

## **SYNTHMASTER 2.5 BETA-TEST VERSION**

Here is a short documentation explaining my program SYNTHMASTER V2.5. I know that this documentation is so poor, but since this version is FREEWARE I did not document everything in deep.

Actually I will prepare a perfect documentation if somebody is **seriously interested** in this project! And I hope that will happen!

### **COPYRIGHT NOTICE**

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### **WHY FREEWARE???**

Well, I tried to show this program to professionals, but they did not care. Besides, I know that no one would send me any money if I made it shareware. Thus, I decided to make this version FREEWARE, so that millions of people would use it and know about me, and thank me for making a contribution to the world of computer music! So please distribute it freely over the net, among your friends, so that everybody knows about ME!

### **PLEASE HELP ME!**

Well, I need help from you, especially if you live in the U.S.A. I am a senior student studying in Electrical and Electronics Engineering in Middle East Technical University. **Next year I WANT TO GO TO THE STATES FOR GRADUATE STUDIES.** However, **I NEED FINANCIAL AID**, and **MY GPA IS LOW (AROUND 3.0 out of 4.0)**. So **PLEASE HELP ME TO FIND FINANCIAL AID IF YOU WANT TO FEEL COMFORTABLE WHILE USING THIS PROGRAM!!!**

### **WHAT IS THE MINIMUM CONFIGURATION TO RUN IT?**

486 DX 33,4MB, Windows 3.1 should be OK, but a P100 8MB is recommended since it makes lots of mathematics!

I have tried this program on Windows 95, and it works with no problem.  
Of course a soundcard is essential to hear the sounds created by the program!

## **WHAT DOES IT DO,WHO IS IT WRITTEN FOR?**

With SYNTHMASTER you can create ORIGINAL SAMPLES INSTRUMENTS of your own and make GREAT MUSIC! And you can do this without paying lots of money to professional keyboards!

Well as it is understood from its name, SYNTHMASTER SYNTHESIZES SOUNDS, and it is not an ordinary synthesizer, it produces PRO QUALITY and ORIGINAL, INFINITELY MANY SOUNDS. When you test it you will see that i am right, that this program is an ORIGINAL ONE.

I believe that SYNTHMASTER is a MUST for every MUSICIAN who has a SAMPLER or a 16 bits SOUNDCARD. Especially, if you have a soundcard with memory and effects like AWE32 (i love it!), YOU CAN CREATE PERFECT SOUNDS AND MUSIC!!!

### ***EXPLANATION OF THE PROGRAM:***

#### ***1) PERIODIC WAVE CREATION WINDOW***

In this window you can create periodic waves. There are five fundamental waves: Sinus, Triangle, Square, Pulse and White Noise. You can choose one of them and you can set the phase and period type of the fundamental wave. Then you can join 16 waves whose frequencies are  $1k, 2k, \dots, 16k$  where  $k$  is the fundamental frequency. (When the fundamental wave is a full period sinus those waves become harmonics! but otherwise not!)

There are lots of parameters for these 16 waves (harmonics), such as Volume, Phase, Upper Limit, Lower Limit, Upper Curvature, Lower Curvature. Just try them only with one wave and you will understand their function graphically.

You can copy the waveform you created to one of the four buffers in the program. just click the right mouse and copy, thats all.

You can also play and save the waveform. Click the right mouse for these actions.

**IMPORTANT : To activate other windows press RIGHT MOUSE BUTTON for the POPUP-MENU.**

#### ***2) PERIODIC WAVE EDIT WINDOW***

In this window you can edit periods. There are two edit waves (periods). They have lots of parameters like Volume, Phase, Upper-Lower Limit, Rectification (full-half-none),

Frequency (1-16). You can mix and multiply them. The output of the operation can be written to one of the four buffers. Besides all these, you can make some operations on the buffers, you can revert, repeat, or take the inverse of the buffers, and you can copy-insert any of the edit waves to a buffer!

NOTE: On each wave's graph the number of maximum bits is written. Click on this label to increase the scale!

### **3) INSTRUMENT CREATION WINDOW**

Here is the most important part of this program. An instrument is formed by mixing two operators. Actually **the number of operators can be increased, but since this is a BETA-TEST version I limit the number of operators with only two.**

Every operator has a main wave, three modulator waves, user-definable pre-filter and shaper.

Every operator has three envelope curves which can be designed as you want!. These envelopes are Volume, Pitch and Filter Envelopes.

While creating the instrument you can change sampling frequency, playing note, and number of loops. Besides you can disable-enable envelope modulators with 'Enable Mod. Loop' checkbox.

After creating the instrument you can play, save, filter, shape and modulate its pitch (chorus), volume or filter cutoff frequency.

Saving can be in three formats: RAW, WAV and BIF. BIF is my own instrument format which stands for BULENT'S INSTRUMENT FORMAT.

#### **3.1) PreFilter:**

At the beginning the prefilter passes all frequencies. By creating different types of filters you can change the frequency characteristics of the main wave of the operator. if you press **CreateMix** instead of **Create** button, you can add filters so that you create more complex and realistic frequency characteristics. By pressing **Reset** button, you can make the filter allpass again. After adding many filters, press **Scale** to normalize the characteristics.

#### **3.2) Shaper:**

With the shaper you can apply nonlinear waveshaping to the operator wave after it is modulated with the Volume Envelope. You can draw the Input-Output transfer curve by **adding** points and placing them with the mouse. You can also set the ratios of the dry input and output that will be mixed after the shaping operation.

### 3.1) Volume Envelope:

In Volume Envelope you vary the volume of the operator in time. The envelope can be between the values +1 and -1. You can disable an operator just by making the Volume Envelope amount zero. You can also modulate volume envelope with the volume mod. wave of the operator.

### 3.2) Pitch Envelope:

In Pitch Envelope you can vary the pitch of the operator within a range of +2 -2 semitones. (+1 -1 full tones) You can also modulate pitch envelope with the pitch mod. wave of the operator.

**IMPORTANT NOTE: If you are using modulators and if the envelope amount of the pitch envelope of an operator is nonzero, dont forget to modulate pitch too, in order to get correct loop points!**

### 3.3) Filter Envelope:

Filter Envelope is very important in synthesizers. In filter envelope you change the frequency characteristics of the operator dynamically. For enabling filter envelope, the envelope amount must be greater than zero and you should set the initial-final cutoff-q parameters. In filter envelope negative values have no significance since the absolute value of the envelope is taken.

Initial Cutoff, Initial Q are the values of the Cutoff frequency and Q (Resonance parameter) when that graph of the envelope is at zero. In the same manner, Final Cutoff, Final Q are the values of the Cutoff and Q when the graph is at max. level.

There are five types of filters. These are : LowPass, HighPass, BandPass, BandStop and AllPass. With using them you can create interesting sounds/effects, especially with a high Q parameter!...

### 3.4) Filtering Instrument:

By creating different types of filters you can change the frequency characteristics of the instrument. if you press **CreateMix** instead of **Create** button, you can add filters so that you create more complex and realistic frequency characteristics. By pressing **Reset** button, you can make the filter allpass again. After adding many filters, press **Scale** to normalize the characteristics.

### 3.5) Shaping Instrument:

With the shaper you can apply nonlinear waveshaping to the instrument. You can draw the Input-Output transfer curve by **adding** points and placing them with the mouse. You can also set the ratios of the dry input and output that will be mixed after the shaping operation.

### **3.6) Modulating Instrument Pitch,Volume and Filter Cutoff Freq.:**

With the modulators, you can create more complex and realistic sounds. You can also delay the modulated signal (dry output) and mix it with the original signal. (dry input)

A Sine wave is used as the modulator. It has 4 parameters: Length, Volume (depth), Phase and DC offset ( used only in Amplitude Modulator).For the Amplitude Modulator a LowPass filter is added to prevent aliasing. Length is the length of one period in terms of the last loop length of the instrument. When you modulate the instrument parameters, the length of the loop increases or remains the same!

**3.7) Adding Echo/Reverb:** Reverb is the effect which simulates the infinite reflections inside rooms, concert halls, etc. I used four parallel echoes cascaded with a filter to create this effect. Every echo has four parameters: delay, volume, attenuation and feedback delay.

## **FUTURE OF THE PROGRAM**

I will add an envelope generator for the created instrument . With that, you will be able to apply volume filter, pitch envelope to the generated instrument as much as you want, and that will make the instrument more complex and realistic.

I will write a sample editor which uses the filters, shapers, modulators , envelope generators used in this program and a lot more effects of course! I will also add user-definable mathematical functions for the Shaper Part.

I will also design a **REALTIME AUDIO PROCESSING PROGRAM** for my **BS PROJECT**. I know that it will be a **must** especially for **GUITARISTS!!!**

I know that the GUI DESIGN of the program is not good, and there are some minor bugs in the program. However, at the moment I did not care much about those since I am concentrating on the algorithims. But **IF ANY COMPANY IS INTERESTED TO BUY THE RIGHTS OF THIS PROGRAM , I CAN IMPROVE THE GUI AND MAKE THE PROGRAM BUG-FREE!**

## **FINAL NOTE:**

**IF ANY COMPANY EMPLOYS ME OR GIVES ME SCHOLARSHIP I can give all my rights on this program to them!!!**

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