



soundart

**USER'S MANUAL**

# **FX designer** by **SpinAudio**

**Chameleon** Delay Based Effects Processor

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# Introduction

FX Designer is a professional audio multi-effects processor application designed for Soundart's Chameleon multipurpose digital audio platform. The sound is processed using modern digital audio processing algorithms taking benefit from the powerful DSP core running inside the Chameleon.

FX Designer is a delay-based digital audio effects processor with a flexible signal processing design that allows to produce such audio effects as chorus, flanger, phaser, spatial effects, various reverbs and any combination of above.

But FX Designer is not just for creation of well-known effects - it's designed to create new, unheard before effects. Take an example: With it it's possible to make a reverb that would sound like a room with sizes changing over time!

To create all that variety of the effects FX Designer offers 6 modulated delay lines with comb/allpass mode switch, 6 assignable LFOs and flexible tap signal router that allows to interconnect taps into a network.

## 1.1 Main features

The main features of the FX Designer are:

- Six modulated stereo delay lines with Comb/Allpass filter type switch
- Six assignable stereo LFOs with five waveforms and stereo shift controls
- Flexible tap signal routing
- Low-Pass/High-Pass filter on each tap
- High flexibility to edit effects parameters using the Chameleon function keys and a logic menu structure
- Comprehensible MIDI implementation allowing to modify parameters using external MIDI controllers, record parameter changes using a sequencer, and preset dumps and requests
- Assignable Chameleon front panel realtime controllers to virtually any sound parameter

## 1.2 Getting started

This section explains how to get started with Chromasonic for the first time.

### 1.2.1 Making the connections

In order to start using FX Designer, you need first to have the Chameleon unit properly connected. Make sure that you have the Chameleon power supply (9V DC/1.2A) plugged to the device and connected to the AC mains. Figure 1-1 shows the Chameleon rear panel connections. Before connecting the Chameleon to other units in the system, ensure that the power to all units is off. Connect the Chameleon audio inputs to your sound source outputs (amplifier, mixer, etc.). Now connect audio cables from the left and right outputs to a suitable amplifier or mixing desk stereo inputs (or use your headphones using the front panel jack). Once all connections are made, turn on the power of the Chameleon and all the other devices in your system.

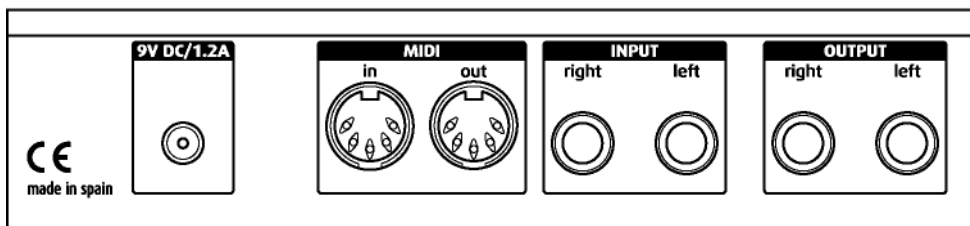


Figure 1-1

Rear panel of the Chameleon.

### 1.2.2 Loading the application

FX Designer application is contained into a MIDI file called "FXDesignerXXApp.mid" (where XX is the current version of the application). Like any other Chameleon application, you have to take care with the user data stored in the existing application before downloading FX Designer. If you have an older version of FX Designer installed in your Chameleon, your existing presets and configuration will be properly updated to the new version once you download it, so it's not mandatory to make a backup of them (although it is always recommended). If you have a different application installed in your Chameleon, you may lose your data if you don't make a backup of it before. **Please read the important notice in the Appendix A** to learn about how to load applications in the Chameleon in a safe way. Once the application is loaded, it is ready to use. By default, the application comes with all the presets set to the default state, with the three effect units disabled. Before to start editing presets as described in the next chapter, you may want to load the Factory presets distributed with the application to take a quick overview of the application features and possibilities, as described in the next section.

### 1.2.3 Loading the factory presets

FX Designer factory presets come inside a MIDI file called "FXDesignerXXFactory.mid" (where XX is the application version). You will need a MIDI sequencer with a free MIDI output. When the application is started, connect the output of your sequencer to the MIDI input of the Chameleon. Then play the MIDI file containing the factory presets and the presets will begin to load inside the Chameleon non volatile memory. Once the Midi file finishes playing, presets will be loaded. If you feed the Chameleon audio input with some audio signal, you will hear how the sound is processed depending on the currently active preset. To switch to another preset, move the encoder left or right, or use the VALUE UP and DOWN keys.

**NOTE:** *Factory presets can be edited, modified and overwritten like any other preset, so all 128 available presets are considered as "user" presets and there are not the so called "ROM presets".*

## FX Designer concept

The main idea behind the plugin is provide an easy way to create various delay based effects from the basic building blocks: comb and allpass filters.

Comb filter is just a delay with a gained feedback loop. It produces a series of exponentially decaying echoes. The decay time is determined by the feedback gain.

Allpass filter is a delay that in addition to feedback loop like in comb filter has also a feedforward loop. It also produces a series of exponentially delaying echoes but every second echo has an inverted phase.

Many audio effects like phaser, chorus, flanger, reverb, are made using these two delay filter types. The table below outlines these differences.

Effect type	Delay range	Delay Modulation	Delay filter type used	Frequency Filters	Interconnection scheme	Dry signal required
Slap-back delay	50-100 ms	no	comb	no	1 comb filter	yes
Multi-delays	50-100 ms	no	comb	no	Parallel comb filters	yes
Multiple-delays	50-100 ms	no	comb	no	Series of comb filters	no
Chorus	20-40 ms	yes	comb	no	1 or more comb filters running in-parallel	required if one comb filter is used
Flanger	0.5-15 ms	may be used	comb	no	1 or more comb filters running in-parallel	yes
Phaser	0.5-5 ms	yes	allpass	no	Series of allpass filters	strictly required
Classic Reverb	0.5-5 ms (allpass) 1-100 ms (comb)	no	allpass, comb	Low-Pass filters may be used	4 parallel comb filters followed by a series of two allpass filters	no
Nested-allpass reverb	0.5-100 ms	may be used	allpass	Low-Pass filters may be used	2 or more nested allpass filters	no

The difference comes from how these blocks are inter-connected. For example chorus and flanger can be made by one or more parallel comb filters, phaser is a series of allpass filters and a basic reverb is a combination of 4 parallel comb filters followed by a series of two allpass filters. The effects also differ in the used delay time ranges and whether or not the delays are modulated.



# Interface Reference

## 3.1 Menu Reference

FX Designer implements a controlling interface similar to all other Soundart applications for Chameleon. The table below shows the menu structure specific to FX Designer. Refer to their manuals for in-depth description.

Group	Page	Parameter	Value
MASTER	VOLUME	Dry	-96..0 dB
		Wet	
		In	
	STATUS	Dry	On/Off
		Wet	
		In	
MIX	TAP1..6	Status	On/Off
		Gain	-96..0 dB
		Pan	L -60 dB.. center.. R -60 dB
		3DPan	R 100%.. center.. L 100%
DELAY	TAP1..6	Type	CB/AP
		Time	1..100 ms
		Feedback	0%..100%
		LFO	Off/OSC1..OSC6
		LFO Depth	0..100 ms
FILTER	TAP1..6	Status	On/Off
		Type	LP/HP
		Cutoff	100..16000 Hz
ROUTING	TAP1..6	In	Master In/TAP1 Out..TAP6 Out
		Out	Master Out/TAP1 In..TAP6 In
LFO	OSC1..6	Status	On/Off
		Rate	0..5 Hz
		Shape	Sine/Tri/Sine <sup>2</sup> /Sn+Sn <sup>2</sup> /Sn*Sn <sup>2</sup>
		Phase	L 100%.. center.. R 100%
MIDI		MidiChannel	1..16
		MidiThru	On/Off
		Midi ID	1..128

## 3.2 Parameters structure

All the application parameters can be grouped into five logical blocks:

- Delays block
- Filters block
- LFOs block
- Routing block
- Mixer block

See the detailed description of every block below.

## 3.3 Delays

### 3.3.1 Delay type

The tap delay can work in two modes: as a comb filter and as an allpass filter marked as CB and AP respectively. The comb filter has only one feedback loop while allpass has also a feedforward loop. Comb filters are mainly used to create chorus/flanger like effects and allpass are used to create various reverbs and phasers.

### 3.3.2 Delay time

This parameter sets the lower bound for modulated delay sweep. The sweep depth is set by LFO Depth parameter. So if you set delay to 20ms and modulation depth to 40 ms, the modulated delay will be swept from 20ms to  $60(20+40)$ ms

**Ranged:** 1..100ms.

**NOTE:** When the modulation is off, the actual delay is set to the middle of the delay sweep. So if you want the actual delay to be equal to the delay parameter value set the LFO Depth to zero.

### 3.3.3 Delay Feedback

The amount of feedback signal that is mixed back to the tap input. For low delay values the feedback makes the sound more harsh and metallic.

**Ranged:** 0..100%.

**Important note:** be very careful when, or better avoid at all, working with feedback value close to 100%. It may create a dead lock feedback loop which may lead to significant output volume increase.

### 3.3.4 Delay LFO

This parameter denotes the index of the LFO used to modulate the delay.

### 3.3.5 Delay LFO Depth

The modulation or sweep depth controls how much the total delay time changes over time. The sum of the sweep depth and delay parameters is the maximum delay used in processing the signal. Alternatively, you can think of the sweep depth as the amplitude of the LFO.

**Ranged:** 0..100ms.

**NOTE:** When the modulation is off, the actual delay is set to the middle of the delay sweep. So if you want the actual delay to be equal to the delay parameter value set the LFO Depth to zero.

## 3.4 Filters

### 3.4.1 Filter Status

Turns on/off using of tap LP/HP filter. When the button is on, the tap signal goes through the filter, when it's off, the signal is bypassing it.

When the status is set to ON the signal from tap delay output goes through the tap filter, when the status is OFF the signal bypasses the filter.

### 3.4.2 Filter Type

There are two types of tap filter available: Low Pass marked as 'LP' and High Pass marked as 'HP' respectively.

### 3.4.3 Filter cutoff

Specifies the tap filter cutoff frequency.

**Ranged:** 100..16000Hz.

## 3.5 LFOs

### 3.5.1 LFO Status

Turns the corresponding LFO on/off. When LFO is turned off all the taps referring to this LFO will stop modulate.

### 3.5.2 LFO Rate

This parameter refers to the rate at which the modulation waveform oscillates.

**Ranged:** 0..5Hz.

### 3.5.3 LFO Shape

The LFO waveform defines how the delay changes over time. FX Designer supports five waveforms: sinusoid, triangle, sinus squared,  $\sin^2$ +(sinus with original rate plus sinus with double rate),  $\sin^2 \times$ (sinus with original rate multiplied by sinus with double rate)

### 3.5.4 LFO Phase

Specifies phase shift between left and right stereo LFO channels.

**Ranged:** -100..100%.

## 3.6 Routing

The routing matrix is used to set up tap interconnection network. Each tap has assignable input and output. The input can be tap1..tap6 or plugin input and output can be tap1..tap6 or plugin output. To connect two taps you need to specify only one link: either to set one tap output to another tap or set one tap input to another tap. There is no need to specify back link. For example if you set tap1 output to tap2, there is no need to set tap2 input to tap1. If more than one tap are connected to other tap input, then the signals are mixed at tap input.

## 3.7 Mixer

### 3.7.1 Master Status

Switches on/off Input, Dry and Wet signals. Note that when you use FX Designer in a send configuration you should turn the Dry signal off.

### 3.7.2 Master Volumes

Specifies the gains applied to Input, Wet and Dry signals.

### 3.7.3 Tap Status

Switches the tap on/off. Note that when a tap is off signal does not pass through it.

### 3.7.4 Tap Gain

Specifies a gain applied to the signal at tap output. Ranges: -96 dB..0dB

### 3.7.5 Tap Pan

This is a conventional stereo pan. Ranges: 100%L..100%R

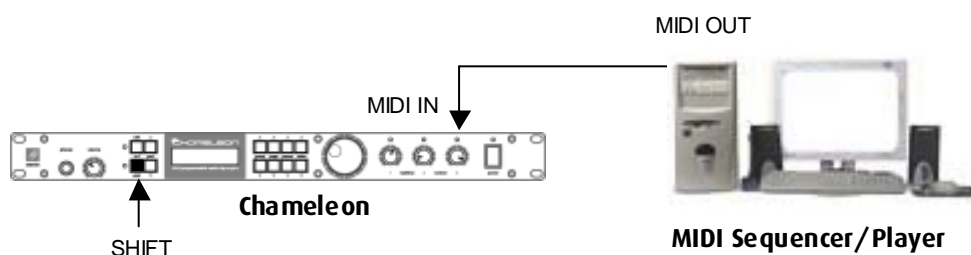
### 3.7.6 Tap 3DPan

This is a binaural pan. It's also called equal-power pan. Unlike conventional stereo pan that creates panning effect by differential gaining of left and right signals, binaural pan creates the panning effect by introducing a small delay between left and right channel

## A

# Loading Applications

To **load a new application or version update** inside the Chameleon follow the instructions below:



- The Chameleon must be powered ON with the SHIFT key pressed, so the following screen will be displayed.

```
Chameleon #01
(WAITING)
```

- Connect the MIDI OUT of your MIDI Sequencer/Player machine (for example, a computer with a MIDI interface) to the MIDI IN of the Chameleon and Play the Application MIDI File containing the new application or version update. It's recommended to disable the MIDI clock in the MIDI Sequencer/Player. If all is properly connected, the following screen will be displayed showing an increasing block counter.

```
Receiving MIDI
0123 of 0756
```

- When the counter arrives to the last block the Chameleon will ask you to store the application in the internal Flash memory: this must be confirmed by pressing the SHIFT key within the next 20 seconds in order to accept the received data. After pressing the SHIFT key, the application will be burned in the internal FLASH memory (**never turn off the Chameleon during this step**)

If any problem happens during the downloading process, the display will show "\*\*\*BAD DATA\*\*\*" or "\*\*\*TIME OUT\*\*\*". To solve this, try setting a lower tempo in the sequencer (i.e. 90 BPM)



Receiving MIDI  
\*\*\*TIME OUT\*\*\*

After the process has been successfully completed, the Chameleon will power-up itself automatically, loading the new stored application, which will need a few seconds to be fully operative after reconfiguring all the internal resources to it's needs (in this stage, if the Chameleon had another application inside before loading the new one, the Presets of the old application will be erased).

***NOTE:*** *There's no risk to damage the Chameleon with wrong or corrupted data, as the Chameleon won't accept those data. In case of error, the old application will remain unharmed.*

**B****Specifications**

<b>Effect class</b>	Multi-FX
<b>Short Description</b>	Six modulated delay lines with a flexible interconnection
<b>Hardware Platform</b>	Soundart Chameleon
<b>Automation</b>	MIDI Automation
<b>Number of included presets</b>	73
<b>Sample Rate</b>	48 kHz
<b>Processing precision</b>	24 bit fixed point
<b>Input/Output format</b>	stereo/stereo
<b>Maximum delay</b>	200 ms( 100 ms base + 100 ms for depth)
<b>Status</b>	Release. Revision 01. Last Updated on 4.March.03





## MIDI Map

Parameter	Controller
Input Gain	Controller 2
Dry Gain	Controller 3
Wet Gain	Controller 4
Tap 1 On/Off	Controller 5
Tap 1 Delay Type	Controller 6
Tap 1 Delay	Controller 8
Tap 1 Feedback	Controller 9
Tap 1 Assigned LFO	Controller 12
Tap 1 Delay LFO Depth	Controller 13
Tap 1 Binaural Pan	Controller 14
Tap 1 Stereo Pan	Controller 15
Tap 1 Filter Mode	Controller 16
Tap 1 Filter Type	Controller 17
Tap 1 Filter Frequency	Controller 18
Tap 1 Assigned Input	Controller 19
Tap 1 Assigned Output	Controller 20
Tap 1 Output Gain	Controller 21
Tap 2 On/Off	Controller 22
Tap 2 Delay Type	Controller 23
Tap 2 Delay	Controller 24
Tap 2 Feedback	Controller 25
Tap 2 Assigned LFO	Controller 26
Tap 2 Delay LFO Depth	Controller 27
Tap 2 Binaural Pan	Controller 28
Tap 2 Stereo Pan	Controller 29
Tap 2 Filter Mode	Controller 30

<b>Parameter</b>	<b>Controller</b>
Tap 2 Filter Type	Controller 31
Tap 2 Filter Frequency	Controller 33
Tap 2 Assigned Input	Controller 34
Tap 2 Assigned Output	Controller 35
Tap 2 Output Gain	Controller 36
Tap 3 On/Off	Controller 37
Tap 3 Delay Type	Controller 38
Tap 3 Delay	Controller 39
Tap 3 Feedback	Controller 40
Tap 3 Assigned LFO	Controller 41
Tap 3 Delay LFO Depth	Controller 42
Tap 3 Binaural Pan	Controller 43
Tap 3 Stereo Pan	Controller 44
Tap 3 Filter Mode	Controller 45
Tap 3 Filter Type	Controller 46
Tap 3 Filter Frequency	Controller 47
Tap 3 Assigned Input	Controller 48
Tap 3 Assigned Output	Controller 49
Tap 3 Output Gain	Controller 50
Tap 4 On/Off	Controller 51
Tap 4 Delay Type	Controller 52
Tap 4 Delay	Controller 53
Tap 4 Feedback	Controller 54
Tap 4 Assigned LFO	Controller 55
Tap 4 Delay LFO Depth	Controller 56
Tap 4 Binaural Pan	Controller 57
Tap 4 Stereo Pan	Controller 58
Tap 4 Filter Mode	Controller 59
Tap 4 Filter Type	Controller 60
Tap 4 Filter Frequency	Controller 61
Tap 4 Assigned Input	Controller 62
Tap 4 Assigned Output	Controller 63
Tap 4 Output Gain	Controller 64
Tap 5 On/Off	Controller 65
Tap 5 Delay Type	Controller 66
Tap 5 Delay	Controller 67

<b>Parameter</b>	<b>Controller</b>
Tap 5 Feedback	Controller 68
Tap 5 Assigned LFO	Controller 69
Tap 5 Delay LFO Depth	Controller 70
Tap 5 Binaural Pan	Controller 71
Tap 5 Stereo Pan	Controller 72
Tap 5 Filter Mode	Controller 73
Tap 5 Filter Type	Controller 74
Tap 5 Filter Frequency	Controller 75
Tap 5 Assigned Input	Controller 76
Tap 5 Assigned Output	Controller 77
Tap 5 Output Gain	Controller 78
Tap 6 On/Off	Controller 79
Tap 6 Delay Type	Controller 80
Tap 6 Delay	Controller 81
Tap 6 Feedback	Controller 82
Tap 6 Assigned LFO	Controller 83
Tap 6 Delay LFO Depth	Controller 84
Tap 6 Binaural Pan	Controller 85
Tap 6 Stereo Pan	Controller 86
Tap 6 Filter Mode	Controller 87
Tap 6 Filter Type	Controller 88
Tap 6 Filter Frequency	Controller 89
Tap 6 Assigned Input	Controller 90
Tap 6 Assigned Output	Controller 91
Tap 6 Output Gain	Controller 92
LFO 1 On/Off	Controller 93
LFO 1 Rate	Controller 94
LFO 1 Shape	Controller 95
LFO 1 Stereo Phase Shift	Controller 96
LFO 2 On/Off	Controller 97
LFO 2 Rate	Controller 98
LFO 2 Shape	Controller 99
LFO 2 Stereo Phase Shift	Controller 100
LFO 3 On/Off	Controller 101
LFO 3 Rate	Controller 102
LFO 3 Shape	Controller 103

<b>Parameter</b>	<b>Controller</b>
LFO 3 Stereo Phase Shift	Controller 104
LFO 4 On/Off	Controller 105
LFO 4 Rate	Controller 106
LFO 4 Shape	Controller 107
LFO 4 Stereo Phase Shift	Controller 108
LFO 5 On/Off	Controller 109
LFO 5 Rate	Controller 110
LFO 5 Shape	Controller 111
LFO 5 Stereo Phase Shift	Controller 112
LFO 6 On/Off	Controller 113
LFO 6 Rate	Controller 114
LFO 6 Shape	Controller 115
LFO 6 Stereo Phase Shift	Controller 116

*Appendix*

**D**

## Contact Information

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