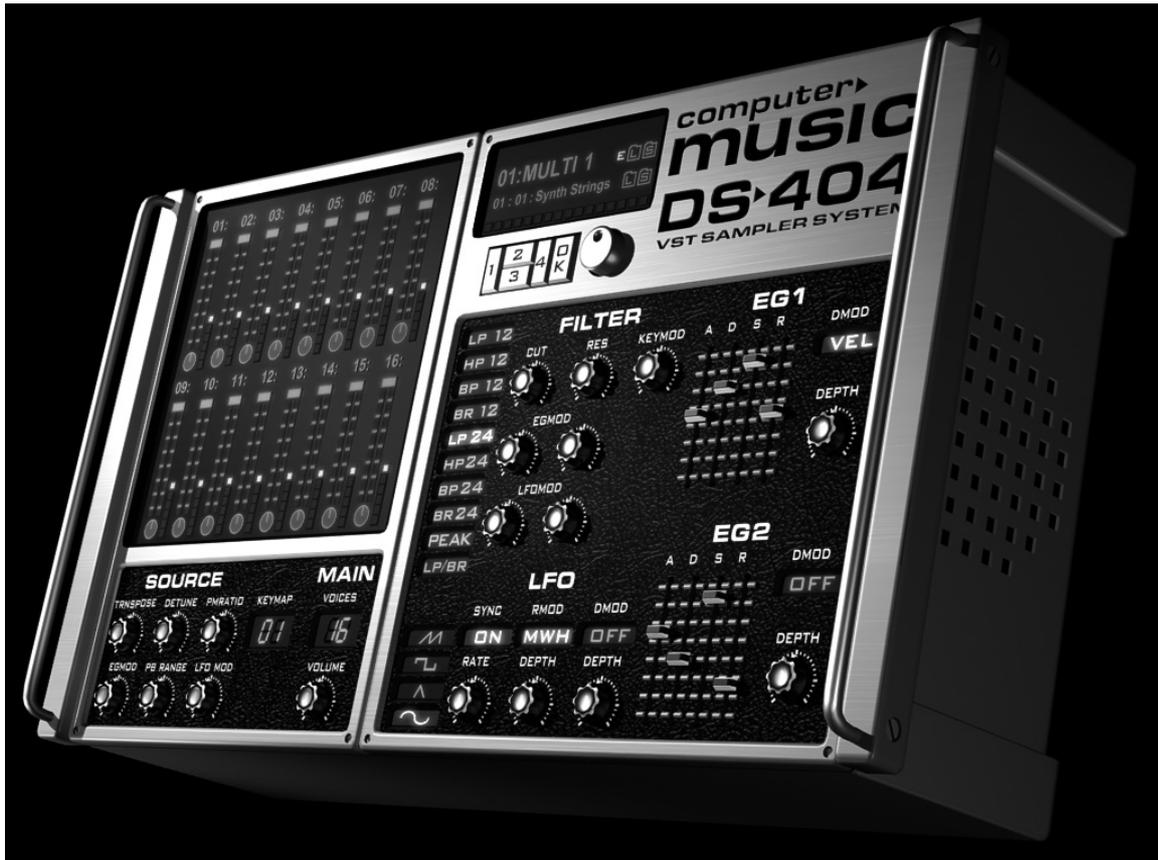




www.muon-software.com

DS404 USER MANUAL



1. Introduction

DS404 is a simple yet fully featured virtual instrument that gives you an introduction to the creative world of digital sampling.

DS404 gets its fantastic filters and effects from Muon Software Ltd's advanced 64-bit Analogue Modelling technology - you can read more at: www.muon-software.com/home/home.html

Also, don't forget that e-mail support for this product is available. Send a message to DS404@muon-software.com if you have any problems at all with the software.

2. Front Panel Control Basics



DS404 has a wide variety of controls for manipulating your samples, with thousands of possible variations.

The main Display Screen on the left is used for loading, editing, looping and mapping samples to your keyboard, and the group of numbered Function Buttons and the Alpha Dial are used to interact with the display screen. The number buttons are used to select menu options, and the Alpha Dial is used to edit parameter values. At all times the OK button is used to finish editing and go backwards one menu. There are some mouse options available also in certain menus – see the sections later on in this manual.

The circular knob controls in the Synthesis Section are used to change parameters that have a continuously adjustable range, whereas the buttons and switches are used to select a choice from a limited set of options or activate some feature. For example, the Filter Selector control may only be set to one of the available choices simply by clicking on the appropriate button. Numeric controls like the Keymap and Voices selectors are operated by first clicking on the control and then dragging up to increase the value or down to decrease the value. These kind of controls are also used in the Patch Window in the top right of the editor.

The knobs are not operated in the common VST plug-in "circle" mode - we have implemented the more convenient "vertical" mode that many people tell us they prefer. In vertical mode the knob is clicked on with the mouse and the value only changes when the mouse is moved up and down. To make very fine adjustments, hold down the SHIFT key when moving the mouse. The same applies to the sliders on the right in the Envelope section.

At all times, a popup display will appear when you are adjusting a control, enabling you to see the control's exact value. Whilst you are learning your way around DS404, or if you wish to make fine adjustments, this is a very useful feature.

If you wish to set any control back to its default value quickly, then just press and hold down CTRL on your keyboard when you click.

3. Architectural Basics

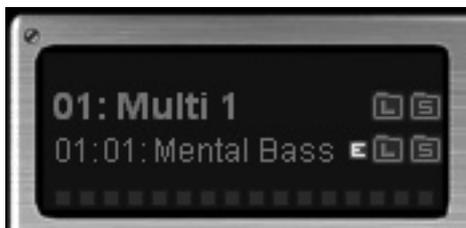
DS404 is a multi-timbral sampler. This means that it is possible to play back different sound patches on different MIDI channels. In fact, you can use one instance of DS404 in your sequencer to play back up to 16 simultaneous separate channels with different patches. Each channel has its own separate "pool" of up to 32 voices, so if your processor can handle it DS404 can playback up to 512 simultaneous voices on 16 different timbres!

To make sounds, load samples into DS404. Then, create a Keymap which arranges your samples into Zones by note and velocity so DS404 knows which sample to play back depending on what key was played and how hard. The output of the Keymap is fed into the synthesis section in the same way a synthesiser like CM101 has oscillators that act as sound sources to be processed by the filter and amplifier. There are 16 possible Keymaps in DS404, and you can load as many samples as you have spare RAM for. Mac users may need to increase the memory settings for their sequencer application if they want to use large patches though, as memory is not dynamically allocated under MacOS 9.

DS404 allows you to store up to 16 Synth Patches. A Synth Patch consists of a Keymap as its source, followed by settings for filter, amplifier, envelopes and LFO. The main screen of DS404 allows you to edit one patch at a time. Several Synth Patches can share the same Keymap as a source. In this way you could create a single Keymap of a multi-sampled instrument, for example, and then use the synthesis features to get up to 16 different tones out of the same set of samples.

Since DS404 is multi-timbral, you can load your Synth Patches into any of the 16 available Timbres. Each Timbre is effectively a separate mini-synthesiser that listens and responds to just one particular MIDI channel, which you can set in the Mixer screen. There are even separate outputs so you can process timbres in your sequencer's mixer with separate effects. DS404 allows you to store these multi-timbral setups, including MIDI channel, patch, volume and pan settings for each timbre in Multi Patches. You can store up to 16 Multi Patches in a single bank.

4. The Patch Window



You may be familiar with using the Program controls provided in your host sequencer software for changing the patches in your VST instruments. Since the patch structure in DS404 is so complex you won't be needing these – instead, we have the Patch Window.

This small display screen at the top of DS404 shows you at a glance (from top to bottom) the currently selected Multi Patch and patch name, the currently edited timbre and the currently selected Synth Patch and patch name. Patches can be changed by clicking on the number indicator, and dragging vertically with your mouse. The currently selected Timbre can be changed in this way too. You can change the name of a given Multi or Synth Patch at any time by clicking where the name is displayed and typing your desired text.

The group of four folder icons on the right of the Patch Window are used for loading and saving Banks (top row) and Synth Patches (bottom row). Your host sequencer may provide buttons to load and save FXP (Cubase-format patch) or FXB (Cubase-format bank) files. You can still use these with DS404, but we recommend that you use the four buttons shown instead so that you can load and save special cross-platform 404 files (as supplied on the CM CD-ROM, for example). 404 files contain all the original samples too so you can easily swap them with other musicians via the Internet, even if they don't have the same sequencer as you.

When saving a 404 Bank, the plug-in will store in the file all loaded samples, all Keymaps, all Synth Patches and all Multi Patches. This is a complete dump of the entire memory. If you choose to load a 404 Bank into DS404 this will cause any data you have loaded to be erased first.

When saving a 404 Patch however, only the patch shown in the lower line of the Patch Window is saved. The file will also contain the Keymap used as the source for that patch plus all the samples used in the Keymap. If you choose to load a 404 patch into DS404, firstly all the samples will be loaded and added to your sample list (even if they already exist), and a new Keymap will be created. Then, the synth settings in the current patch will be over-written with the settings from the file. Don't worry though if you don't remember whether or not you saved a 404 file as a Bank or a Patch – the plug-in writes a special marker into the file that it reads back while loading. Regardless of which icon you click the correct action will be taken for the file specified.

Using these facilities, you can load individual sounds into DS404 and create your own banks for your songs. If you save your sounds as patches you will be able to easily swap them with other musicians over the Internet. If you make lots of patches from a single Keymap, or use the Mixer to create layers of patches you should save them as a Bank.

When you save your song in your host sequencer, DS404 attempts to save the full bank into the song file. If your host sequencer is not capable of processing this data then it will be lost. When you reload your song, DS404 will start up in its default state. You should read the DS404 Release Notes.pdf document to see if your host program is compatible with this feature.

The other important part of the Patch Window is the small "E" icon that appears whenever a patch has been edited. The "E" can be clicked on to reveal a menu of options whenever it is lit:



You must remember to save any changes you have made to the current patch before selecting another one. If you don't save your changes, they will be lost.

However, if you tweak a patch using MIDI CC controllers, DS404 doesn't assume that the patch has been edited, even though the knobs may move on screen. The same applies to automation messages received from hosts such as Cubase. In this way, if you play a song with automation, you can always reset DS404 at the beginning of a song to a particular patch simply by writing a Program Change message into your MIDI part. This is just like a hardware synth, and we call it the Advanced Patch Management System. You can also undo any changes you make from the edit menu too.

The final option in the Edit Menu changes the Memory Protection Mode. The default (Memory Protection On) is as described in the last section – changes do not take place until stored. When Memory Protection is Off, changes will affect the patch immediately and you do not need to save them. You should select the mode that most suits your way of working, though if you're using a sequencer we do recommend that you leave it on the default setting.

On the bottom line of the Patch Window you will see 16 activity lights that show when "Note On" and "Note Off" messages are received at DS404's MIDI input.

5. The Display Screen



The display screen of DS404 is where the main sample editing duties in DS404 are carried out. Upon loading, the plug-in will show the main menu as seen above. In this menu there are four options (Sample List, Sample Edit, Keymap Edit, and Mixer).

To select an option, click on the corresponding numbered button in the Function Key section just below the Patch Window:



To return from a menu to the Main Menu, click on the OK button in the same section. Some menus have sub-pages, and you will have to click on OK more than once to return to the Main Menu.

6. The Sample List Menu (F1 from Main Menu)

The Sample List is the menu for loading, deleting and selecting samples in DS404. It can be accessed at any time by clicking F1 whilst in the Main Menu.



The Sample List is divided into two areas. The main area is a list of samples loaded, with the currently selected sample highlighted in bright yellow. You can change the currently selected sample by clicking in the list or using the Alpha Dial. The screen will scroll when using the Alpha Dial if you have more than 12 samples loaded.

At the bottom of the screen, some details about the currently selected sample are shown in bold blue.

A new sample can be loaded into DS404 by clicking F1. A dialog box appropriate to your platform will be displayed that allows you to browse the various folders in your computer's File System. Do not attempt to close the DS404 window whilst this dialog is displayed!

Any 16-bit uncompressed PCM sample can be loaded into DS404, provided that it adheres to the Microsoft WAV or Apple AIFF file formats. If the sample contains Root Note and Loop Point information DS404 will automatically recognise and use it. If you attempt to load a sample that DS404 does not recognise it will be ignored.

Stereo samples can be loaded into DS404, but they are automatically split into two separate waveforms in memory, one for the left channel and one for the right channel. DS404 automatically maintains a "stereo link" between the two samples no matter which slots they get loaded into so that they are played back correctly. Note that DS404 will need to use two separate voices to play back a stereo sample and this will consume twice as much of your CPU power as a mono sample. Users with slow computers may wish to consider converting their samples to mono before loading.

In DS404 samples of any sample rate may be used. The plug-in will automatically calculate the correct playback rate to play the sample back properly at its Root Note (more about Root Notes later). Samples must, however, be recorded using 16-bit depth.

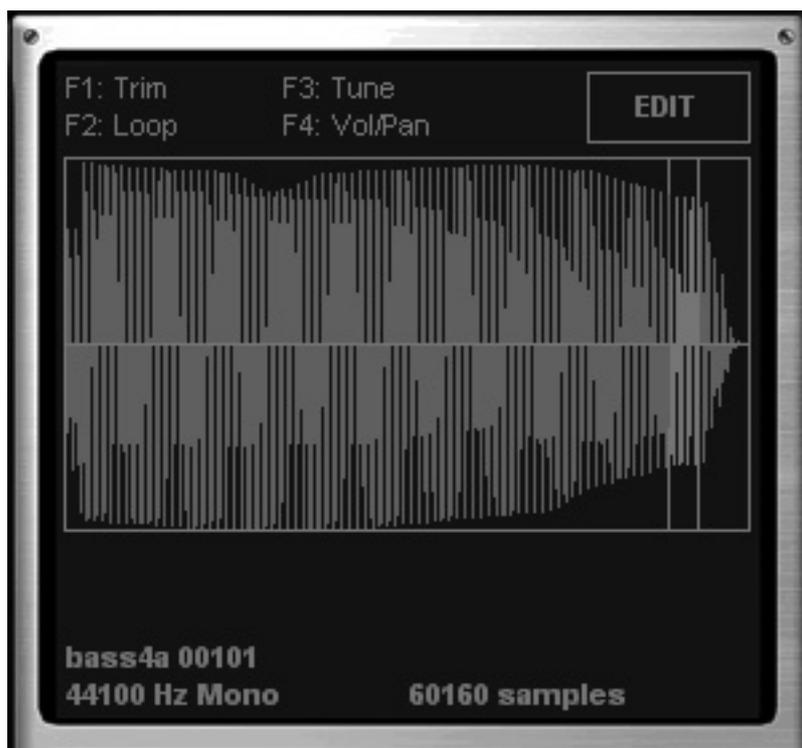
To clear a sample you have loaded, click the F4 button. If you clear one channel of a stereo sample the other channel will automatically be deleted too. Any associated Zones for a sample in the Keymap Editor will also be deleted when you delete a sample.

The remaining two options (Edit and Map) are short cuts to the Sample Editor and Keymap Editor screens. You can select a sample in the Sample List screen and then click F2 to edit it or F3 to map a Zone in the current Keymap for the selected sample.

7. The Sample Menu (F2 from Main Menu/Sample List)

As its name suggests, this screen is for editing the various playback properties of a loaded sample.

The screen is divided into three main areas, the waveform display, the parameter area and the sample information area.



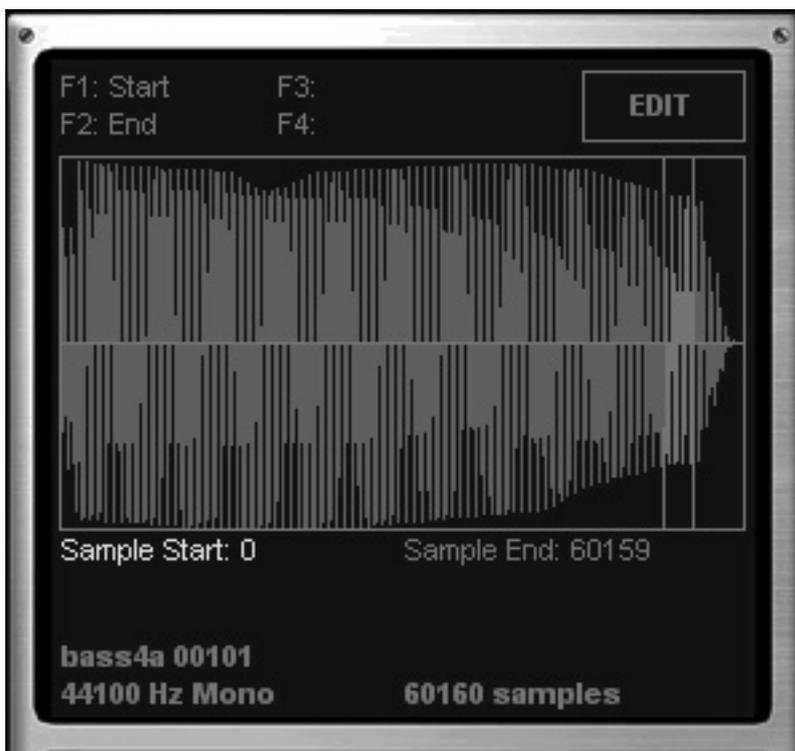
The main focus of the display is the large waveform window in the middle. Here you will see your selected sample and any loop points. Remember, if you create loop points in your samples in your wave-editing package, DS404 will be able to read them automatically. The looped portion of a sample is shown in a brighter blue than the rest of the wave.

To zoom in on any part of the wave (up to 128x magnification), simply left-click anywhere in the wave window. Once maximum zoom has been reached no further magnification is possible. You can scroll the display simply by left-clicking and dragging horizontally. To zoom out, PC users should right-click and Mac users should alt-Click. To reset the viewport, PC users need to CTRL-click whereas Mac users should option-click.

Clicking on the function buttons activates a sub-menu for a particular group of parameters. The groups are:

- F1: Trim (sample start and end points)
- F2: Loop (loop start and end points, loop mode)
- F3: Tune (Root Note, Fine Tune and Pitch Tracking)
- F4: Volume and Pan

To return to the main Sample Edit Menu, click on OK from any of the Sub Menus.



The Trim menu (F1) is shown above. The menu at the top of the screen has changed to become a parameter selector. The parameters available in the sub-menu are shown in the parameter area at the bottom of the display with the currently selected parameter highlighted in yellow. You can now use the Alpha Dial to change the value of that parameter. Note that changing sample properties in this way might not have an immediate effect if you are playing a sound – you may need to wait until you play another note before your changes are heard. This doesn't apply to the Synthesis parameters covered in later sections.

Explanations of the various sub menus and parameters follows:

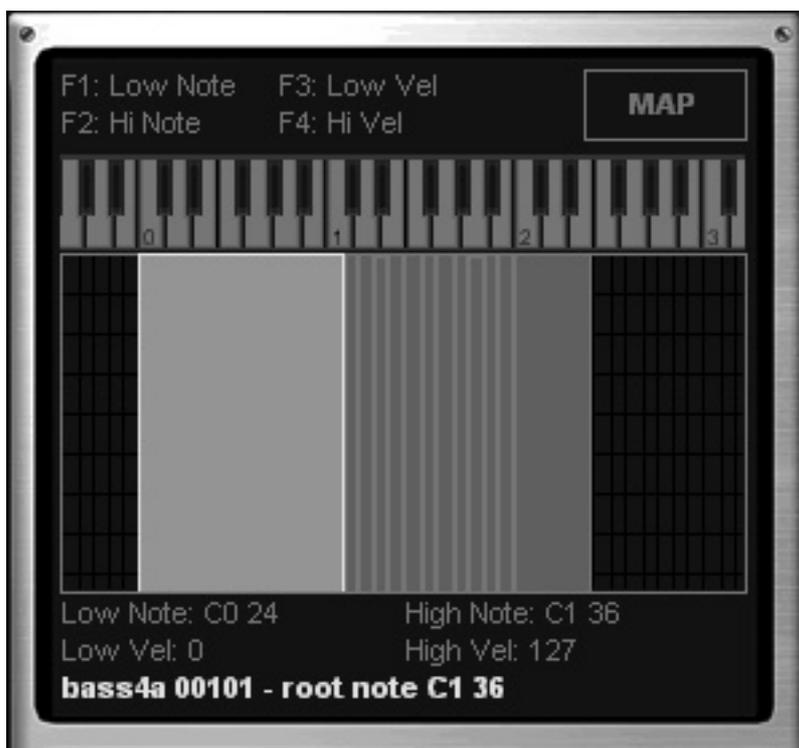
Menu	Parameter Name	Description
F1: Trim	F1: Sample Start	Sets the point in the sample that playback will begin from. Cannot be more than Loop Start.
F1: Trim	F2: Sample End	Sets the point at which playback will stop. Cannot be less than Loop End.
F2: Loop	F1: Loop Start	In looped playback modes, the point in the sample that will be returned to when playback reaches Loop End.
F2: Loop	F2: Loop End	In looped playback modes, the point in the sample where playback will return to Loop Start.
F2: Loop	F3: Mode	Sets the looping behaviour for this Sample (see below).
F3: Tune	F1: Root Note	Sets the point on the keyboard where the sample will be played back at the rate it was recorded. If you've sampled a G3 on your keyboard, set this to G3, for example.
F3: Tune	F2: Fine Tune	+/- 100 cent adjustment.
F3: Tune	F3: Key Track	If your sample doesn't need to track the keyboard pitch (for a drum sound maybe) set this to yes. This switches off DS404's Linear Resampling engine for this sample.
F4: Vol/Pan	F1: Volume	The volume level at which this sample is played back, as a % of the recorded volume.
F4: Vol/Pan	F2: Pan	Position in the stereo field of this sample. Note this can be set independently for the left and right channel of a stereo sample, unlike the other parameters above, which are automatically linked.

The various Loop Modes available in DS404 require further explanation. The loop mode can be set in the Loop Submenu as shown above, and the various choices are as follows:

Loop Mode	Description
One Shot/Cut	Plays the sample all the way just once until the end of the sample is reached or the key is released. Loop points and envelope Release settings are ignored. Attack, Decay and Sustain are still processed though. There is a ~10ms crossfade on key-up to prevent clicks.
One Shot/End	As above, but plays the sample through until you end regardless of if you release the key or not. The Envelope Release setting is still ignored but there is no automatic crossfade. You can use the Decay and Sustain settings to fade the sample out if necessary.
Loop/Cut	Plays the sample all the way until the Loop End point is reached. Playback will then loop between the Loop Start and End points until the key is released. The envelope Release settings are ignored. Attack, Decay and Sustain are still processed though. There is a ~10ms crossfade on key-up to prevent clicks.
Loop/End	As above, but plays the sample right through to the end after key-up. There is no automatic crossfade but you can use the Decay and Sustain settings to fade the sample out if necessary.
Loop/Cont	As above, but the loop is played continuously even after Key Up. The envelope Release setting is used to gradually fade the sample out.

8. The Keymap Editor (F3 from Main Menu/Sample List)

You will notice that if you load a sample and then play on your MIDI keyboard, you won't hear anything. DS404 needs to know how the samples you have loaded correspond to the notes on your keyboard. This is done in the Keymap Editor.



A Keymap is a collection of Zones, each Zone contains a single mono sample or pair of channels from a stereo sample. DS404 can store up to 16 Keymaps, and these are used as the Source for the synthesis section like the Oscillator in a synthesiser. You can create up to 16 different patches based on a single Keymap, but more about that later in this manual.

The Keymap display always shows the Keymap selected in the patch being edited. You can change this by changing the Keymap number spinner below the display. Note that this will also edit the current patch in the Synthesis Section.

In the editor you will see a piano-style keyboard at the top. You can click and drag this keyboard to pan the display left and right. The keyboard covers the entire 128 MIDI note range from C-2 on the far left to G8 on the far right. You can CTRL-click (Mac users, Option-click) to return to the middle at any time.

Below the piano keyboard is a grid. The vertical lines correspond to the notes on the keyboard above, and the horizontal lines mark off different velocities. The highest velocity (127) is at the top of the grid, and the lowest velocity is at the bottom.

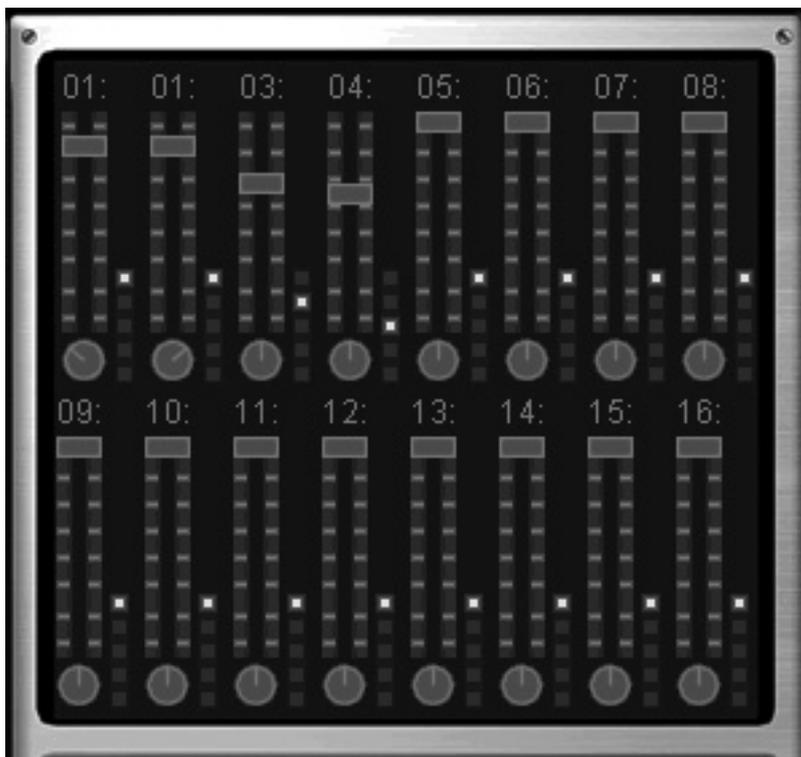
To make DS404 play a particular sample when a particular MIDI note is played, create a vertical zone by clicking and dragging the mouse in the grid under your chosen note on the keyboard. Zones cannot overlap, and DS404 will automatically adjust any Zones you create to prevent this from happening. You can right-click (Mac users, Alt-click) in the Zone after you have drawn it to hear what the selected sample will sound like when played. You can make as many zones as you like for a single sample in as many of the 16 possible Keymaps as you wish.

The vertical span of the zone determines at which velocities the sample will play. If you adjust a zone with the mouse so that it stretches from the bottom of the grid to the top, the sample will be played regardless of the MIDI velocity transmitted. The horizontal span of the zone determines the pitch range, so if you widen a Zone to span the range from C-2 to G8 the sample will be played regardless of the MIDI note received. You can pick up Zones and move them into new positions on the grid by clicking in the middle of the Zone, holding the button down and dragging with your mouse. Zones can be resized by clicking on one of the edges and dragging with the mouse too. You will see the dimensions of the zone change in the parameter area as you do this.

Zones are always created for the currently selected sample shown at the bottom of the display. You can click on a zone and edit the sample it is linked to by clicking F1 (Set Sample) in the main Keymap Editor menu. You can also delete any zones you create accidentally by clicking on them and selecting F2 (Delete Zone) from the main Keymap Editor menu. The third and final option in this Menu, F3 (Fine Edit), allows you to use the Alpha Dial to make small adjustments to the dimensions of the selected zone. Hold down the Shift key whilst moving the Alpha Dial for extra-fine adjustments.

9. The Mixer (F4 from Main Menu)

The final menu available in the display screen is a mixer that you can use to set the MIDI channel, volume, pan, and output channel for each of DS404's 16 timbres.



The MIDI channel for each timbre is shown in numeric form at the top of each mixer fader. You can change the channel selected for a timbre by clicking on the number and dragging vertically. If you set multiple timbres to the same MIDI channel this will cause them to play simultaneously when you send MIDI notes to that channel – this means you can stack up patches to make huge, complex sounds if your CPU is up to the task.

The vertical array of lights to the right of each fader is the output selector. DS404, like a hardware synthesiser, has a number of separate outputs that, in suitable host software, appear as separate channels in your main mixer. DS404 has a main stereo output (the first light, and the default) plus four separate mono outputs. If you route a sound to a mono output the Pan control will have no effect.

Note that some host sequencers do not support multiple output for VST instruments. You should check your sequencer's manual or read the DS404 Release Notes.pdf document for more information.

10. The Synthesis Sections

As mentioned earlier in this manual, DS404 features extensive features for livening up your raw Keymapped samples.

The output of the Keymap, when played over MIDI, is piped into the Synthesis Section. Each of the 16 Timbres in DS404 has its own separate Synthesis Section for maximum flexibility.

There are five areas in the Synthesis Section, these are explored below.

11. Source/Main Section



This is where sound enters and leaves DS404's 64-bit virtual synthesis circuitry.

On the left are controls relating to the pitch of the sample being played. The Transpose control has a range of +/- 12 semitones and affects the sound after the sample has been selected from the Keymap. If you wish to transpose the MIDI data before the sample is selected from the Keymap you should use the transpose features of your sequencer or master keyboard instead. Detune adjusts the pitch in increments of 1 cent to +/- 100 cents.

The remaining controls in the source section allow you to control how the pitch of the played sample changes over time.

EGMOD is short for Envelope Generator Modulation, and this control determines how much of the signal from EG2 is sent to the pitch control. Setting the control to the right will mean that the playback pitch will rise when the envelope output is rising, and fall when the envelope output is falling. The higher you set the control, the more extreme the pitch bend.

LFOMOD is short for Low Frequency Oscillator Modulation, and this control determines how much of the signal from the LFO is also sent to the pitch control. Note that all the modulation signals (transpose, detune, LFO and EG2) are all added together (summed) before affecting the actual pitch value.

PMRATIO is short for Pitch Modulation Ratio. When set to 1 (the default), the maximum pitch modulation via EG2 or the LFO is +/- one octave. When set to 5 (maximum) the pitch modulation possible is +/- five octaves. Similarly when the control is set to 0.25 (minimum) the maximum modulation possible is +/- one quarter of an octave. If you want a subtle vibrato to simulate human expression, the lowest setting for this control will give you a very fine control over the amount of pitch modulation. If you want crazy pitch sweeps or dives go for the maximum ratio!

PBRANGE is the maximum pitch bend possible with the pitch bend wheel. Note that in Fruity Loops you should set this control to the maximum (12) and set the actual pitchbend range in cents from within Fruity Loops itself. Note also that if you layer multiple patches on the same MIDI channel that do not have the same PBRANGE the patch will no doubt go out of tune if you use your keyboard's pitch wheel. You should make sure any layered patches all have the same PBRANGE.

The last control in the Source area is the Keymap selector. This determines which set of samples (Keymap) forms the input to the Synthesis Section for this patch. To alter the value shown, just click on the control and drag vertically. If the Display Screen is set to the Keymap Editor whilst you change the selector the screen will change to show the new Keymap.

On the right hand side of this section are the Main controls. From top to bottom these are the Voice Selector and the Master Volume. The Voice Selector is effective, like all other synth parameters, only for the currently selected timbre. That is to say that each of the 16 Timbre engines in DS404 has a separate pool of up to 32 voices. The maximum theoretical polyphony is actually a staggering 512 voices if your CPU can take the strain.

Users with modest CPUs will find that large stereo patches with lots of modulation and filtering use up a lot of processing power. Cutting samples back to mono, and reducing the number of voices allocated to the timbre can help reduce the CPU load. Switching off the filter will help too.

12. Filter Section



The filters in DS404 can be used to sculpt the tone of your raw samples in subtle or crazy ways!

On the left is large filter type selector. DS404 has 10 different kinds of filter available:

Filter	Description
LP12	12db/Octave Lowpass filter – reduces the treble
HP12	12db/Octave Highpass filter – reduces the bass
BP12	12db/Octave Bandpass filter – reduces the bass and treble together
BR12	12db/Octave Band reject filter – creates a notch in the spectrum like a phaser
LP24	As LP12 but with a stronger effect
HP24	As HP12 but with a stronger effect
BP24	As BP12 but with a stronger effect
BR24	As BR24 but with a stronger effect
LP/BR	A hybrid of Band Reject and Lowpass. Great for Phasey-synth sweeps
PEAK	A narrow peaking filter that emphasises only a small range of the spectrum

The action of the CUT (Cutoff) control is to set the point in the audio spectrum at which the effect of the filter begins. For a lowpass filter this means the frequency after which the treble is reduced. In a highpass filter this would be the frequency at which the bass is back to normal (the opposite of a lowpass filter!). For bandpass and bandreject the cutoff is the centre of their area of effect.

The RES (Resonance) control, in the LP12/24, HP12/24 and LP/BR filters, causes the output of the filter to feedback into the input. This creates a peak in the spectrum at the cutoff point. Many classic “squelchy” analogue synth sounds use a resonant lowpass filter. With the BP12/24 and BR12/24 the resonance control widens or focuses the filter’s effect around the centre frequency.

The KEYMOD control determines how much of the keyboard pitch signal is sent to the Filter Cutoff. If the control is set to minimum, the cutoff will not change as you play up and down the keyboard. With certain filter settings this could cause your sound to become muffled. When the control is at maximum (and the CUT control is at minimum) the filter cutoff will precisely track the note frequency played. If you want to get an even tone from a filtered sound across a wide range of notes you will need to use the KEYMOD control. Note that negative keytracking is also possible. Like analogue filters DS404's filters will start to ring aggressively at high levels of resonance – with KEYMOD you can use this ringing as an extra, tuned harmonic in your sound.

The remaining four controls in the filter section are divided into two rows, labelled EGMOD and LFOMOD. You should note that the two knobs on each row line up with the knobs above – this is because the left hand knobs relate to the cutoff frequency, and the right hand knobs to the resonance.

The left hand EGMOD knob determines how much of the signal from EG2 is added to the Cutoff frequency of the filter set by the CUT control. You can use this to vary how the filter opens, and closes over time for exciting dynamic effects. The right hand EGMOD determines how much of the EG2 signal is added to the Resonance. With the BR and BP filter types this can add an extra dimension to a filter sweep.

The left hand LFOMOD knob feeds the Low Frequency Oscillator signal into the filter cutoff in a similar manner to the left hand EGMOD knob. The right hand LFOMOD control does the same for the Resonance. In conjunction with the LFO section these two controls can be used to set up repeating filter sweeps and patterns that can be sync'd to your song's tempo (if your host sequencer supports this feature).

13. LFO Section



LFO is short for Low Frequency Oscillator. You may be familiar with synthesiser oscillators that produce an audible tone – LFO's are identical but operate at a much lower frequency, often below the hearing threshold. The output of the LFO is not connected to the audio circuitry however. Instead, the rising and falling output is used to make the value of another parameter (for example filter cutoff) rise and fall automatically.

DS404 contains a very well specified LFO. On the left is the Waveform selector that allows you to choose the waveform that the LFO will output. The shape of each waveform is shown on the buttons themselves and are as follows:

Waveform	Description
Sawtooth (a.k.a. Ramp)	A slow rise followed by a rapid drop. Interesting to use on synth sounds modulating pitch or filter for pulsating, rhythmic effects
Square (a.k.a. Pulse)	Rapid rise, followed by a rapid drop, not so good on filters but fun on pitch for siren effects.
Triangle	Slow rise, slow fall with sharp transitions at the maxima. Excellent on pitch and filter cutoff.
Sine	As above, but with smoother transitions at the maxima. Good for natural sounding vibrato.

To the left of the Waveform Selector is the main LFO control, RATE. This determines the actual frequency of the LFO output in Hz. The SYNC button above the RATE knob switches the LFO into tempo-sync'd mode. If your host sequencer supports the transmission of tempo information to VST plug-ins, DS404 will read your song tempo and lock the LFO to it. If you change the tempo in your song, DS404 will also stay locked. The rate control can be used to set the LFO speed as a multiple of the song tempo. If your sequencer doesn't support tempo information you will see a pop-up with "N/A" appearing whilst adjusting the rate control in tempo-sync'd mode.

The final group of four controls in this section allow you to use MIDI performance controls such as Velocity or Aftertouch to change the LFO rate and depth in real time.

RMOD stands for Rate Modulation. The upper button selects the Rate Modulation Source, and the lower knob sets the amount of effect that parameter has on the LFO rate. Rate modulation can be done even when tempo-sync'd though it will mean that you will go out of sync!

An example of how to use this might be to control the filter modulation in an vibrato Organ-type patch. The RMOD source could be set to the Modulation Wheel, and the initial rate set to quite slow. Then, as you play you can speed up and slow down the vibrator effect with the wheel. DMOD, or Depth Modulation, can be used in the same way. With the source set to Aftertouch, you could fade vibrato into a patch at the end of sustained notes like a guitarist if the LFO is modulating the source pitch. It could also be used to fade in filter sweeps into a synth patch.

14. Envelope Section



DS404 has two envelope generators in the Synthesis Section. EG1 is always routed to the output amplifier and cannot be selected as a source for modulation elsewhere. EG2's output can be used to modulate pitch (as we showed in Section 11) and the filter cutoff or resonance (as shown in Section 12).

Each envelope generator has four stages:

Stage	Description
Attack	Time taken for the EG output to reach maximum output
Decay	Time take to fall from maximum to the sustain level
Sustain	% of maximum output to hold at until key release
Release	Time taken to die away to zero output after key release

Next to the sliders that control the A/D/S/R parameters are the modulation controls. These are the same as in the LFO section, with a source selector button above and a depth control underneath. With these controls, the maximum output level of the envelope can be modulated using MIDI control.

One of the most common uses for this feature would be to have sounds get louder when the keyboard is played harder, and softer when the keys are played more gently. To do this, set the EG1 DMOD (Depth Modulation) Source to VEL (velocity), and increase the Depth control underneath as you play. You will soon find a level that gives you the right dynamics for your patch.

If you've loaded a patch from another user, their playing style and master keyboard may be different to yours. If you find the patch is too dynamic or not dynamic enough adjust the DMOD Depth Control to suit and re-save the patch.

EG2 is used most often to control how the filter opens and closes over time. You can improve the realism of a lot of sampler patches by setting careful filter envelopes, and modulating EG2 with velocity. For example, the tone of a lot of instruments gets brighter as you play them harder – trumpets, pianos and guitars all respond in this way for example. To simulate this (without resorting to having hundreds of velocity-mapped samples) you can set an appropriate filter envelope on EG2, and use the Velocity Modulation to open the filter more for harder notes than for soft ones. Again, you can use the depth control to adjust the dynamics to match your master keyboard and playing style.

15. MIDI Control

DS404 can be controlled via MIDI Continuous Controller messages if you have an external controller, or can edit them in your host sequencer.

MIDI CC messages are numbered from 1-127. DS404 can only respond to CC's 75-109, and each is reserved for a particular function. The MIDI Channel that the message is transmitted on determines the Timbres that receive it. Messages sent on channel 5, for example, only affect Timbres set to MIDI channel 5.

These parameters are listed below. Please note that DS404's on-screen controls cannot SEND CC messages, they can only receive them.

CC	Parameter
75	Source Keymap
76	Source Transpose
77	Source Detune
78	Source Pitch Modulation Ratio
79	Source Pitch EG Modulation Depth
80	Source Pitch LFO Modulation Depth
81	Filter Type
82	Filter Cutoff
83	Filter Resonance
84	Filter Cutoff EG Modulation Depth
85	Filter Cutoff LFO Modulation Depth
86	Filter Cutoff Key Track Depth
87	Filter Resonance EG Modulation Depth
88	Filter Resonance LFO Modulation Depth
89	EG1 Attack Time
90	EG1 Decay Time
91	EG1 Sustain Level
92	EG1 Release Level
93	EG1 Depth Modulation Source
94	EG1 Depth Modulation Depth
95	EG2 Attack Time
96	EG2 Decay Time
97	EG2 Sustain Level
98	EG2 Release Time
99	EG2 Depth Modulation Source
100	EG2 Depth Modulation Depth
101	LFO Waveform
102	LFO Sync
103	LFO Rate
104	LFO Rate Modulation Source
105	LFO Rate Modulation Depth
106	LFO Depth Modulation Source
107	LFO Depth Modulation Depth
108	Max Voices
109	Pitch Bend Range

11. Getting Help

It's no doubt that DS404 is a powerful sampler, and it is designed to make creating new sounds quick and easy and quick. For some, though all that power can be daunting -just mail us at DS404@muon-software.com and we'll do our best to answer your questions quickly and courteously. Best of luck!!

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