UltraSound Patch Maker Lite

Ultrasound Patch Maker Lite lets you create and modify <u>patches</u> to be used with the Gravis UltraSound.

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Quick Tour and Tutorial

This quick tour and tutorial will acquaint you with many of Patch Maker's features by taking you step-by-step through the creation of a new underline patch. (In the following, it is assumed that you have installed Patch Maker in the directory C:\PMAKER.   If you have chosen to install Patch Maker in a different directory, use that directory name instead when C:\PMAKER is referred to in the instructions.)

It will take about 15 minutes to complete this tutorial. You can stop working through the tutorial at any time and resume it later. Just be sure to save the patch you are working on before closing Patch Maker. To resume working on your patch, open the saved patch.

1. Start Patch Maker.

If you haven't already started Patch Maker, do so now by double-clicking on its icon:

You will see an empty window with a menu bar at the top and a toolbar just below the menu bar.

2. Add a waveform.

Under the File menu, choose the Open .WAV File... command and open the file C:\PMAKER\ VIOLIN.WAV. The following icon for the waveform will appear near the bottom of the Patch Maker window:

You can play the violin waveform by clicking the right mouse button when the mouse cursor is over its icon. You should hear a very brief violin note when you do this.

3. Create an empty patch.

Under the File menu, choose the New command. A black and white keyboard appears a new window.

You can clean up the Patch Maker window a little by now choosing the Tile command under the Window menu.

4. Add the waveform to the patch.

You add waveforms to patches by dragging and dropping their icons onto patch keyboards. Move the mouse cursor over the icon.   Click and hold the left mouse button.   While continuing to hold the left mouse button down, move the mouse cursor over a point

somewhere near the middle of the keyboard and release the button when the cursor shape

changes from ⊘ to

⬚ . (Be sure the cursor is over the keyboard and not just in the keyboard window when you release the button.) The keyboard now appears yellow with a red border and a red rectangle:
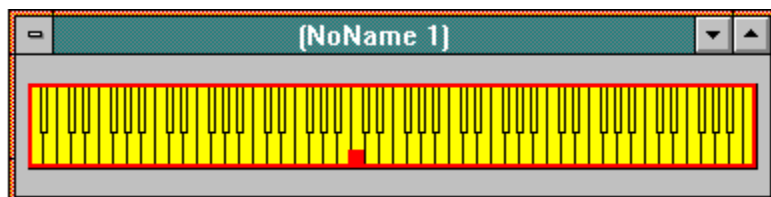
The red border indicates the range of notes that the waveform will be used for.   The rectangle, which appears on the note where you dropped the waveform, indicates the location of its root note.   We will return to these items later in the tutorial.

You can play the patch now if you want, but it will not sound very good until we do some more things to it.   To play the patch, click the right mouse button on one of the keys of the keyboard. If you click on the key where the red rectangle is located, the sound you get should be just like that of the original .WAV file.

5. Save the patch

We haven't done much yet, but let's save the patch now anyway.   Under the File menu, choose the Save As... command. If the Save As... command is grayed out, click the left mouse button on the keyboard to make the keyboard window active.   Then choose Save As... again.

You can save it with any name that you like, but it is recommended that you give it a name that indicates that it is an experiment, for example, C:\PMAKER\TUTORIAL.PAT.

6. Define a loop region

How are we going to make our little blip of a violin sound like an instrument that can play notes of arbitrary length? The trick is to play a part of the waveform (called the loop region) over and over again. For this to sound good, the ends of the loop region must match precisely. If they don't the patch will have horrible buzzes or clicks in it.   Setting up a good loop region is often the hardest part of making a patch. Fortunately Patch Manager can simplify the process in many cases.

To set up the loop region, click on the toolbar icon that looks like this: ↻

This brings up the Edit Loop Region dialog.   Now click on the
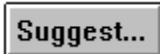
▶ Play

button to play the patch. Sounds terrible, but that's because we haven't set up our loop region properly yet.   The default loop region is half of the entire waveform, which is rarely a good choice.   Press the

Stop button to stop the sound if you wish.

There are two values that determine the loop region: the place where the loop starts and the length of the loop. The slider controls in the Edit Loop dialog let you adjust these.   If you are playing the patch while you adjust these values then you hear the results immediately.

Sometimes the only way to set a loop region is to do it by ear, that is, keep adjusting the sliders until the sound quality is good. However, when the sampled sound is highly periodic, as is the case for our violin, then Patch Maker can help.   Click the button marked

Suggest...

Patch Maker then briefly analyses the waveform values and suggests a loop length that should work, in this case 135.282 samples. To use that value, click the same button, which now looks like

Use

If you are not already playing the patch, press the Play button now. It should sound like a reasonably good violin note.

Press the **✔ OK** button to close the dialog and save the loop region values.

7. Tune the patch

Our violin is almost certainly way out of tune. Click the tuning icon

Y

on the toolbar and the Adjust Tuning dialog appears.   Under the Play button in this dialog are options to play the patch note, a reference tone, or both.   Press Play and select various combinations of options.   You will no doubt hear that the patch note and the reference tone are quite different.

The tuning of the waveform is controlled by the frequency of the root note. There are two ways to adjust the root note frequency to get the patch in tune. The first way is to move the slider labelled Sample Pitch while playing the waveform until it is at the same pitch as the reference tone. The second, and easier way, is to press the Use button under the Suggested Frequency label.   (If the button is labelled Find... then press it to analyze the waveform and calculate the suggested frequency. Then press the Use button.) The suggested frequency is not always the best one, but in the case of our violin patch, it works just fine.
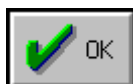
Press the **✔ OK** button to close the dialog and save the tuning value. You may notice that the position of the root note (as indicated by the solid red box on the keyboard) has changed, reflecting the new value of the root frequency.

8. Set up the envelope

There is nothing wrong with the default envelope for our patch, but let's look at how to adjust it anyway. Click the icon

on the toolbar to bring up the Choose Envelope dialog.

The default selection of "Sustain notes" is appropriate, because we want a violin note to continue playing until a *note off* message is sent.

When a violin note is played, you would expect it to be have a constant volume until it is turned off.   This is different from a piano note, for example, where the volume starts to die away as soon as it is played. So, choose the "Sustain at constant volume" option under the "While note is on..." label.

When a violin note stops playing, the sound dies away almost immediately. So, choose the "Reduce volume quickly" option under the "When note is turned off..." label.

Press the button to close the dialog and save the evelope values.

9. Adjust vibrato and tremolo

Real violinists use vibrato to give a sustained note a more interesting sound. To add vibrato to our patch, click on the icon

on the tool bar to bring up the Edit Vibrato dialog, which lets you adjust the sweep, rate and depth of vibrato for the patch.

These values can be adjusted and the effect heard immediately if the button is pressed, You might need to press the

 and then the Play button for the vibrato to begin. Set the vibrato values as follows: sweep = 30, rate = 200, depth = 10. Press the

 button to close the dialog and save the vibrato values.

We could set the tremolo values in a similar manner by clicking the icon

on the tool bar.

10. Adjust the balance

Violins in chamber music or orchestras are usually located on the right (as seen from the audience).   So let's set the balance of our patch to the right.   Click the icon

on the toolbar to bring up the Adjust Balance dialog box. Press the button to hear the violin and adjust the Balance slider to move the sound to the right. A value of 11 for balance works well.

Click the button to close the dialog and save the balance value.

11. Add a description
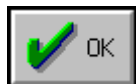
Click the icon

on the toolbar to bring up the Patch Descriptors dialog. You are no doubt very proud of the patch you have created and want to replace the default Description field with your own

personalized remark. Go for it. Press the button when you are done to close the dialog.

A name for the instrument (up to 16 characters) can be entered in the Instrument Name box. This name can displayed by applications (such as UltraSound Patch Manager) to help identify the patch. "Violin" would be a reasonable choice for a name. You could also add a name for the current waveform.   By default it has the same name as the .WAV file it came from.
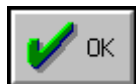
Click to button when you are done to close the dialog and save the name.

13. Adjust the waveform range

Most instrument patches contain more than one waveform. Different waveforms are used to cover different ranges of notes, in order to achieve a higher quality of sound.   As it stands, our violin patch does not leave any room for other waveforms, because the single waveform we have covers the entire keyboard (as indicated by the fact that all the keyboard keys are yellow).

To make room for other waveforms, we will adjust the range of notes to be covered by the current waveform.   To do this move the mouse cursor over the right end of the red box

until it changes into the shape ⊣ . Press the left mouse button and hold it while you move the mouse to the left.   The yellow-colored region changes with the mouse movement.   Move the left hand side of the region similarly.

Your keyboard might look something like this when you finish:

If you try to play notes outside the range shown in yellow, you won't hear anything. You could now drop another waveform onto an uncolored part of the keyboard. Colors for waveform ranges alternate between yellow and blue.

15. View the patch information

Press the toolbar icon

to bring up the View Patch Information dialog. It lets you see how big the patch is, and information about the current waveform.

16. Congratulations!

Well done, you now know how to create new, high-quality patches for your UltraSound. This is a good time to do some experimenting, if you haven't already. Open several patches and several wave files at once into Patch Maker's window. Add more wave waveforms to your patch. And of course, use the patch in making music or special effects!

How to Load an Existing Patch for Editing

There are three methods for loading a patch file into Patch Maker.

(1) Use the File | Open command.

(2) Drag and drop a patch file from the Windows File Manager into Patch Maker's main window. (See your Windows documentation for more information about drag-and-drop.) The patch file extension must be .PAT. You can drop several files at the same time.

(3) Include the name of the patch file in the command that is used to start Patch Maker. For example, to load the patch file **hello.pat** when Patch Maker starts, you could create an icon with the command line

    pmaker.exe hello.pat

patch

A patch is a file that contains sound waveforms and associated information that is used to define an instrument sound for the UltraSound.

loop region

A loop region is a portion of a <u>waveform</u> that is played repeatedly to provide sound for a note whose duration is longer than the duration of the waveform.

File New

The New command creates an empty patch. You would use it if you want to create a new patch from scratch using waveforms. To edit an existing patch, use the File Open... command.

File Open...

Use the Open command to bring an existing patch into Patch Maker's window in order to test or modify it. You can also <u>open patches</u> by specifying them on the command line or by dragging and dropping them onto the Patch Maker window.

File Open .WAV File...

Use this command to open a <u>waveform</u> file. Later, this can later be added to a <u>patch</u> by dragging and dropping it onto a patch keyboard.

You can also open a waveform file by specifying its name on the command line when you run Patch Maker, and by dragging and dropping a file with the extension .WAV from the File Manager onto Patch Maker.

File Save

Use this command to save a patch that you have created or modified. Any changes you have made to the patch will then be permanent.

File Exit

Use the Exit command to leave Patch Maker. If you have modified any <u>patches</u> since they were last saved, you will be asked if you want to save them.

Edit Delete

Use the Delete command to remove the current <u>waveform</u> from the current <u>patch</u>.

Edit Remove Silence

The Remove Silence command can be used to eliminate periods of silence from the beginning and end of a <u>waveform</u>. It works on the current waveform by first doing an analysis to find the first and last sample points that are louder than a threshold (which is determined automatically). You are then given the option to delete the sample points outside that range.

Edit Maximize Volume

If the current <u>waveform</u> is too quiet, you can use the Maximize Volume command to increase its volume. The sample data is analysed to find the minimum and maximum values, then all points are multiplied by a factor which ensures that the maximum allowed range is used.

At the same time, the average value of the samples is arranged to be zero (i.e., any DC offset is removed). This can help the <u>patch</u> sound better and avoid pops and clicks.

You are informed of the percentage by which the waveform volume will be increased, and asked to confirm that it is alright to proceed. Note that because of the DC offset removal, it can happen that the percent volume increase is negative.   This is an applicable value and can lead to a better sounding patch if accepted.

Edit Loop Region

A waveform in a patch often has a loop region defined. This dialog lets you interactively modify the loop region values to obtain high-quality sound that can have a long duration.

Defining the loop region

A loop region has a start point and a length, which can be set by their respective sliders marked coarse and fine. As the names suggest, coarse lets you set the value to approximately where you want it and fine lets you fine tune the value for the best sound. You can not have a start point and loop length combination that would put the end of the loop region past the end of the sample data. Thus the sliders may refuse to move beyond a certain point when you are dragging them to the right.

Getting loop parameters that result in a good sound can be tricky. For many waveforms, the [Suggest...] button can help. When you press this button, the sample data is analyzed (this may take a few seconds) and a minimum loop length to use is suggested.

After pressing the Suggest... button, its label changes to use and something like the following will appear:
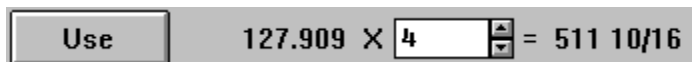
In this example, the suggested minimum loop length is 127.909. However, you can sometimes get better results by using a multiple of the minimum length. In the example, the multiplier is set to 4 with a resulting loop length of 511 10/16. If you press the Use button now, the loop length will be set to 511 10/16 samples, and the loop start point will be set as close to the end of the waveform as possible. Some fine tuning may still be needed, but the above procedure will often get you into the right ballpark.

Setting the loop type

The loop region can be played forwards, backwards or in both directions. The check boxes labelled *Forward*, *Backward*, *Unidirectional* and *Bidirectional* let you choose these options.

Enabling looping

When you bring up this dialog, the Enable Looping checkbox is checked by default. If you do not want the patch to play the loop region repeatedly, uncheck this box.

Choose Envelope

This dialog lets you view or modify the <u>envelope</u> options for the current sample.

The **Sustain** option lets you determine what happens when you have set a note on, but before you turn it off. For most percussion instruments, the notion of turning the note off does not apply, and you just want the sample to play through. For melodic instruments, you typically want the note to continue playing (although perhaps at decreasing volume) until a note off is sent.

The **While note is on...** options let you choose whether a note maintains a constant or decreasing volume until note off is sent. Note that if looping is not enabled, the note sound will play only for the duration of the sample in any case.

The **When note is turned off...** options let you choose how quickly the note volume decreases when a note off is sent.

Use the button to interactively explore the effects of these options. You may need to stop and re-start the note to hear the effect of some options.
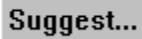
Adjust Tuning

This dialog lets you put the current <u>waveform</u> in tune. When you press the button, you will hear your waveform and a reference tone, which is at the pitch that your waveform should be at to be in tune.

You can interactively set the pitch while the note is playing by adjusting the slider labelled Sample Pitch. You can play either the waveform note or reference tone alone, or play them together by choosing the appropriate option under the Play/Stop button.

In many cases, you can press the button to get some help in gettting the patch in tune. When you press

, the sample data is analysed (this make take a few seconds) and a frequency is suggested to put the sample in tune. The label of the button changes to

. If you press the Use button, the suggested frequency will applied to the patch tuning values to affect its pitch.

Edit Vibrato/Tremolo

This dialog lets you view or modify the vibrato (pitch variation) or tremolo (volume variation) characteristics, respectively, of the current waveform. The effects of vibrato and tremolo are determined by the sweep, rate and depth of the effect.

You can interactively set these values by pressing the [Play] button and adjusting the sliders.   In some cases, you need to stop and re-start the note in order to hear the effect.

sweep

The sweep value for vibrato or tremolo determines how soon after the note is turned on that the effect takes place.   The larger the value of sweep, the longer the delay.

rate

The rate value for tremolo or vibrato determines how quickly the pitch or volume varies.

depth

The depth value for tremolo or vibrato determines how large the variation is.

Edit Patch Descriptions & Names

This dialog lets you view and modify descriptions of elements of your <u>patch</u>.

Patch Description holds any text you want about the patch.

Instrument Name can hold the name of the instrument for this patch. This can be used by other applications to help identify the patch.

Waveform Name can hold any name you wish to give to this waveform. By default, Patch Maker uses the name of the .WAV file that the waveform came from.

Display Patch Information

This dialog shows some information about the patch data. None of this information is necessary to make patches, but is provided for the curious.

Total Patch Size is the total amount of UltraSound memory that will be taken up by the patch. It is usually a little larger than the sum of the sizes of each waveform in the patch, because the size of each waveform is rounded up the next multiple of 32.

Waveform Size This is the size (in bytes) of the current waveform.

Waveform Rate This is the sampling rate of the current waveform.

Type of Data Waveform data can be 8-bit or 16-bit, signed or unsigned.

Commands

File menu
New
Open
Open .WAV File...
Save
Save As...
Exit

Edit menu
Delete
Remove Silence
Maximize Volume

Window menu
Tile
Cascade
Arrange Icons
Close All

Toolbar

 Display patch information

 Edit patch descriptors

 Edit loop region

 Choose envelope

 Adjust tuning

 Edit vibrato

 Edit tremolo

 Adjust balance

 "Panic button"

Adjust Balance

This dialog lets you adjust the balance of the current waveform. Each waveform in a patch can have its own balance.

Panic Button

The panic button reloads all patches that you are working on into UltraSound memory. There are two situations where you might want to do this:

1. A note will not stop playing. (We have tried to prevent this from happening, but have provided the panic button, just in case.)

2. No sound, or incorrect sound, is heard when you play a patch note. This can happen for example if you run another program which uses the UltraSound while Patch Maker is running.   The other program may have loaded its own patches.

waveform

A waveform is a collection of <u>samples</u> of a sound. In Windows, waveforms are usually stored in a file with .WAV extension. A <u>patch</u> for the UltraSound contains one or more waveforms which contain the sampled sounds of an instrument.

(Sometimes, people use the term sample and waveform interchangeably.)

sample

A sample is a single number representing one point in a digitized sound. (Sometimes the word sample and <u>waveform</u> interchangeably.)

envelope

The envelope of a <u>waveform</u> is a set of numbers that describe what volume each part of the waveform should be played at and whether the volume increases or decreases in each part.

sustain

If a <u>waveform's</u> <u>envelope</u> has sustain selected, a note will play through the first part of the envelope and then maintain a constant rate of increase or decrease of volume for as long as it is on. When the note is turned off,   the note plays through the remainder of the envelope.

If sustain is not selected, then a note will play through the envelope values without stopping until the end of the sample is reached.

root frequency

The root frequency of a <u>waveform</u> in a <u>patch</u> determines the pitch at which a note will play. The root frequency is normally the frequency that the note was played at when it was sampled. It might be different to allow for fine tuning of the note.

The note corresponding to the root frequency is shown as a red rectangle on the patch keyboard. It can be changed in the <u>Adjust Tuning</u> dialog.

note range

A single waveform in a patch is normally used to play several different notes in a range. The notes that a particular waveform applies to are known as a note range and are shown as colored regions (yellow or blue) of the patch keyboard.

File Save As ...

This menu command lets you save the current patch into a file with a different name.

Suggest…

When you press the Suggest… button in the <u>Edit Loop Region</u> or <u>Adjust Tuning</u> dialogs, Patch Maker analyses the current <u>waveform</u> to determine what values to use for the <u>root frequency</u> and the length of the <u>loop region.</u> Then the name of the button changes to Use.

Use

If you have pressed the Suggest... button in the Edit Loop Region or Adjust Tuning dialogs, then the name of that button changes to Use. If you press Use, the suggested value is used.

Window Tile

This command arranges the patch windows so that they do not overlap.

Window Cascade

This command arranges patch windows so that they overlap in an orderly fashion.

Window Arrange Icons

This command spaces any icons evenly in the main window.

Window Close All

This command closes all patch keyboard windows, patch keyboard icons and waveform icons.