Blueprint of DSynkant
&
reverse engineering of Roland D-50

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Contents

Chapter 1

Introduction

1.1 What is this document about?

The goal of this document is to describe in all details every missing information from the official documentation of Roland D-50.

1.2 What this document is not?

This document is not a user manual of DSynkant. For this purpose you should referee to the manual of DSynkant available on the official website of DSynkant

`http://dsynkant.sourceforge.net`

1.3 How to read this document?

This document contains both answers and questions not answered yet. When you see green somewhere in the document you'll know it is a question. If you have the answer of any question please contact me at

`a-lin[try_to_remove_that]@users.sourceforge.net`

if you notice english mistakes please contact me too...

Chapter 2

The engine

In this chapter it is question of the engine of the synthesizer and also everything concerning the conversion between the parameters manipulated by the user *(user parameters)* and the internal parameters of the engine *(engine parameters)*.

2.1 Notations

2.1.1 User parameters and engine parameters

To recognize the difference between the user parameters and the engine parameters, the user parameters will have the post-fix _usp added and the engine parameters no particular notation.

2.1.2 Mathematical notations

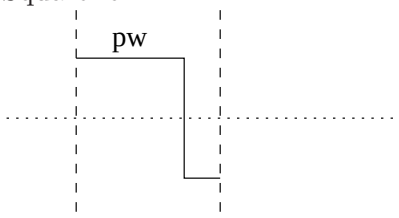
$Int[n.m]$	the set of integers between n and m included
$Real[n, m]$	the set of reals between n and m included
$log(x)$	the natural logarithm, that is the inverse function of exp(x)

2.2 Wave generator

2.2.1 Wave form

Synthesizer sound generator

- Square form :



The relation between $pulseWidth\_usp \in Int[0, 100]$ and $pw \in Real[0.5, 1]$ can be well approximated by the following equation :

$$pw = \gamma \times log(\alpha * pulseWidth\_usp + \beta)$$

where $\alpha = 1.17844$, $\beta = 11.7539$ and $\gamma = 0.201171$. Like for the sawtooth form, the square form seems to have a resonnance filter when the pitch goes higher. Filter to determine.

- Sawtooth form :
The sawtooth form is describred by the following function :

$$st(t) = sq(t) \times cos(w \times t + \epsilon)$$

where $sq(t)$ is the square form defined above, w the angular frequency ($w = 2\pi \times f$) and ϵ a slight shifting forward phase that occurs when the pitch is lower. Determine ϵ. In addition there is a sligth resonnance filter when the pitch gets higher. Filter to determine.

PCM sound generator

2.3 Chorus

The chorus of D-50 takes in input a mono signal and outputs a stereo signal.

2.4 Miscellaneous or not yet classified

- It seems that the only stereo in a patch comes from chorus and reverb.

Chapter 3

Banks and patches

Most of the information is well detailed in the documentation of VC-1 so for the moment I see no open question about banks and patches format.

Chapter 4

Acknowledgements

Below is the list of all people that helped me making this document :

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