

# Modular2

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# Introduction

## What is a Modular Synthesizer?

To answer this question, we should first perhaps address the more basic question: What is a synthesizer? In its modern form, a synthesizer is typically a system composed of building blocks such as oscillators, filters, envelopes, etc – and usually these building blocks are connected together in a fixed structure. Although the parameters of such a synth are programmable and permit a wide range of sounds to be created, in the end the fixed structure dictates the limits of what the synth can do. But how would it be if you could choose the building blocks yourself, as well as decide for yourself how they should be connected? With the Modular, you can do exactly that!

Actually, the idea of a modular synthesizer is anything but new. In fact, the earliest synthesizers back in the middle of the 1960s were all modular. Users of these systems constructed their own instruments from assorted synthesis building blocks, each of which was essentially a separately-packaged electronic circuit capable of performing a specific synthesis function – an oscillator,

a filter, an amplifier, etc. – hence the term "modular". Each module had inputs and outputs as well as its own set of controls permitting adjustments to the resulting sound. Creating a working synthesizer was merely a matter of connecting a set of modules together via patch cables. Thus, the structure of a synth could be determined quite flexibly and sound design possibilities were limited mainly by imagination, patience and the cost of the modules (or by the number of patch cables on hand!) But there were disadvantages as well: not only cost, size and the temperamental nature of the analog circuits but, most important, the fact that such synths were limited to monophonic operation, and that there was no efficient way to save and recall sounds which were created on them, let alone the circuit configurations themselves.

The Modular opens a new chapter in the history of modular synthesis. The Scope Fusion Platform's cutting-edge DSP technology affords you more possibilities than ever before. You can draw upon a library of over 140 modules to realize your

sound design ideas. Just as in the past, you're at full liberty to choose which modules you use and how to connect them – but now, the circuits you create are polyphonic (if you wish) and can be stored and recalled, as can the sound settings you create for them.

Never worked with a modular synth before? No problem – you won't be left to fend for yourself. This manual, including the Modular Tutorials (highly recommended!) will take you by the hand and show you how easy it is to use the Modular. The interface has been extensively developed and refined to make it as clear, intuitive and efficient as possible – which translates into more fun for you, the user. Once you've gotten acquainted with the fundamentals of the Modular, the Module Reference section of this manual provides detailed information on all of the modules in the library.

Your CreamWare Team wishes you success and enjoyment with the Modular!

# The Modular Concept

## Overview

This section of the manual serves to familiarize you with the general concepts of the operation and use of the Modular2. It provides an overview of the various types of modules and signals available to you. The Module Reference section provides detailed descriptions of all modules and their parameters. It can be viewed as both a reference and as a very detailed, in-depth user's guide. The Tutorials are especially helpful for users who have never worked with a modular synthesizer – but are highly recommended even for experienced synthesists as a way of getting a quick initiation into the special aspects of the Modular.

## Devices and Patches

A **device** is an instrument, a mixer, an effects processor, etc., that can be loaded into the Routing Window and connected there as desired. The Modular is precisely such a device. However, it may take a bit of time to get used to the notion that there is not just one Modular device, but infinitely many! This is because the Modular device itself is essentially a blank slate – an empty container – within which a **patch** is constructed.

The Modular **patch** is the combination of modules loaded into the Modular device, including the cabling that connects these modules together to create a functioning synth circuit. Of course, the structure of this patch is completely up to you. When you save your patch as a module, you're actually saving a new, customized version of the Modular device. This new device can later be loaded into the Routing Window, connected, and played, just like any other device. In fact, you can even use several different (or identical) Modular devices in the same project! In this sense, a Modular device is just the same as any other device.

## What are patches?

A patch is a copy of the Modular Window, containing an arbitrary circuit of Modular modules and a list of presets, which has been saved as an independent device (that is, in a file with the extension **.mdl**).

This means that whenever you assemble a collection of modules to produce a synthesizer, an effect, or anything else, and save it to disk, you have created a new patch.

As an independent device contained in a separate file, a Modular patch can be easily shared – via the Internet, for example – and we encourage you to do so!

## Loading a patch

As already alluded to above, loading a Modular patch is just like loading any other device. In the **File Browser**, open the **./Modular2/Patches/** folder. Here you'll find several files with the **.mdl** extension. Click on the name of the desired patch and drag and drop it into the Routing Window. When you drop it, the patch appears as an independent module in the Routing Window at the current position of the mouse cursor.

You can also visit our website at **<http://www.creamware.com>** where you'll find many new patches from CreamWare and other users in the Modular2 users pages (**Service->Modular Area**).

## Connecting patches in the Routing Window

Hooking up a Modular patch after it has been loaded into the Routing Window is the same as for any other device. MIDI and audio inputs are located on the left side of the module, and the outputs on the right.

In order to play and hear the Modular device, you need to connect the module's MIDI inputs to a MIDI source module, and the audio outs 1 and 2 to an audio destination module. However, note that depending on the configuration of the patch, the audio outs available may vary.

A typical setup for auditioning a Modular factory patch consists of the following connections: **Out** on the **Scope MIDI Source** module (the hardware MIDI input of the DSP card) to the **MIDI input** of the patch module, and the **audio outs 1 and 2** on the patch module to the analog outputs of your DSP card (assuming that your audio monitoring system is connected to the card's analog outputs).

Note: the Modular device has four audio outputs. Exactly which outputs are used and what they are used for may vary from patch to patch, but in general, the connections described above are suitable for a first listening test.

## The Modular Window

To open the Modular window, double-click on the patch module. You can also open it with the **Open Modular Surface** command in the context menu (right-click in Windows, or Ctrl + <click> in the Mac).

The Modular window is the work environment where you develop your patches. The window comprises two sections: the upper part, which contains the basic functions and the **Modular Folder**, and the much larger lower part, the **Module Container**. Details on the use of this window follow in later sections.

## Loading and saving presets

If you opened a patch in the Routing window you can immediately open the Modular window and audition the presets that are stored with most patches.

**Presets** store the settings of all dials, switches, faders, text fields and other controls in a patch. Presets store this synthesizer or effects setup information so that the configuration (and thus the sound) can be quickly recalled.

### To access the preset list of a Modular patch:

Open the Modular Window (as described in the previous section) and click the Preset icon – the second one to the right of the Tension knob in the control bar at the top of the window. The Modular Preset List opens. Via this list, you can recall, store and delete Modular presets as usual.

Every CreamWare factory patch comes with a full list of presets created by CreamWare sound designers (keep this in mind when loading a factory patch – the preset it loads by default is just one of many contained in the patch). If you've loaded a factory patch you'll find a number of entries in the Preset list. When you double-click on an entry, the patch settings and connections change to produce another sound or effect.

If one of the presets is already selected in the list you can use the up and down arrow keys to change the selection, and the RETURN key to load it.

Managing presets in the Modular - for example, assigning program change numbers - is the same as in any other device.

To **store** your settings in a preset, the Preset List must be open. Click the diskette icon to insert a new „Untitled“ entry in the list. Edit its name as desired. If the preset already exists, a dialog appears asking you to confirm whether you want to overwrite the existing entry. If you don't want to, answer No. An Untitled entry will then appear in the list. Other preset list functions, such as ProgramChange, are described in the main manual, as they are the same for all devices.

Note: When you store a modular preset, it applies only to the current modules loaded and their wiring. Changes to the modules or their connections can lead to unpredictable results. For example, if you replace one module with another, there will be no settings in the preset for the new module. To use the preset after replacing a module, you have to save it again. This means you should save presets only after the modules and their interconnections are finalized.

**To ensure that your presets are permanently saved**, you must either save the patch or export its preset list as a separate file. In general, with the Modular, the first option is the better one. (Exporting a preset list is discussed in the main manual).



## Control bar functions

The Control bar is the narrow upper part of the Modular Window. The basic controls and main functions of the Modular workspace are located here.

In order to see the Modular Window and its Control bar, you must have a patch loaded and have opened its Modular surface. If you haven't already done this, do it now – the following discussion will be much more meaningful if you have the actual device in front of you.

In the upper left corner of the Control bar, next to the name "Modular2", the **patch name** appears. This comes from the name of the file from which the patch was loaded and cannot be directly edited.

The **Voices** text fader, roughly in the middle of the Control bar, sets the voice count (polyphony) of the patch. Set a new value by clicking and up/down dragging on the fader. The new setting will be applied when you release the mouse button. Note that the time it takes to change to the new polyphony value varies according to the size of your patch.

The maximum polyphony is limited to 16 voices (per MIDI Voice Control). Voices may also be limited depending on the number of modules loaded and their interconnections. You will be presented with a warning dialog if voices cannot be allocated for any reason. The Voices entry field is found on the Preset List surface. It is identical in function to Voices in the control bar.

The **Routings** options, which affect the display of virtual cables in the Modular and can often greatly simplify its use, are located next to the Voices control. Each of these options is switched alternately on or off via simple clicking.

The first button from left (**Routings on/off**) displays or hides all cables (button color light blue or dark blue, respectively). As with all Routings options, this one has no effect upon the *connections* which the cables represent, but only upon their onscreen appearance. This option is extremely helpful when you're no longer modifying a patch, as it leaves all module controls fully accessible.

**The following display options are shown only if routing mode is enabled.**

The **Solo Cabling** option, second from left, confines the display of cables to only those cables which connect to the currently selected module. To see the connections to/from a different module, simply click on it.

Each of the remaining (colored) buttons switches the display of cables of the corresponding color on and off. Modular cables are assigned default colors (which you can then change) according to signal type, as discussed later in this section.

Finally, the **M** button enables or disables the **hide cables on Move** option, meaning that the cables connected to a module will not be displayed while the module is being repositioned in the Modular Window. It's a good idea to leave this option switched on, as it can make moving modules much quicker.

These are just the basic functions of the menu bar. More functions will be described in later sections.

## Adding, moving and deleting Modular modules

Modules are the building blocks used to create patches. This is done by loading the desired modules into the **Module Container** – the main, "open" space in the Modular Window – and connecting them together with virtual cables.

The modules themselves are described in detail in the Module Reference section of the manual. An overview of the modules is presented later in this part of the manual.

**Loading modules:** Click on one of the **Module Folders** to open a menu listing the modules contained in it. As the mouse pointer passes over these entries they are highlighted.

To load a module, click and hold on its name in the menu, move the mouse cursor over the Module Container, and release the mouse button. The module appears at the position of the mouse cursor. If another module was already positioned there, it will be shifted downward (as will any other modules directly below it) to make space for the new one.

**To move a module,** click and drag it to a desired position. The module can be shifted around freely, but will "snap" into the nearest grid position when you release the mouse button. The increments of the grid correspond to the dimensions of the smallest Modular module.

**Delete a module by** selecting it (clicking on it) and then pressing the DELETE key. A dialog appears asking you to confirm the delete.

**Note:** The only way to reverse the deletion of a module is to reload a previously stored version of the patch. Otherwise you will have to reload the module and reconnect it in the patch.



## Making the Connections

To create patches it is not sufficient only to load the desired modules; you must also connect them together. It takes a certain amount of experience to arrive at the optimal patch configuration, but you can acquire this with practice.

If you are new to modular synthesis you should experiment with the tutorials that accompany the modular.

Of course, you can immediately start experimenting with your own circuits. Just don't get discouraged, and in no event should you give up if your initial attempts don't work right away.

Now to the actual patching: A connection requires two compatible signal connections on two modules. Generally, compatible signals are identified by the colors of the jacks (connection points). This is not *always* the case, however. One of the great attractions of a modular system is the way you can experiment with the signals in a patch.

**Create a connection** by clicking on one connection point, or jack, and then on the other. The appearance of a cable hanging between these two points indicates that the connection has been made successfully. If no cable appears, or if an error message pops up, this may indicate that you are trying to make a connection between incompatible signals (signal types and compatibility are discussed later). If no error message appeared, you may have merely "missed" – try again.

**Cable colors** are assigned to a cable automatically on the basis of the type of signal they carry (signal types are discussed later). The assigned color can subsequently be changed as follows: select the cable by clicking on it, then right-click (CTRL + mouse button in Mac version) on the selected cable to open a pop-up menu from which you can select a new color.

**Cables can be moved** out of the way if they are blocking access to or visibility of a control or display field. Simply click and drag the cable upward or downward as necessary. Alternatively, you can select the cable via click and then adjust its "tension" via the **Tension** knob in the Control bar.

**To Delete a cable** click the two jacks which the cable connects in succession (i.e., use the same actions used to create the connection) – or select the cable and press the DELETE key.

**Be sure also to read the Signal Types section below for further information regarding the creation of connections.**

## Adjusting the Parameters

Because the Modular2 uses only a few controls, adjusting the parameters is quite straightforward. This section describes only these standard controls. Controls for modules that have their own control interfaces are described separately in their own module reference sections. The multi-segment envelope generators and the step sequencer are also described separately.

### Potentiometer

The Modular2 uses potentiometers to adjust many of the parameters. Potentiometers appear in different sizes, and in unipolar and bipolar versions.

A potentiometer's size generally indicates something about the nature of the parameter it controls. Large potentiometers are used to adjust static values that directly control a parameter. An example would be a filter's cutoff frequency.

Smaller potentiometers usually influence parameters indirectly. Modulation Depth is an example of this type of control parameter.

Whether a controller is unipolar or bipolar is indicated by the presence or absence of plus and minus signs under the control. A control without these signs

is unipolar; it allows only positive values. A control with plus and minus signs is bipolar, and can be adjusted to both positive and negative values. Examples of bipolar controllers are the Coarse and Fine Tuning controls on an oscillator.

All potentiometers - large or small, unipolar or bipolar - operate alike. Click and hold the (left in PC version) mouse button while the mouse cursor is over the control. Now, when you move the mouse cursor around the control in a circular motion, the control will follow. Clockwise rotation increases the value, and counter-clockwise rotation decreases it.

For fine adjustments (a higher control resolution) increase the distance of the mouse cursor from the center of the control. To set the value, release the mouse button.

After you release the mouse button, the control remains selected. This means you can continue to make fine adjustments to the value using the left and right arrow keys on the computer keyboard. The right arrow increases the value, and the left decreases it. And here's an important feature: doubleclick on the potentiometer to set it to its central, or neutral, position.

## Faders

Faders are 'sliding' controls. These are provided in both vertical and horizontal orientation. Vertical faders are used in envelope generators to control times and levels. Horizontal faders are used in Mix and Gain modules. These controls also adjust parameter values directly. To adjust a value, click with the (left = PC version) mouse button on the fader button and drag it in the appropriate direction.

With vertical faders, dragging the button up increases the value. With horizontal faders, dragging to the right increases the value. Decrease values by dragging downward or to the left.

For finer adjustments, move the mouse cursor off the fader button (while still holding the button down). The further away, the finer the resolution. To set the value, release the mouse button.

After you release the mouse button, the control remains selected. This means you can continue to make fine adjustments to the value using the left and right arrow keys on the computer keyboard. The right arrow increases the value, and the left decreases it. Again, doubleclick on the potentiometer to set it to its central, or neutral, position.

## Text Fields

Many parameters that use potentiometers or faders also let you enter values directly into an associated text field. To enter a value into a text field, simply select the field by clicking on it with the (left in PC version) mouse button. Now you can enter a value from the computer keyboard. Confirm the value by striking the <Enter> key.

You can move the text cursor in a text field using the left and right arrow keys. The BACKSPACE, DELETE and NUMLOCK keys delete the character behind or before the cursor respectively.

## Textfader

This control is a combination of a text field and a variable fader. Like a fader, click the field and hold the mouse button down while moving the pointer to change the value. The field cycles through the allowable values. Moving the pointer up increases the value, and moving it down decreases it.

## Buttons

These are the most basic of controls. Clicking on a button enables or disables its control option.

## Saving patches

This section covers the last, and perhaps most important, aspect of patch creation: saving the patch. If you don't save the patch, all your work configuring the connections and settings, and saving presets, will be lost.

Clicking the **Save** icon, located directly to the right of the Tension knob, opens a standard file save dialog. Select the desired folder and a descriptive (or at least distinctive) name which will help you remember which patch this is (remember, there's no limit to the number of Modular patches you can create and/or collect!), and then click OK or press ENTER.

Now you can load the Modular2, and its entire patch configuration, by dragging it into the Routing window.

# Module Groups – an Overview

The modules provided with the Modular are organized into groups according to function. An overview description of these functional groups is provided here, roughly in the order of typical signal flow from input to output.

The order in which the groups of modules is described in this manual is not based on an alphabetical sequence, but on a functional one. The first modules described are MIDI and sound source modules. Next come the processing modules. Finally, the output modules are detailed.

## MIDI

This group contains modules that process or directly respond to MIDI messages. The most important of these is the MVC (MIDI Voice Control) module, which forms the core of any Modular synth patch and controls oscillators, envelopes, etc. This group also includes the MIDI Clock module for generation of and/or synchronization to a MIDI clock stream, and "pure" MIDI processing modules such as KeySplit and KeyZone.

## Oscillators

These are the modules that produce signals – typically periodic, pitched waveforms. Almost all classic synthesizers are built around oscillators which produce a harmonic- or overtone-rich signal that lends itself well to subsequent processing (filtering, etc.). The Modular includes these "classic" virtual-analog oscillators as well as FM oscillators, various noise generators, and the Uknow oscillator (the latter is at the heart of the Pulsar UKNOW 007 synth). With the newest software version, the list has expanded to also encompass the Morphing Saw and Morphing Pulse oscillators and the highly intriguing Spectral oscillator, among others.

## Envelopes

An envelope generator produces a signal which varies over time in a predefined way. This signal begins or restarts its "course" in response to a trigger event – typically, but not always, a note event – and is used to modify tone color (through filters), loudness (through amplifiers), the pitch of an oscillator or various other sound attributes. Typical Modular envelopes offer 3-4 phases – however, the MultiSegment envelope allows for complex envelope shapes consisting of up to 128 segments! The "vintage" envelopes allow continuous adjustment of curve characteristics between linear and exponential, as well as offering independent modulation of individual envelope times.



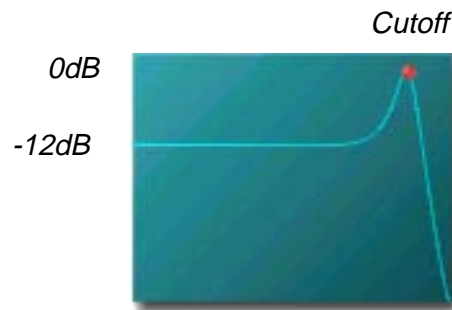
## Mix & Gain

This group includes a wide assortment of mixers, amplifiers and attenuators for combining signals or for boosting or cutting their levels, along with switches for selecting among two or more signals, linear and exponential VCAs intended for control by envelopes and the Poly Out modules for conversion of polyphonic signals into simple (mono) signals.



## Filters

Filters modify the tonal character of a sound by selectively boosting or cutting specific frequencies. These frequencies can be directly adjusted by simple controls, and can also be made to vary over time by means of modulation inputs which can be driven by envelope generators, LFOs etc., producing dynamic timbre modifications. The filters provided with the Modular include "classic" low-pass, high-pass and band-pass filters for subtractive synthesis as well as more unconventional types such as the Comb filter and the Vocal (formant) filter which produce very unique, distinctive sounds.



## LFOs

LFOs (Low Frequency Oscillators) are waveform generators used to produce periodic modulation at speeds generally ranging from many seconds per cycle to just barely above the audio threshold at 20-30 Hz. Typical modulation effects produced via LFOs include vibrato (oscillator pitch modulation) and tremolo (amplifier gain modulation).



The Modular includes a wide assortment of LFO modules featuring a variety of waveforms, both periodic and random. Many of these modules can be operated at speeds up to 400 Hz, and some even include frequency control inputs permitting the LFO speed to be controlled in the same way as the pitch of a normal oscillator.

Along with the LFO modules, a Sample & Hold module – often used in conjunction with an LFO – is also part of this group.



## Modifiers

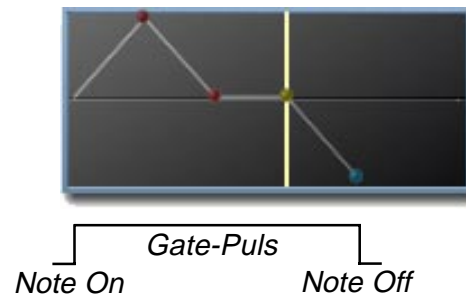
This group contains a variety of small modules which extend your sound control options. For example, the pitch modulator modules can be connected between an MVC module and oscillator modules to facilitate pitch modulation of one or several oscillators.

A few different types of Constant Value modules provide, as the name implies, adjustable constant output values which can be fed to control inputs (such as oscillator pitch or frequency cutoff) that normally require dynamic control input signals.



## Gate

A gate is a control signal usually derived from a keyboard and typically used to trigger envelopes and LFOs.



A gate signal essentially has only two values or states: on or off, corresponding to KeyDown and KeyUp. This group includes modules which process gate signals and in some cases convert them to other signal types, permitting these signals to be adapted to additional other uses besides control of envelope generators.

## SEQ (sequencing)

Along with the fundamental modulation/control sources you've already heard about, such as envelope generators and LFOs, the Modular also provides sequenced controllers, referred to as step sequencers. These modules are perhaps the most interesting of the controllers. They store sequences of control values which they output in a step-by-step fashion, typically under control of a Clock module. Furthermore, they are capable of storing large numbers of such sequences, or patterns, and of playing the patterns themselves in programmable order, and in addition, they feature their own Preset Lists for storage and management of sequences.





## Drum

This group contains oscillator modules designed especially for electronic percussion synthesis. These modules can be controlled by simple gate signals as well as by MIDI events matching specific criteria (note number, velocity, etc.), opening up broad possibilities for control of one or several of these modules by external sequencers or the Modular's own Drum Sequencer. On top of that, each of the drum oscillator modules includes its own preset list and comes "straight out of the box" with a healthy selection of factory presets already built in.

## Effects

The Modular offers a full assortment of effects modules which help you add the finishing touch to your sounds and patches. Most of these are monophonic effects intended to be used follow the Poly Out module, but polyphonic effects modules are also on hand.

Flanger, chorus, delay, dynamics processing – it's all there. But if that's still not enough, you can deploy the Mono Insert or Stereo Insert modules for integration of third-party effects.

## Signal types

As with classical analog modular synthesizers, cables are used in the Modular synth to carry signals between various modules. Whereas the voltages relayed from point to point in the analog modulators represented either audio or control signals, the Modular makes use of these signal types as well as various others (e.g., MIDI). An overview of Modular signal types along with their corresponding default cable colors is provided here.

### Audio signals

These signals are produced by oscillators, filters, mixers etc. as well as by LFOs and envelope generators. To obtain the best possible audio quality, these signals are always computed with full audio bandwidth (up to 96 kHz and 32-bit precision, depending upon the current Sample Rate Settings). This is true for LFOs and envelope generators as well as for the other module types, which is why LFO and envelope signals, although typically low-frequency signals, are also classified as audio signals in SCOPE/Pulsar.

#### Colors:

(Pure) audio signals – red and green

Modulation signals - blue

### MIDI Signals – Clocks/Triggers

The Modular, like other synthesizers, has a MIDI input and MIDI output. Certain Modular modules, such as the Drum Synthesizer, require a direct MIDI connection in order to function. Others, such as Clock and Trigger modules, transform MIDI signals into other types of signal. Apart from this, these are standard MIDI signals, such as are normally sent out by keyboards and sequencers.

#### Colors:

MIDI - yellow

Clock and Trig - yellow.

### Gates and Esync

Gate signals are produced primarily by the MVC (MIDI Voice Control) module and are used to trigger envelopes. The Esync signals which are in turn produced by many envelope modules are fed back to the MVC, which is thereby provided with the information it needs to optimally coordinate polyphonic voice management. Periodic gate signals can also be derived from MIDI-synchronized or free-running clock generator modules.

#### Colors:

Gate – yellow

Esync - orange

## Rules for making connections

Although the Modular essentially permits you total freedom with regard to cabling, this has its limits. Not every imaginable connection makes sense – just as in the "real" world, you would not (could not!) plug your electric guitar into a MIDI jack. Likewise you cannot make such connections in the Modular2. Following are some general guidelines (for full information regarding connections to specific modules, consult the Module Reference):

### Impossible connections:

- Two or more outputs connected to the same input
- Connections which would result in a direct feedback loop (unless the Xmod & Feedback Connector module is inserted into the circuit)
- Connections between basically incompatible signal types (e.g., Gate/Esync and MIDI)
- Audio and Freq signals cannot be connected to one another

### Allowable connections:

- An output can be connected to any number of compatible inputs
- Audio signals and modulation signals can be connected to one another

### Audio connections:

- Audio inputs are indicated by green jacks
- Audio outputs are indicated by red jacks

### Modulation connections:

- Modulation inputs and outputs are indicated by blue jacks

**This listing of rules and functionality gives only a rough description of possible patches and module usage. Detailed information for each module and its connections is found in its individual reference section.**

## Advanced Single/Poly Management

By „Single/Poly Management“ we mean the switching of individual modules that are operating polyphonically (according to the global **Voices** setting) to monophonic operation. This is a technique that, when used skillfully, significantly improves the performance of the Modular2.

Let's imagine you're building a new Modular patch. Of course, you want to play the patch polyphonically, so you include a PolyOut module. Next you load some oscillators, filters and envelope generators into the container, ahead of the PolyOut module. These load as polyphonic modules according to the number of voices selected.

The next module to add is an LFO to control effects such as vibrato, tremolo, and filter modulation. Here you have a choice: you can load the LFO either as a monophonic or a polyphonic module. As a polyphonic module it offers the potential of producing a fuller sound because it is implemented once for *each* voice, allowing

for more complex modulations. As a monophonic module, it is capable of only simple modulation, because it is loaded only once for *all* voices. However, the synthesizer now has more available voices because of the DSP overhead saved. You do not have to locate the LFO after the PolyOut module to use it monophonically - it can remain in the patch wherever you loaded it.

Basically this goes for all modules - a monophonic mixer after the PolyOut, or a mix of monophonic and polyphonic effects etc. anywhere in the patch.

Modulation effects excepted, as these are predominantly monophonic.

You will find that by adjusting the polyphony carefully, you can improve the quality and performance of your patches.

Here are a couple of examples to illustrate the idea:

- for a wah-wah effect, load the LFO and filter as monophonic modules, and locate them after the PolyOut module.

- when using a polyphonic EQ after an oscillator and before a filter, place the modules ahead of the PolyOut module.

Switching an already loaded module between monophonic and polyphonic operation is discussed in the next section.

Additional information on the poly/mono operation is found in the tutorials and module reference sections.

## Setting the Mode: Mono or Poly

For all modules, including those mentioned in the previous section, you can open an option menu by right-clicking (CNTRL + <click> on a Mac) anywhere on the module surface.

The first two options are:

- switch to polyphonic mode
- switch to single mode

Select the appropriate option to place the module in the desired mode.

As mentioned in the Advanced Poly/Mono Management section, modules load in polyphonic mode by default. To avoid incorrect connections, load them ahead of the PolyOut module in the patch.

A blue-colored module surface indicates that the module is in polyphonic mode. You can switch to mono mode at any time by selecting **switch to single mode** in the menu. You can also switch back at any time by selecting **switch to polyphonic mode**.

Most of the time switching between modes results in only small sonic differences. When the differences are slight, it means the configuration is correct and you can use mono mode to reserve DSP resources. If you switch to mono mode and the sound changes dramatically, or it sounds strange, you should switch the module back to polyphonic mode.

**Note: Some modules are monophonic only, and therefore do not have options for Single/Poly management. Load these modules after the PolyOut module in the patch. Also under polyphonic modules you will find certain modules for which polyphony does not apply, such as the MVC. Treat these as polyphonic modules.**

## Switching between Single and Polyphonic modes

After all of that theoretical discussion, you'll probably be pleased to find that the actual technique involved is quite simple. Modules which support polyphonic mode are always loaded in this mode by default (i.e., when you add them to a patch from one of the Module Folders). This mode is indicated visually by the blue color of the module. To switch such a module to monophonic or "single" mode, right-click on it ('Ctrl' + mouse button in Mac version) – a context menu will appear, containing the options **switch to polyphonic mode** and **switch to single mode**. Simply select the latter option. The module color will switch to green to indicate that the module is now monophonic.

Naturally, switching back to polyphonic mode is also done via this context menu. If you find that your patch suddenly sounds "strange" or no longer plays polyphonically after switching a module to single mode, this probably means that this particular module needs to be used in polyphonic mode in your patch – simply switch it back.

**Note that certain types of modules – especially effects modules – support *only* monophonic operation and therefore should not be used within the polyphonic portion of a patch. These modules do not offer the option of mode switching via a context menu.**