplies results from the sum of currents of all the modules in the frame (A-100G6 or G3). The current of each module is specified in the module description. Normally, the standard power supply will be sufficient for a 6U system if not too many power consuming modules are used in the same system (e.g. many A-110). Otherwise the PSUII with 1200mA can be used.
Some of the modules (e.g. A-113, A-190, A-191) require an additional power supply of +5 V. You can choose between the simple plug-in low cost adaptor A-100AD5 (max. current 100 mA) which can be plugged into a free socket on the bus board or the separate power supply A-100NT5 (max. current 500 mA) which has to be mounted on the rear panel of the basic frame.

The **basic frames** A-100G6 and A-100G3 are completely assembled and tested. They include the standard power supply (+/-12V, 650mA), bus boards, rear, top and bottom covers. At the rear panel the power supply, the mains inlet, power switch and fuse are located. Instead of the standard power supply (650mA) the PSUII (1200mA, ring core transformer) is available at additional charges.

For applications with only one or a few modules the **miniature power supply** with integrated bus board (A-100MNT) is available. The A-100MNT deliveres +/-12V (100mA) and +5V (50mA) and has 4 bus connectors. The A-100MNT runs with a standard AC adapter (9V AC output) and uses no dangerous voltages - in contrast to the A-100NT12 or A-100PSUII.

The 6U basic frame is also available as a **portable suitcase version** (A-100P). One can choose between mains inlet in front or at the rear panel. In the first case the lower row of the A-100P has only 76HP available as the mains inlet/switch/fuse requires 8HP on the front side. But the mains inlet is fully covered during transportation. If the version with the mains inlet at the rear panel is chosen the full 84 HP are available, but the mains inlet is not covered during transportation !

You can also purchase the **bus board** and one of the power supplies separately so that you may use other frames or power supplies too. ***These devices are allowed to be installed only by qualified personnel because of the electrical safety (230 or 115V mains voltage). Self-building of frames is recommended only for customers who are familiar with electronics because of the electrical safety !***

MIDI Integration of the A-100

For integrating the A-100 into a MIDI system, the internal **MIDI interfaces A-190, A-191** and **A-192** or the external interfaces **MCV24, MCV4** and **MSY2** are available. The most versatile interface is the MCV 24 with 24 control voltage outputs, allowing control of each voltage-controllable parameter in the A-100 from MIDI.

The **MIDI analog sequencer MAQ 16/3** is the right choice if you love analog sequences controlled by MIDI. It is equipped with 3 CV and Gate outputs which are compatible with the System A-100. Due to the MIDI features it has some different features compared to A-155.

The **REGELWERK** may be used for MIDI synchronous analog sequences as well but is not as versatile as the MAQ16/3 for this purpose.

For rhythmic, MIDI synchronous trigger sequences we offer **SCHALTWERK** with 16 CV and 8 Gate outputs. All devices are described on www.doepfer.com.

Even some of our OEM products (e.g. **CTM64**, **MTC64**, **Pocket Electronic**) can be used in combination with A-100 to transmit or receive Midi data. For example the **MTC64** can be used to generate up to 64 gate signal controlled by Midi note messages.

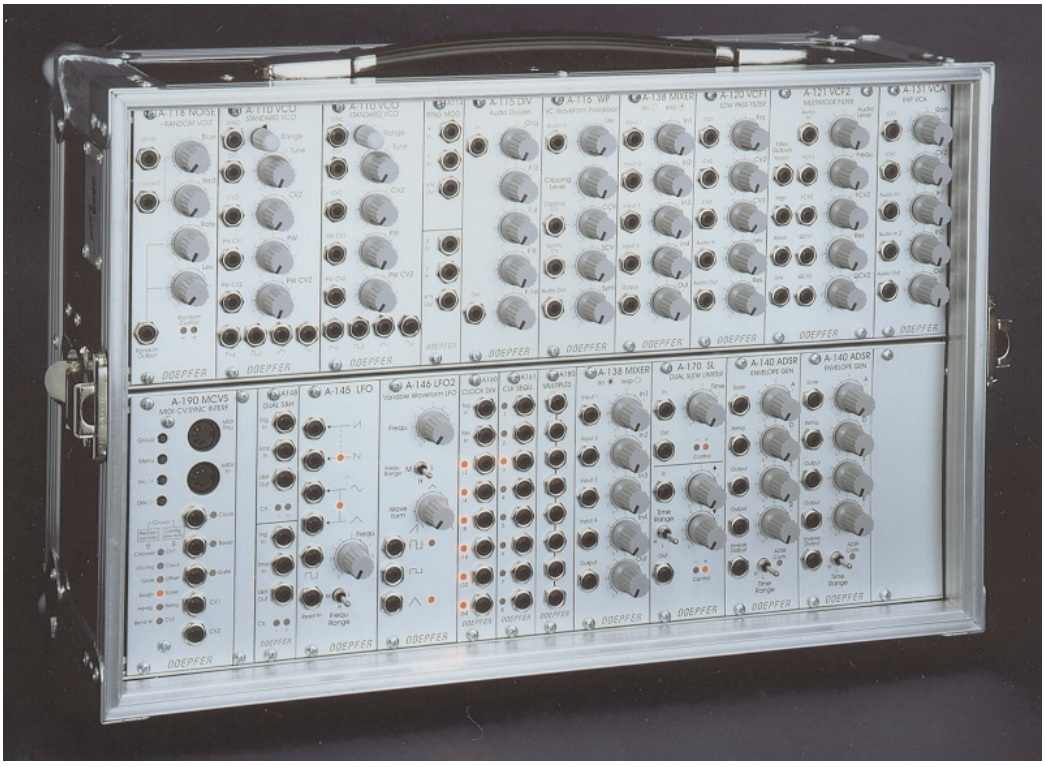
Prices

The prices for single modules do not include installation fee, user's manual and patch cords. The installation fee for one module is specified in the price list. We recommend to order only completely assembled and tested systems. Only experienced users may order single modules with separate frames and assemble the modules in the frames themselves.

The module prices are valid for orders of *single* modules. If you order modules *together with a basic frame*, the modules will normally be installed into the frame, paying regard to your wishes for configuration. In this case the mounting fee per module has to be added. Only if you wish the modules expressly unassembled we ship the modules and the frame separately.

Single modules do not include the user's guide, only the basic systems include the user's guide! If you order single modules the user's guide has to be ordered additionally. The user's guide is available in printed form only for the complete A-100 system (including all modules), not for single modules. For single modules you find the user's guides as pdf-files on our web site www.doepfer.com for print-out.

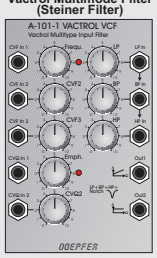
Handling and shipping charges, import duty and tax are *not* included in the prices. These depend upon the country, distance, weight and type of shipment. If there is a Doepfer representative in your home country you have to order from the representative (please look at our web site www.doepfer.com -> dealers for details).



A-100 Basic System II (Suitcase Version, mains inlet on rear panel)

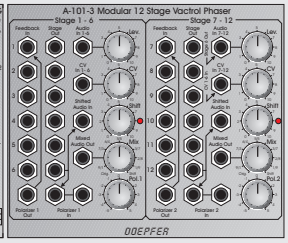
A-100 Modules Overview

A-101-1
Vactrol Multimode Filter (Steiner Filter)



A-101-2
Low Pass Gate

A-101-3
Modular 12 Stage Vactrol Phaser

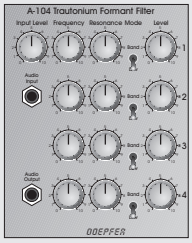


A-101-9
Univeral Vactrol Mod.

A-102
Diode Lowpass

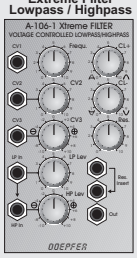
A-103
18dB TB303 Lowpass

A-104
Trautonium Formant Filter



A-105
24 dB SSM Lowpass

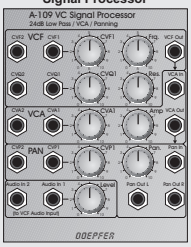
A-106-1
Extreme Filter Lowpass / Highpass



A-107
Multitype Morphing Filter

A-108
6/12/24/48 dB Low/Band Pass

A-109
Voltage Controlled Signal Processor

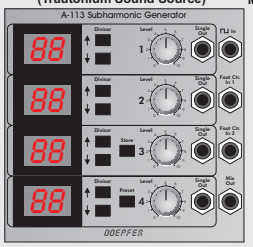


A-110
Standard VCO

A-111
High-End VCO

A-112
8-Bit Sampler/ Wavetable Osc.

A-113
Subharmonic Generator (Trautonium Sound Source)



A-114
Ring Modulator

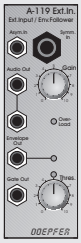
A-115
Audio Divider

A-116
VC Waveform Processor

A-117
Digital Noise/ 808 Sound

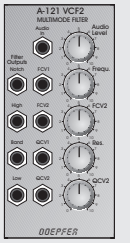
A-118
Noise/ Random

A-119
Ext. Input/ Env. Follower



A-120
24dB Moog Lowpass

A-121
12dB Multimode VCF



A-122
24dB Lowpass

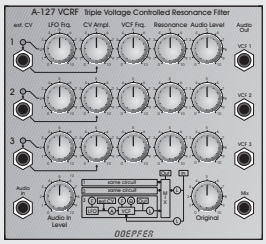
A-123
24dB High Pass

A-124
12dB Wasp VCF

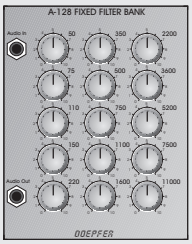
A-125
VC Phaser

A-126
Frequency Shifter

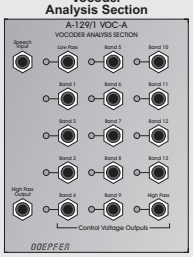
A-127
VC Triple Resonance Filter



A-128
Fixed Filter Bank

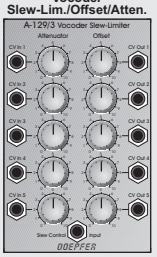


A-129/1
Vocoder Analysis Section



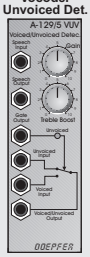
A-129/2
Vocoder Synthesis Section

A-129/3
Vocoder Slew-Limi./Offset/Atten.



A-129/4
Vocoder Slew Contr.

A-129/5
Vocoder Unvoiced Det.



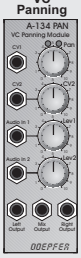
A-130
VCA (linear)

A-131
VCA (exp.)

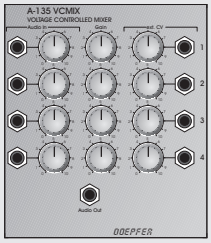
A-132
Dual VCA

A-133
Dual VC Polarizer

A-134
VC Panning



A-135
VC Mixer



A-136
Distortion/ Waveshaper

A-137
VC Wave Multiplier

A-138a
Mixer (linear)

A-138b
Mixer (logarithm.)

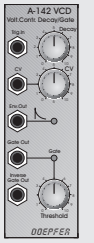
A-138c
Polarizing Mixer

A-139
Headphone Amplifier

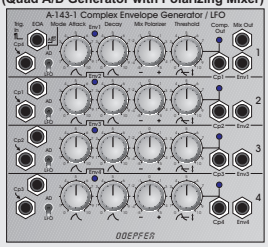
A-140
ADSR

A-141
VC ADSR

A-142
VC Decay/ Gate

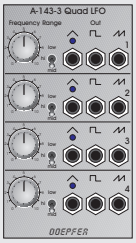


A-143-1
Complex Envelope Generator (Quad A/D Generator with Polarizing Mixer)



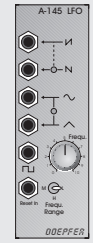
A-143-2
Quad ADSR with EOA/EOD/EOR Outputs

A-144
Quad LFO



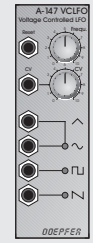
A-144
Morphing Controller

A-145
Standard LFO



A-146
Variable Wave-form LFO

A-147
VC LFO



A-148
Dual S&H

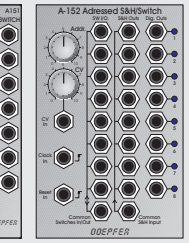
A-149-1
Quant./Stored Random Voltages

A-149-1
Dig.Rnd. Volt.

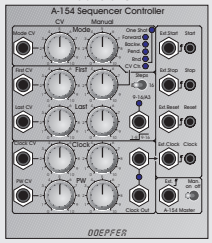
A-150
Dual VC Switch

A-151
Sequ. Switch

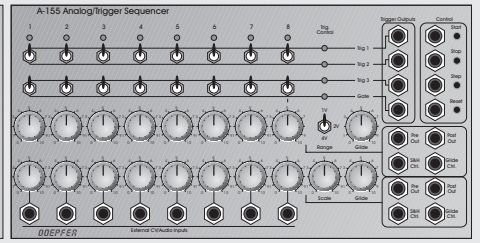
A-152
Voltage Addressed S&H/Switches



A-154
Sequencer Controller



A-155
Analog and Trigger Sequencer



A-156
Dual Quantizer

A-160
Clock Divider

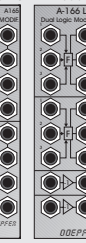
A-161
Clock Sequ.

A-162
Dual Trigger Delay

A-163
VC Divider

A-165
Trigger Modifier

A-166
Logic Module



A-167
Analog Comparator

A-170
Slew Limiter

A-171
VC Slew Limiter

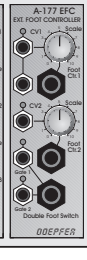
A-172
Min./ Max.

A-175
Voltage Inverter

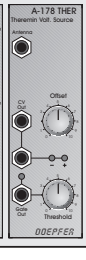
A-174
Joy Stick

A-176
Contr. Volt. Source

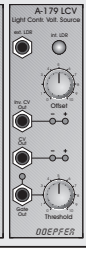
A-177
Foot Contr. Interface



A-178
Theremin CV Source



A-179
Light Contr. CV Source

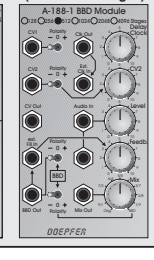


A-180
Multipl. I

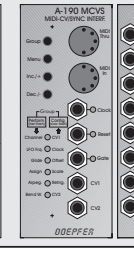
A-181
Multipl. II

A-185
Bus Access

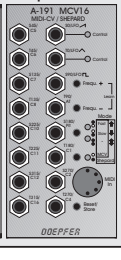
A-188
BBD Module (128 ... 4096 stages)



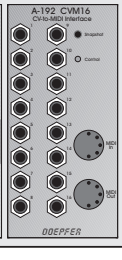
A-190
MIDI-CV/Gate/ Clock Interface



A-191
MIDI-CV Interf./ Shepard Gener.



A-192
16 Channel CV to MIDI Interf.



A-196
PLL

A-197
Analog Meter

A-198
Trautonium/Ribbon Controller

A-199
Spring Reverb

summer 2006