



# FM ANTHEM

FM / PD WAVETABLES & PRESETS FOR U-HE HIVE2



## “FM ANTHEM” for U-he HIVE2 Documentation

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**PLUGMON**  
GUI & SOUND DESIGN

# About the Package

“FM ANTHEM” is a HIVE2 expansion featuring original FM/PD style wavetables.

## How to Install Presets

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- Open Hive
- Switch to the **Preset Browser**
- Right-click on the **User** folder to show a popup menu
- Select the **open in Explorer** (Windows) / **reveal in Finder** (macOS) option.
- Drop the preset folder there.

## How to Install Wavetables

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- Open Hive
- Open wavetable loading menu
- Select the **open in Explorer** (Windows) / **reveal in Finder** (macOS) option.
- Drop the preset folder there, or any newly created folder inside there, with any name you like.

How does Hive manage wavetables? Here is what Urs says about that :

Currently wavetables are identified solely by their filename and location. If a wavetable isn't found where it was when saving a preset, the engine looks into the preset directory first. Then checks any other directory within the wavetables folder.

(Quoted from a KVR Thread)

So as long as it resides inside the "Wavetables" folder, a **folder** can be moved or renamed. But you can't rename wavetable **files**.

# To Use Wavetables Correctly

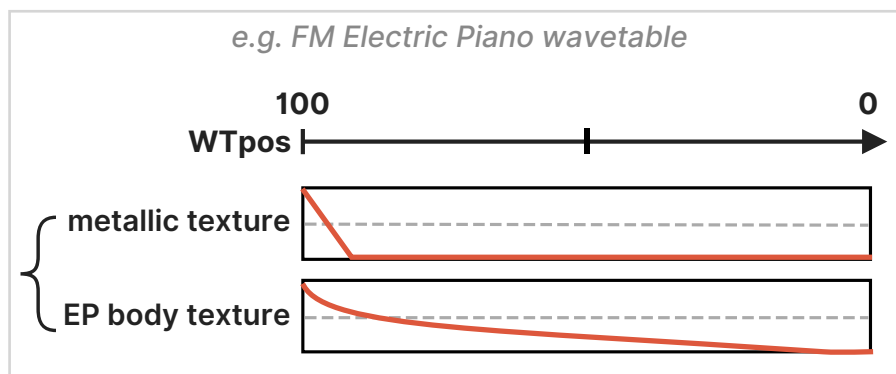
You don't need to learn about FM/PD to use these wavetables. (That *is* the good thing of using wavetables instead of actual FM/PD synths. Isn't it?)

## Basic Usage

But one thing to remember : You have to **run through WTpos from 100 to 0** to replicate the whole FM sound (by assigning some ENV, FNC or One shot + Reverse WT option).

Each FM wavetables holds the information like *“metallic hammer sound decays very fast, body stays for a while, eventually end up with pure sine wave...”* and it is achieved by using WTpos as timeline.

In the case above, if you set WTpos0 fixed, it's just pure sine wave. if WTpos100 fixed, it's just static metal sound, nothing like electric piano.



This also means that **how fast WTpos decay from 100 to 0** matters very much. Too short/long decay may sound weird or unrealistic.

Pseudo-acoustic wavetables are especially severe on this point. Please refer to presets to learn about the wavetable usage. For example, load *“KY4 - DX Marimba”* and you'll see the preferable tunings for *“DX Marimba”* wavetable.

## Other Creative Usage

Conversely, using only some part of WTpos or using unusual envelopes could result in new interesting sounds. Setting max WTpos like 80-90 may create softer sound. Setting slow attack envelope may create unreal acoustics.

# About UHM

UHM(U-He Math) is a **wavetable scripting language** developed by U-he, introduced in 2018. You can draw 256 frames wavetables, 2048 samples resolution for each. For further information, please read the [official userguide](#).

## UHM vs Exported Wav

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Many of the wavetables are exported as wav. There's only one reason for this : **fast loading time**.

Note that the sound quality of uhm wavetables is **identical** to exported wav files. when you load a uhm file on Hive, it generates wavetables **on load**. So the difference is solely "storing it on computer as wav" or "generating it every time on load, for saving disk space".

It takes some time to convert long scripts to wavetables, so for long scripts we chose to export as wav.

## Handling UHM files

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For those exported as wav, you can also download the original UHM version of them (for those who want to see/learn/edit the inside).

Exporting uhm as wav is done by the **Export command** written in the script.

```
25  
26  Export " ../ ../DX/DX Brass Bright.wav"
```

If these lines are written, Hive will export a wave file on loading a uhm. If the folder path is incorrect (e.g. folder doesn't exist), export will fail.

## Modification and Copyrights

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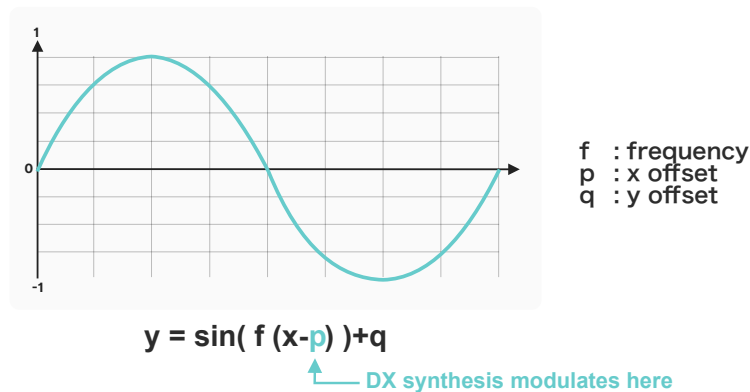
You can freely edit uhm files to get new sounds (You should make backup tho). But **do not upload the modified ones to public!** Sharing those derivative works violates the [Terms and Conditions](#). Please use them for personal use only.

# FM Recreation in UHM

Here's some brief explanation for how much of FM synthesis can be replicated on UHM.

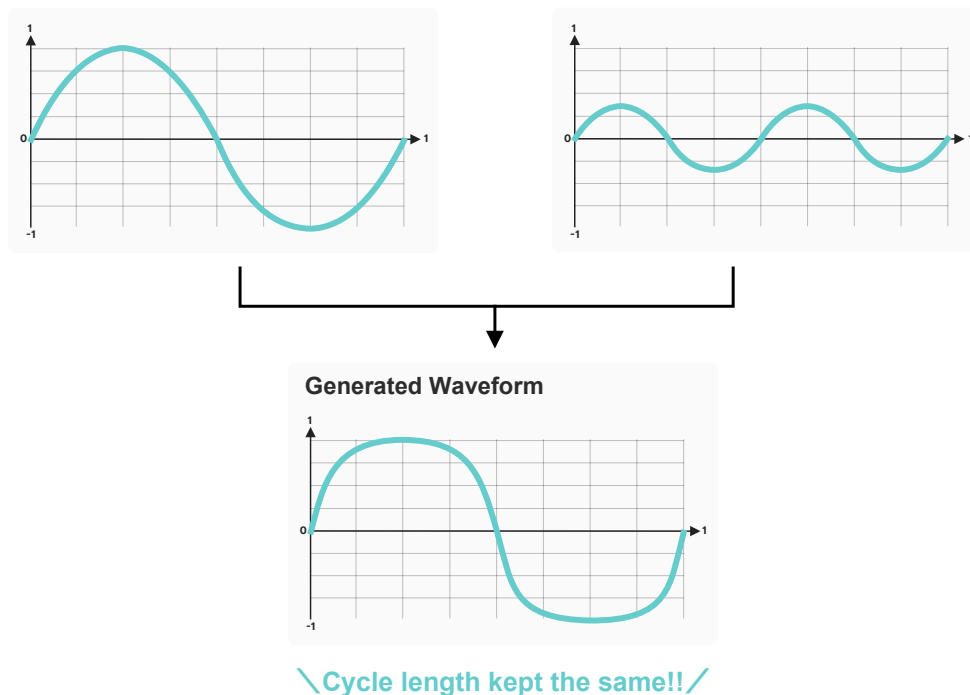
## FM Synthesis into Wavetable?

Some may think that FM synthesis cannot be expressed with a wavetable, because “FM” means “frequency modulation” and wavetable has nothing to do with frequency. But “DX” style FM is technically, in fact, what should be called “**phase modulation (PM)**”.



In this method, as long as the ratios of modulators/carrier are **all integer**, the cycle length of output waveforms doesn't change from the original carrier.

Carrier : Modulator = 1 : 2

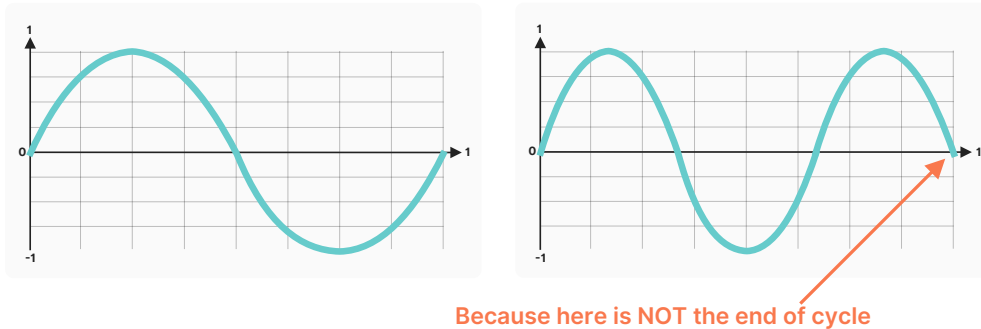


So all these waves can be packed into wavetable. This is the nature of DX style FM.

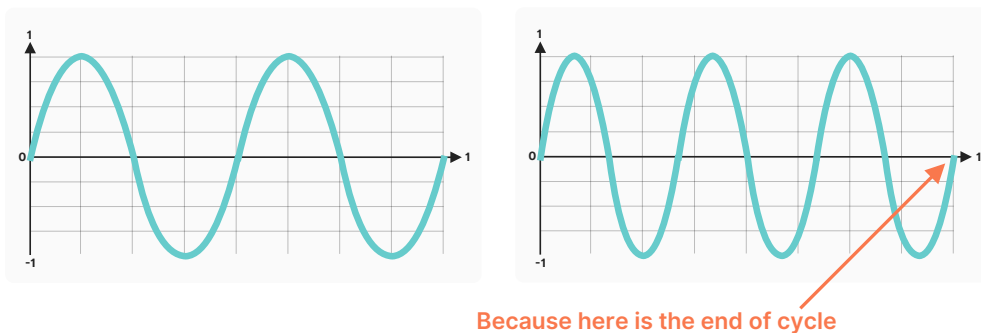
## Pack decimal ratio FM waves into a wavetable

FM sounds using decimal ratios like 1.5 or 1.25 can also be cloned, by **multiplying all the ratios** and create longer waveform cycle. (x2 for 0.5, x4 for 0.25)

Carrier : Modulator = 1 : 1.5 ... cannot be cloned



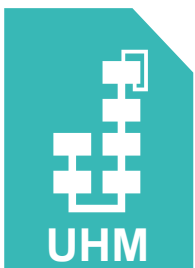
Carrier : Modulator = 2 : 3 ... can be cloned



The output sound of 2:3 is identical to 1:1.5, except for it gets octave higher. Some of our wavetables (e.g. Gamelan, Tub bells) uses this technique to incorporate non-integer modulators. For these WTs, **you need to adjust “octave” settings low**.

More complexed level of FM synthesis — Ratio like 1.01, fixed frequency, ratio modulated by envelope — are beyond what wavetables can express.

## Editability of FM wavetables



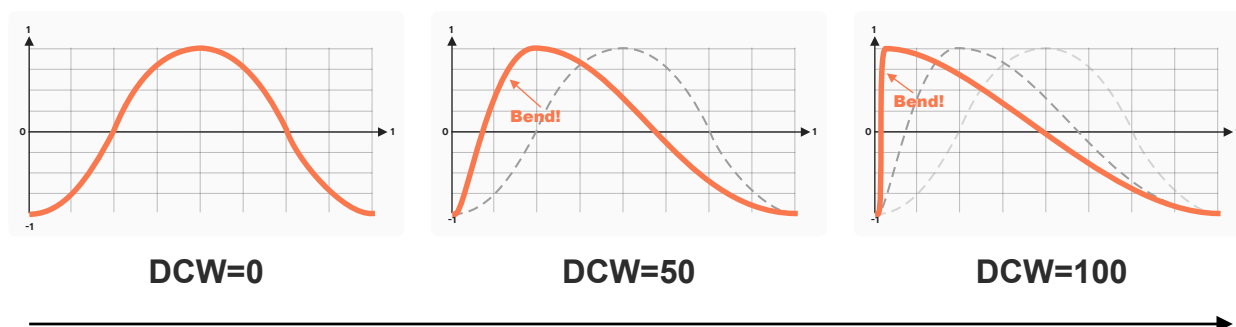
So whole 6OPs are packed as a single WT file. This means that **if you want to change operators' ratio/depth, you have to open/edit uhm files**, which is cumbersome things to do.

So if you want that level flexibility, just go for actually FM synths. What this product aims at is to instantly recall some well-tuned FM waveforms (just like presets) and expand the sonic possibility of Hive.

## PD Recreation in UHM

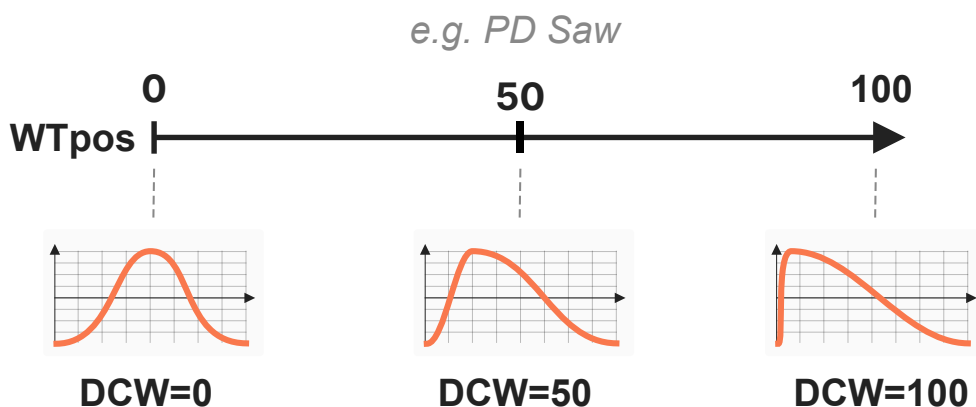
Also, “CZ” style phase distortion synthesis is exactly what UHM is good at.

To make a story short, CZ creates various waveforms by bending/shrinking cosine wave, whose depth is controlled by a knob called “DCW (*Digital Controlled Waveform*)”.



It’s worth remembering that the waves generated by this method is **slightly rounded** even when DCW=100, which contributes to the characteristics of this synth. (We referred to recorded samples of original hardwares and emulation plugins as well to investigate how much they’re rounded.)

On our wavetables, WTpos corresponds to this “DCW depth”.



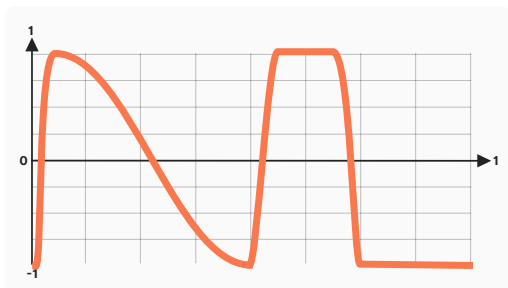
## Implementation Method



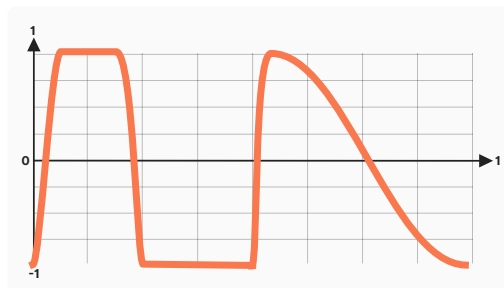
What we’ve written inside UHMs is not the output *shapes*, but the *algorithm* itself — Distorting the phase reading speed of cosine wave. If you want to modify these UHM files, p13 of [CZ-101 manual](#) will help.

## Phase Altered Combinations

You'll find that only half of the combination waves are packed — e.g. *Saw-Sqr* is there, but *Sqr-Saw* is not.



Saw-Sqr Included



Sqr-Saw not Included

This is because these pairs **sound identical** to each other. It is true that when “Phase” parameter is set to either “Reset” or “Flow”, the very first attack, the very first cycle of waveform sounds different (whether it starts with Saw or Sqr), but the difference is hardly audible.

If you desperately want the altered version, please use “Constant” mod source to shift the “Phase” parameter of OSC (which is hidden but accessible in Mod Matrix). Mod depth must be 50.



# About MX Series

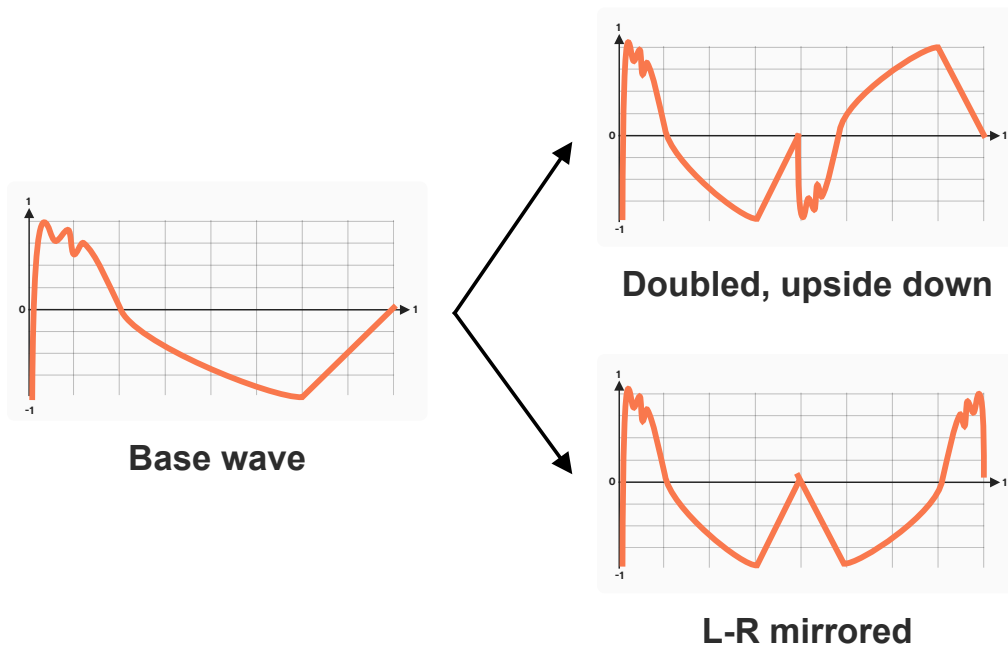
Wavetables named “MX” are those inspired by Massive X synth. Simple waves are almost identically cloned, but for complexed waveform, they’re just **similar in characteristics** and details are different.

Some non-FM waves are also included, for they’re just useful.

## Characteristics of MX wavetables

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In many tables, *mirroring* technique is used — a base wave is duplicated in line, with the right one flipped vertically or horizontally.



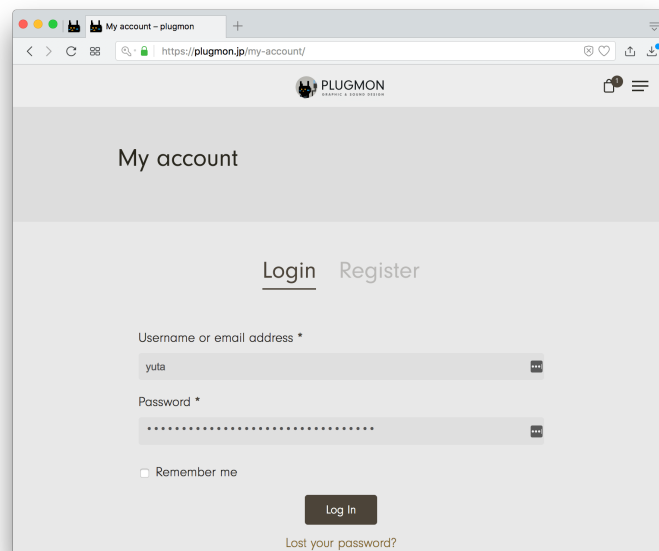
To do this , `aux1_fi` command is frequently used in scripts.

## Download & Update

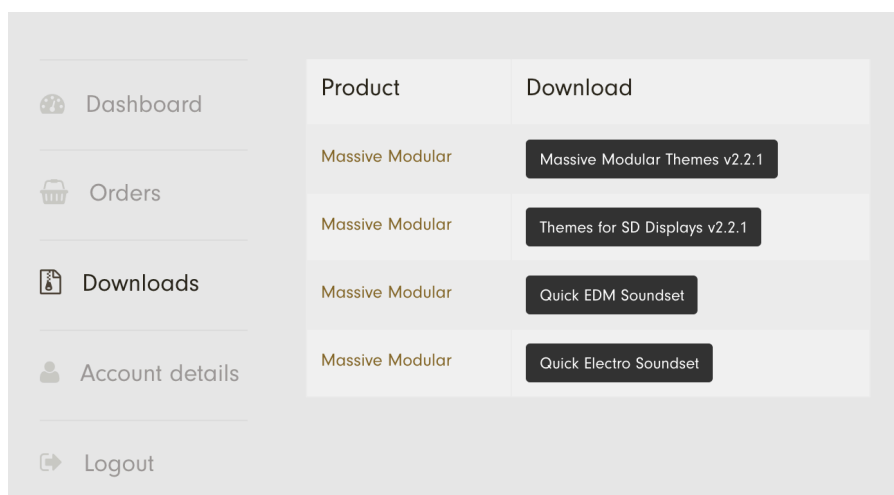
Re-download or update is provided via the website.

Your account page is : <https://plugmon.jp/my-account/>

Please login with your e-mail and password. **If you don't have account yet, you have to create one** (When creating, make sure that you enter the same address as you used on purchase).



After login, go to "**Downloads**" tab, where you can download your purchased products.



\*If you have any troubles, please [contact us](#).

# List of Wavetables

Folder	File
CZ Basics	CZ01 Saw
	CZ02 Square
	CZ03 Pulse
	CZ04 DubSine
	CZ05 SawPulse
	CZ12 Saw-Sqr
	CZ13 Saw-Pul
	CZ14 Saw-DbSn
	CZ15 Saw-SwPl
	CZ23 Sqr-Pul
	CZ24 Sqr-DbSn
	CZ25 Sqr-SwPl
	CZ34 Pul-DbSn
	CZ35 Pul-SwPl
	CZ45 DbSn-SwPl
CZ Rasonators	CZ06 Reso1
	CZ07 Reso2
	CZ08 Reso3
	CZ16 Saw-Res1
	CZ17 Saw-Res2
	CZ18 Saw-Res3
	CZ26 Sqr-Res1
	CZ27 Sqr-Res2
	CZ28 Sqr-Res3
	CZ36 Pul-Res1
	CZ37 Pul-Res2
	CZ38 Pul-Res3
	CZ46 DbSn-Res1
	CZ47 DbSn-Res2
	CZ48 DbSn-Res3
	CZ56 SwPl-Res1
	CZ57 SwPl-Res2
	CZ58 SwPl-Res3
	CZ67 Res1-Res2

Folder	File
DX	CZ68 Res1-Res3
	CZ78 Res2-Res3
	DX Basic Saw
	DX Basic Square
	DX Bass Solid
	DX Bellet
	DX Brass Bright
	DX Brass Soft
	DX Brass Trumpet
	DX Clavinet
	DX Drum Seed
	DX E Bass I
	DX E Bass II
	DX E Bass III
	DX EP Crystal
	DX EP Soft
	DX EP Wurli
	DX Gamelan
	DX Harpsi
	DX Log Drum
	DX Lute
	DX Marimba
	DX Metallic Mallet
	DX Musicbox
	DX Noise Seed
	DX Orchestra
	DX Organ I
	DX Organ II
	DX Organ Pipes
	DX Piano Grand
	DX Pulse Hollow
	DX Reed
	DX Strings
	DX Tub Bells
MX Basics	MX Basic Shapes
	MX Cosmonics A

Folder	File
	MX Cosmonics B
	MX Dual PWM
	MX Motor Saw
	MX Sine WM Mirror
	MX Sine WM
	MX Sqr in Sqr
MX Monsters	MX Aggrobot
	MX Bitrion
	MX Bomb SQ
	MX Caspicus
	MX Dragon Cruise
	MX FM Groan
	MX Math
	MX Xbiter
OPL	OPL Basics
	OPL Cat's Eyes
	OPL Chip Metal
	OPL Chip PWM
	OPL Corkscrew
	OPL Doppelganger
	OPL In Vitro
	OPL Marunouchi
	OPL Mirror Sync
	OPL Mitochondria
	OPL Neuron
	OPL Ninja Saw
	OPL Skullmod (Multi)
	OPL Skullmod
	OPL Tidal Waves
	OPL Whirlwind