DEFRACTOR

*Ver.**0.96ß***

DIGITAL SYNTH WITH SAMPLE GENERATOR

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URL: http://www.303dim.com/neurotix
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DISCLAIMER

I accept NO resposability for any damages to your system or your brain caused by this software. You can NOT change any part of this software.
This program is FREEWARE. That means you DON'T have to pay for it! Commercial use is allowed under my permission.
If you use samples generated by this program please write it in your tunes/midis. Thx.
This documentation may contain -TRUE- JPEG-english speech. That means I think my english isn't a very good one... if you don't understand something please mail me; I hope I'll reply with a better english... (I HOPE :) !!!).

WHAT'S NEW?

DEFRACTOR 0.96ß

- Fixed Instrument loading bug
  - Fixed Custom WaveForm Loading bug

DEFRACTOR 0.95ß

- Removed “Save WaveForm...” from oscil’s menus. You don’t need it because you have the .DF2 format... :)
- Fixed a bug in the “Cancel” procs in ”Custom...” Wave form loader.
- The core is now working with 32 bit Float data. The generation calculation is now faster then the old one. In fact now the generation engine has a speed ratio of more than 3:1 !!! (that means a 3 second sample is generate in less than a second!!!)
- Display Fix: Defractor can now be used at 640x480 display resolution. It also feature “Magnet resizing” ;)
  - Found a solution for the auto-verify data input in the frequency edit-boxes (now the scroll-bars aren’t updated... so no more unexpected updating of the text you’re writing)

DEFRACTOR 0.94ß

- Pinch/Punch Filtering gives decent results (but I still have to work on it... if you like how they work now, mail me... ;))
- Added Noise generator
- Solved a *BIG* bug in Custom Wave Form Loader (I didn't see it :))
- Support for Defractor Enhaced Instruments (.DF2)
- Removed the configuration file (thx to AKA)
- Visual Enhacements :)
- Better wave form redrawing (thx to AKA)
- Many fixes to the code (thx to AKA)
- Intelligent Preview! Now the sample isn't recomputed every time you press the preview button (I'm still working on it but thx to AKA for suggestions)
  - Added demo instruments (thx both MAZ and AKA)

DEFRACTOR 0.93ß

- Added copy and swap buttons
- Added the "None" shape
- Completely fixed the "Logarithmic Tooth" (now it works!)

- SwapFile Handler recoded
- Fixes in the Sample Preview
- Envelope generation is a "bit" faster than the old one
- Envelope generators, Internal Multiplier and Division Factor has now 0 (zero) control. No more "division by zero" :)
- Started Pinch/Punch filter debugging (fixed some bug)
- Proportional Stretching gives something close to what it's expected to do... ;)
- Custom Stretch now active but is'nt close to what it should do... :(
- Added "Bell" function
- Documentation in .DOC format (word 7.0)

DEFRACTOR 0.92ß
- Fixed a BIG bug in check-boxes

DEFRACTOR 0.91ß
- Fixed some bug in Load/Save Instrument (it doesn't work after sample generation)
- Changed Frequency Scroll Bars Lenght
- Some little changes to the source code
- Now is 3 to 4 times faster in sample generation
- .WAV support
- .XI support (buggy)

DEFRACTOR 0.9ß
First release of the program.

WHAT IS DEFRACTOR?

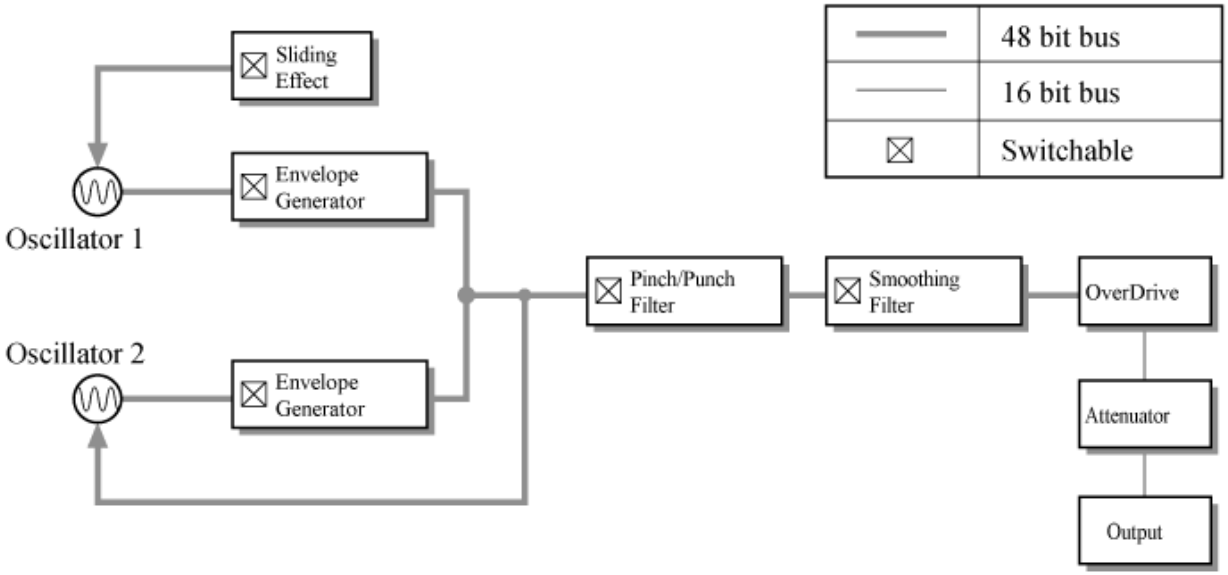
I don't know! Ehehehe... Defractor is a sample-generator software based on 2 oscillator combined in a twisted way.
It's NOT a vintage-analog-synth emulator (sorry if you are looking for it).

Each oscillator has these features:
- Selectable Wave Form: 12 waveforms + 1 Custom Loadable Shape;
- Internal Amplifier/Attenuator with distortion;
- A frequency (of course :));
- An envelope generator (Attack+Decay);
    - A section called *"More Settings..."* where you can find Modifiers, and Shape options.

After the mixing of the 2 oscillators the output signal pass thrugh a Smoothing Filter, a Pinch/Punch Filter (my own filter algorithm), an Overdrive and an Attenuator.

HOW DEFRACTOR WORKS

Synthetically: the two oscillators are mixed together and the mixed output modulate the oscillator 2. That's the strenght and the limit of DEFRACTOR. You have take that the mixed output is the LFO of oscillator 2.
In the samples created with DEFRACTOR you will notice that the oscillator 2 is the MAIN signal and the oscillator 1 do all the effects. That's useful when making no-pad samples (TB-303 -like and something like it...): its sound is fat and powerful. Pad's are really poor with DEFRACTOR (when I tested the program nothing REALLY good came out! ;) and when I say "REALLY good" I'm talking about samples to die for!!!).
After that you know why the oscillator 2 envelope generator is the most important in the sample.
Here a simple scheme:



Please Note: All the 48 Bit connection are now 32 Bit width.

Conclusion: All the sample generation turns around the oscillator 2 enveloped output.
I hope to have always a 1-1 generation in all future version. That means the core generation of 1 sec of sample will not exceed 1 sec of calculation.

FEATURES

Here are the specs of the Defractor Core:

- 32 Bit Oscillators mixing + 32 Bit Envelopes;
- 32 Bit Generation Engine;
- 32 Bit Smoothing Filter;
- 32 Bit Pinch/Punch Filter;
- 32 Bit Overdrive;
- 16 Bit Attenuator;
- Sliding F/X used for simulate velocity;
- Frequency & Amplitude synchronizers;

In future versions of the software all the 48 Bit features will be lowered to 32 Bit. The use of a 48 Bit Float is a reminescence of the DOS experimental-version of DEFRACTOR. The 32 Bit generation will be faster than this.

SYSTEM REQUIREMENTS

R.P.E. (**R**eally **P**oor **E**nviroment):

- 486
- 8 Mb RAM
- 800x600 Display Resolution
- A program that loads 16 Bit SIGNED RAW data in INTEL order like Sound Forge XP, Sound Forge 4.0, CoolEdit 95 or CoolEdit 96.

D.S.E. (**D**ecent **S**ystem **E**nviroment):

- Pentium
- 16 Mb RAM
- 800x600 Display Resolution
- A program that loads 16 Bit SIGNED RAW data in INTEL order like Sound Forge XP, Sound Forge 4.0, CoolEdit 95 or CoolEdit 96.
- A Fast Hard Drive or SCSI Hard Drive (required only for very long samples)
- A Sound Card (required only if you want to listen to the samples and sample preview)

DEFRACTOR TOOLS ANALISYS

FILE MENU

Reset Synth

Resets the synth variable/oscillators settings to default.

Open Instrument...

Opens an instrument file .DFC.
The .DFC file contains all the settings of the synth except for Stretching (Proportional and Custom) and custom wave form. If you use a custom wave-shape and you want to swap instruments, you MUST enclose the custom shapes the instruments use. For the .DFC format specifications see below.
I also added the .DF2 format (Enhaced Instrument) that stores Custom Wave Forms.

Save Instrument...

Save current instrument in standard 1.0 Defractor instrument (.DFC) or Defractor Enhanced instrument (.DF2). You MUST use the enhaced instrument format if you want to store your custom waveforms with instrument settings.
Standard Defractor Instrument (.DFC) Advantages:

- Very small size (less than 500 bytes)
- Stores all the basic information for making a good samples

Standard Defractor Instrument (.DFC) Disadvantages:

- It doesn't store Stretching information
- It doesn't store Custom Wave Forms

Enhaced Defractor Instrument (.DF2) Advantages:

- Stores all information of the instrument (including Stretching, Custom Wave Forms)

Enhaced Defractor Instrument (.DF2) Disadvantages:

- "Big" size of the instrument file (more than 16K)

The .DFC file is thought for quick internet exchange of instruments.

Save As Sample...

Saves the current instrument as a sample. This function generate the sample and save it to disk. The .RAW file is 16 Bit SIGNED and WITHOUT HEADER - its playback rate is 44100 Hz - INTEL byte ordering. The .WAV file is a standard microsoft wave. The .XI file is a standard FastTracker II instrument file (with tuning & envelope); you will find the correct playing-rate in C-5.

Instrument/Sample Settings...

This call the "Instrument/Sample Settings" window.

> **Instrument Name** - is the name of the instrument (this will be saved only in the .DFC format and in .XI instruments). >40 chars.

Instrument/Sample Length - is the length of the sample (or the instrument) in secs. From 0.05s to 8m20s (500s).
Buttons - Quick selects length of the instrument. The three buttons called *"0.74297"*, *"1.48594"* and *"2.97188"* gives a sample size of 64K, 128K and 256K respectively (this is usefull for making samples for GUS boards).

Exit Defractor

Close the program without confirmation (very simple to use ;)).

OSCILLATOR 1 and OSCILLATOR 2 MENU

All this functions work in the same way for both the oscillators.

Sine

Sets the oscillator using a Sine wave-form. Phase is 0 degrees.

Square

Sets the oscillator using a Square wave-form.

Saw Tooth

Sets the oscillator using a Saw Tooth wave-form.

Triangular

Sets the oscillator using a Triangular wave-form.

Exponential Tooth

Sets the oscillator using a Exponential Tooth wave-form.

Logarithmic Tooth

Sets the oscillator using a Logarithmic Tooth wave-form. By the "More Settings..." window you can change the bending rate of the shape.

Square+Duty Cycle

Sets the oscillator using a Square wave-form with Duty-Cycle. Duty Cycle can be changed thru the "More Settings..." window.

Pulse

Sets the oscillator using a Pulse wave-form. The Pulse type can be changed in the "More Settings..." window.

Parabolic Tooth

Sets the oscillator using a Parabolic Tooth wave-form. This tooth wave-form is "belled". This means it contains a positive and a negative tooth. Next version will support the single tooth wave-form.

Circular

Sets the oscillator using a Circular wave-form. Circular Stretching can be modified by the "MoreSettings..." window.

Ramp Tooth

Sets the oscillator using a Ramp Tooth wave-form. As the Parabolic Tooth this wave-form is "belled" but in this one you don't need the single tooth shape (the single tooth is Saw Tooth).

Noise

Sets the oscillator generate noise.

None

Sets the oscillator to a plain, silent wave-form.

Custom...

Loads a custom shape in .RAW format. The .RAW file must be WITHOUT HEADER, 16 Bit SIGNED data in INTEL order. The optimal shape size is 4410 Bytes (0.1 secs). Lower sizing will fill the difference with 0 (zero). Higher size will be truncated.
In future version a .RAD format will be supported.

ABOUT MENU

About Defractor...

Shows the "about" window of DEFRACTOR.

Contributors/Beta Testers...

Shows the "Contributors/Beta Testers..." window. If you want to ***appear*** in this window see the instruction below.

LAYOUT

Frequency Scroll-Bars & Frequency Edit-Boxes

Changes the frequency of the oscillator. Frequency variations are NOT shown in the panel. The frequency range is 1 to 32000 Hz. Left tools set oscillator 1 properties, right tools set oscillator 2 properties.

"More Settings..." Button

Opens the "More Settings" window. This window contains tools for changing the waveform look.

Tool	***Saved in .DFC***	***Description***
Parameter 1 (Scrool-bar)	Yes	Set Duty-Cycle, Pulse-Width, Circular Stretching and Bending Rate for Square+Duty Cycle, Pulse, Circular and Logarithmic Tooth respectively.
Parameter 2 (Scrool-bar/Inactive)	Yes	Unused
Upper (Check-box)	Yes	Switch the positive part of the pulse on and off.
Lower (Check-box)	Yes	Switch the negative part of the pulse on and off.
Reset Shape (Button)	No	Reset all changes of the wave-form.
Proportional Stretch (Scroll-bar)	No	Stretch the wave-form using a proportional algorithm.
Custom Stretch (Scroll-bar)	No	Stretch the wave-form using my own algorithm.
Mirror (Button)	No	Mirror (vertical) the wave-form
Reverse (Button)	No	Reverse the wave-form (same as Mirror button but it works horizontally).
Bell (Button)	No	Apply the “Bell” function to the waveform. The “Bell” function stretch the wave to an half of its length the it attack a mirrored copy of the stretched wave at the end of the first one (then the length is equal to the original).

Envelope Generators Panel

Contains the settings for the Envelope Generators. The envelope type is AD (Attack & Decay). The attack time range is 0.00 sec to 30.00 sec. The decay time range is 0.00 sec to 240.00 sec.

Tool	***Saved in .DFC***	***Description***
Enveloping Oscillator 1	Yes	Enable/Disable enveloping for oscillator 1 signal.
Enveloping Oscillator 2	Yes	Enable/Disable enveloping for oscillator 2 signal.
Attack	Yes	Set the Attack Time (the left one for the oscillator 1, the right one for the oscillator 2).
Decay	Yes	Set the Decay Time (the left one for the oscillator 1, the right one for the oscillator 2).

Filters Panel

This panel contains all the 48 Bit filters that works directly in the generation-engine. Overdrive and Attenuator works on the 48 Bit engine output.

Tool	***Saved in .DFC***	***Description***
Smoothing	Yes	Enable/Disable smoothing filtering.
Smoothing Power	Yes	Set the power of the smoothing filter.
Pinch/Punch	Yes	Enable/Disable Pinch/Punch filtering.
Pinch/Punch Power	Yes	Set the power of the Pinch/Punch filter.
Pinch/Punch Threshold	Yes	Set the threshold level of the Pinch/Punch filter.
Sliding	Yes	Enable/Disable sliding.
Sliding Ratio	Yes	Set the sliding ratio. The ratio is Hz/sample.
Sliding Up/Down	Yes	Set the sliding goes to higher frequencies (Up - Enabled) or to lower frequencies (Down - Disabled).

Smoothing Filter Overview

Higher values for Smoothing Filter are for less smoothing of the sample-wave; lower values are for higher smoothing. Smoothing result is like a low-pass filter.

Pinch/Punch Filter Overview

Pinch/Punch filter is a little strange filter. It works as a distortion. The Threshold value sets how much wave will be Pinched and how much is Punched. This filter work symmetrically to the 0 axis; this means it works in the same way in the positive-part of the wave as in the negative one but it NEVER works in all the amplitude width (it has two different process for a single sample if it is negative or positive).

Sliding Overview

Sliding is a tool used to increase or decrease the frequency of the oscillator 1. This is like turn a resonance knob on a synth, a portamento effect or a modulation knob, depends on the engine settings. Ratio specify how much quickly the frequency decreases or increases (that depends on the Up/Down check-box). The Ratio value is in Hz per sample. This mean you can have a sliding from 13.23 Hz/sec to 132.3 KHz/sec.
Sliding is also useful to simulate (?) high-frequency decay on a bass or synth hit, or to make a scream-like sample.

Advanced Panel

It contains advanced and engine output modifiers. The Internal Multiplier and the Division Factor are really advanced settings (see after the table).

Tools	***Saved in .DFC***	***Description***
OverDrive	Yes	Set the overdrive power.
Attenuator	Yes	Set the attenuator power.
Amplitude Synchronizer	Yes	Enable/Disable Amplitude synchronization for oscillator 1.
Internal Multiplier*	Yes	Multiplies the output of the routine that mix oscillator 1 with oscillator 2.
Division Factor*	Yes	Reduce or raise the power of the internal LFO.

* This setting work directly to the core of the generation-engine.

OverDrive Overview
That's really simple! Higher values gives higher overdrive.

Attenuator Overview
Higher the value higher the attenuation.

Amplitude Synchronizer Overview
This tool synchronizes the amplitude and the phase of oscillator 1 with the oscillator 2 amplitude. Why this? Because the Amplitude Synchronizer is useful to make BassLine-like samples or fat bass hits.

Internal Multiplier and Division Factor Overview
The Internal Multiplier multiplies the output of the oscillator mixing routine. As a result, the sound is modulated (or over-modulated).
The Division Factor reduces or raises the power of the internal DEFRACTOR LFO system. Please don't set it to 0 or the program will crash.
Now I think you are a "bit" confused but it's difficult for me explain what this two values actually do. I left them to give you more flexibility on the sound feel. With this two values you can do softly or violent sonority with the same effect and without touch any oscillator tool.

Sample Preview

It previews the instrument. It generates the sample thru the same algorithm of the sample generation: what you listen is exactly what will be saved and played in your tracker/sequencer.
To use the Sample Preview you need a sound card or a playing device.

'>>>' and '<<<' Buttons

This two buttons are used to copy the oscillator waveform (with frequency, settings and amplitude). The **>>>** button copies Oscillator 1 settings to Oscillator 2. **<<<** button copies Oscillator 2 settings to Oscillator 1.

< -- > Button

This button swaps settings between Oscillator 1 and Oscillator 2.

HOW TO BUILD A SOUND

This section is like a simple tutorial on how to make a simple sound.
The following is an example on how to create bass synth touch samples:
Set the length of the instrument (sample) thru the Instrument/Sample Settings window. A bass synth isn't too long then 0.5 secs or 0.7429 secs (for GUS users) is enough. Set the instrument name, if you want. Click on DONE and start setting up the synth.
Set the main oscillator, Oscillator 2, frequency to 110.0 Hz, then enable the oscillator 2 volume envelope (attack 0.006 secs; decay ~0.8 secs).
Set the oscillator 1 waveform to Sine.
Now set the overdrive (usually I set it to 1.10) and the smoothing filter (2.100). Note: When you set the smoothing power don't go below 1.6 because it REALLY smooth the waveform!
What kind of sound do we want to have? An analog-synth like? A 90's expander?
To have a analog-like sound I suggest to set the oscillator 2 waveform to Saw, Triangular or Square (generally I don't use the Sine shape to make bass sounds). Using a Parabolic Tooth or a Ramp Tooth will give good result if you like recent sound synthesis.
I suggest to leave the Amplitude/Phase Synchronizer checked (I don't like the result the synth gives when it is off).
Now set the oscillator 1 frequency like a modulation filter; 220 Hz or 330 Hz sounds good. Preview it.
If the sample sounds too rich of high-frequencies add more smoothness by lowering the value of the smoothing power or lower the oscillator 1 frequency. You can also increase the sliding ratio.
If you like the sample save it with Save As Sample...; set your preferred format and click OK.

In the same way of this bass sample, you can create 303-like sounds and other acid sounds. Varying the Division Factor and the Internal Multiplier you can customize the synth generation.

KNOWN BUGS

- Both Stretching tools aren't fully functional
- I need to work around the Pinch/Punch Filter (it gives result that are only near what I want)
- Wave form name sometimes wrong after loading an instrument
    - .XI format writes data with displace.... you can find buggy distortion zone

FUTURE DEVELOPMENT

That's what you will find in future versions. If you have any suggestion or comments write to me (don't ask for miracles please! :)).

- I'm planning an Enhance Filter and a little 16 position sequencer
    - Your suggestions (shot now! :))

DEFRACTOR FAQ

Q: Did someone ask you something about the program?
A: No! :)
Q: Why don't you add some demo instruments?

A: I added demo instruments in this release (0.94ß) :).

CONTRIBUTORS

Do you want to support FREE-WARE programmers (the poorest coders in the globe :))?
You can do it by send a VERY little contribution. The contribution is only 5$ US (or 8.000 to 10.000 Lire for italian guys). If you think the value of DEFRACTOR is more send more money, if you think is less send less money.
Contribution? What gives?
Happiness (for me) and *Glory* (for you). If you send money your name will compare in the Contributors/Beta Testers Window (that's the Glory... ehehehhehe....); at the same time I will be more happy :)... If you send more than 100$ I will add a window in DEFRACTOR only for you in a DEFRACTOR DeLUXE Release!!! Ehehehhehh.....

Send money to:

Jenner Fusari
Via Sammartina 50
48020 - Villa S.Martino (RA)
ITALY

THANX & GREETINGS

Big Thanx to:

Fabio Rani	***(Beta-Tester)***
Lanzoni Claudio	***(For help decrypting this DOC to a good english)***
Fabio Rani	***(Beta-Tester)***
Dixan	***(For support to the project)***
Pedr0/CBR	***(For support to the project)***
Swan & SCREAM Org.	***(For support to the project)***
M00nShado	***(For denigration to the project ;))***
Pirazzini "PiRaZ" Claudio	***(For estimations to the project)***
AKA	***(For suggestions and help ;))***
MAZ	***(For suggestions ;))***
Przemyslaw Marczyk	***(For suggestions/bug-reporting)***

APPENDIX 1 - THE .DFC FORMAT

Revision 970421.1 - Version: 1.0Beta2

ATTENTION - The format may change in future versions of DEFRACTOR (until the 1.0). I suggest not to code any loader for this version of the format. The .DFC format version 1.0 (non beta) will be the _REAL_ one.

Size	*Type*	*Description*
10	Byte	DFC Signature: Byte 0 - 'V' Byte 1 - Version number (1st digit) Byte 2 - Version number (2nd digit) Byte 3 - Version number (3rd digit) Byte 4..9 - Unused
40	String	Instrument Name (1st char unused)
4	Real	Instrument Length (sec)
4	Real	Oscillator 1 frequency Hz
4	Real	Oscillator 2 frequency Hz
4	Real	Oscillator 1 amplification
4	Real	Oscillator 2 amplification
145	OscSetup	Oscillator 1 Waveform Setup
145	OscSetup	Oscillator 2 Waveform Setup
5	EnvSetup	Oscil. 1 Envelope Setup
5	EnvSetup	Oscil. 2 Envelope Setup
1	Bool	Smoothing Filter Enable/Disable. Values: 0 :Disabled 1 :Enabled
4	Real	Smooth Power
1	Bool	Pinch/Punch Filter Enable/Disable. Values: 0 :Disabled 1 :Enabled
4	Real	Pinch/Punch Power
4	Real	Pinch/Punch Threshold
1	Bool	Sliding Enable/Disable. Values: 0 :Disabled 1 :Enabled
4	Real	Slide Ratio (Hz/sample)
1	Bool	Slide Direction. Values: 0 :Down (Decrease) 1 :Up (Increase)
4	Real	OverDrive
4	Real	Attenuator
1	Bool	Phase & Amplitude Synchronization. Values: 0 :Off 1 :On

4	Real	Internal Multiplier
4	Real	Division Factor

Type: OscSetup (Oscillator WaveForm Setup)		
1	Byte	Shape Number. Values: 0 - Custom 1 - Sine 2 - Square 3 - Saw Tooth 4 - Triagular 5 - Exponential Tooth 6 - Logarithmic Tooth 7 - Duty Square 8 - Sined Square (not available from menus) 9 - Pulse 10 - Parabolic Tooth 11 - Circular 12 - Ramp Tooth 255 - None
4	Real	Parameter 1
4	Real	Parameter 2
1	Bool	Option 1
1	Bool	Option 2
1	Byte	Unused
1	Byte	Unused
128	String	Unused

Type: EnvSetup (Envelope Setup)		
1	Bool	Envelope Enable/Disable. Values: 0 :Disabled 1 :Enabled
4	LongInt	Attack Time (msec)
4	LongInt	Decay Time (msec)

APPENDIX 2 - THE .RAD FORMAT

Not released yet.

APPENDIX 3 - THE .DF2 FORMAT

Will be available soon (it is under development).