



Pitch 'n TimeTM 2

Time stretching and Pitch Shifting for Professionals

User Guide

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System Requirements

Hardware

- PowerPC® Macintosh

or

- Pentium PC

Software

- Pro Tools 4.0 or higher

NOTE: Serato Pitch 'n Time 2 was designed to be used with Digidesign Pro Tools. Although Serato Pitch 'n Time 2 may function with other DAW's that support the AudioSuite architecture, not all functions may look and behave as described here.

Basics

What Serato Pitch 'n Time 2 does

Serato Pitch 'n Time 2 is a high quality time stretching and pitch shifting plug-in for use with Digidesign's AudioSuite architecture. It offers time compression and expansion from a ratio of half speed through to double speed independent of pitch, and pitch shifting of up to 12 semitones independent of tempo.

The time-stretching and pitch-shifting functions each have three interchangeable panels, ranging from simple fixed ratios to complex tempo and pitch alterations that vary over time. You can even warp the timing of your samples just by placing markers and moving them around.

The tempo and pitch panels can be mixed and matched to suit your application, and with a sufficiently powerful processor previewing may be done in real time.

Why is Serato Pitch 'n Time 2 an AudioSuite Plug-In and not TDM or RTAS?

At the time of writing the Digidesign Audio Engine (DAE) supports three plug-in architectures: TDM, AudioSuite and Real-Time AudioSuite (RTAS). TDM and RTAS are real-time architectures using DSP and host-based processing respectively, while AudioSuite is file-based.

The two real-time architectures provide the digital equivalent of "black boxes". One of the fundamental aspects of their design is that they require a plug-in to have a 1:1 input to output ratio, so the number of samples coming out of a plug-in must equal the number of samples being sent in. This behavior is similar to having an external box with audio inputs, outputs and controls. In principle such a box cannot time stretch, since time stretching implies a non 1:1 input to output sample ratio.

Being file-based, AudioSuite plug-ins have complete random access to the source data and also have no restriction on input to output ratios. This gives a plug-in the freedom to implement such processes as sample-rate conversion, time stretching, and time reversal. AudioSuite is the only Pro Tools plug-in architecture under which Serato Pitch 'n Time 2 can operate effectively.

Getting Started

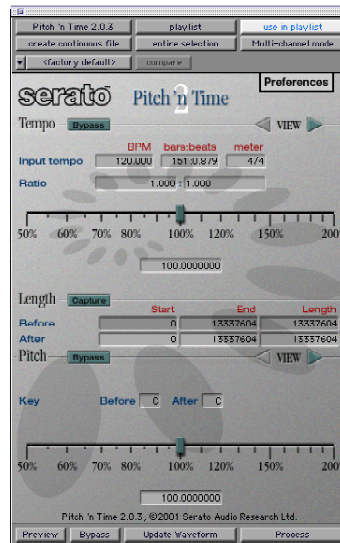
How to launch Serato Pitch 'n Time 2

1. Bring up the Serato Pitch 'n Time 2 window by selecting it from the AudioSuite menu.
NOTE: This menu is not accessible until you have a session open.



2. The Serato Pitch 'n Time 2 Window should appear with the standard Pro Tools plug-in controls at the top and bottom of the window.

Providing that you have some audio in your session Serato Pitch 'n Time 2 is ready to use.



The Interface

The screenshot shows the Serato Pitch 'n Time 2.0.3 interface. At the top, there are buttons for 'create continuous file', 'entire selection', 'Multi-channel mode', and 'use in playlist'. Below these are 'factory default' and 'compare' buttons, and a 'Preferences' button. The main interface is divided into three sections: Tempo, Length, and Pitch. Each section has a 'Bypass' button and a 'VIEW' button. The Tempo section shows a waveform with a tempo line and a 'Reset' button. The Length section shows a table with columns for 'Start', 'End', and 'Length'. The Pitch section shows a waveform with a pitch line and a 'Reset' button. At the bottom, there are buttons for 'Preview', 'Bypass', 'Update Waveform', and 'Process'.

Preferences
lets you customize the interface to suit your way of working.

Tempo
The time-stretch modes are: Fixed, Variable and Morphing.

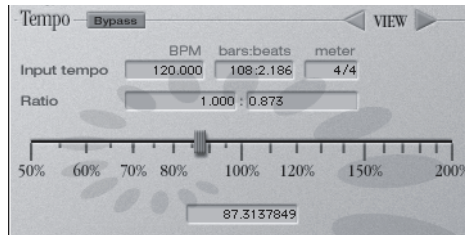
Length
shows the start, end and output length of your selection.

	Start	End	Length
Before	3:01.840	3:16.622	14.781
After	3:01.840	3:17.702	15.862

Pitch
The pitch-shift modes are: Fixed, Variable and Varispeed.

Fixed Time-stretch Panel

The simplest way to control tempo, the fixed time-stretch panel, lets you accurately slow down or speed up your selection by a single stretch factor.



The amount of time stretch is displayed in the center of the panel below the slider. Moving the slider changes the ratio, and the new value may be entered directly into the field. By going to the preferences panel you choose to work with percentage change, or with output BPM if you prefer.

The ratio fields let you specify the time stretch factor by entering before and after rates. An ideal use for this feature is time-stretching to convert between two frame rates; Just enter the source and destination frame rates, and press process.

This panel also includes fields to assist with BPM calculations. These are:

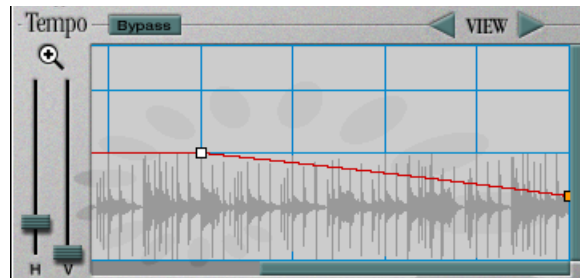
Input BPM: This field shows the original tempo of the current selection in Beats Per Minute. If the tempo of the selection is defined within Pro Tools then this field is filled in automatically (if no value has been entered manually). When the input BPM is entered, the Bars & Beats field is calculated automatically.

Meter: Entering the current time signature assists the plug-in with interpreting the Bars & Beats field, by nominating how many beats each bar contains.

Bars & Beats: This field shows the length of the current selection in Bars and Beats, if known. Entering this length will cause the plug-in to calculate the BPM of the selection.

Variable Time-stretch Panel

This panel offers a more sophisticated interface to the time-stretching function of Serato Pitch 'n Time, by providing an editable tempo automation graph.



Here you can see someone adding a ritardando to a constant-tempo recording

The most important part of this view is the red line. This shows how the speed of playback will vary over time. The small boxes on top of the line are handles, and these let you specify the tempo you want at a particular time. Most handles are white, but the currently selected handle is shown in orange. The time and tempo of the selected handle is shown in the two fields Time and Tempo below the graph.

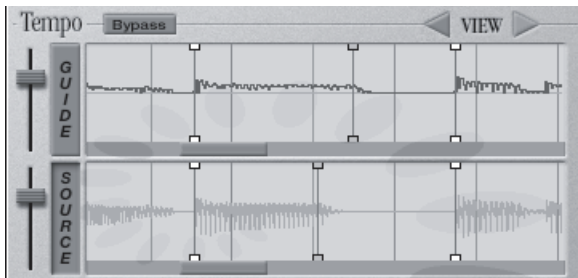
To select or move a handle, click within its box. To create a new handle, click anywhere on the line where there isn't already a handle. To delete a handle option-click it, drag it outside the graph, or move it on top of one of the handles to either side. The line always shows how the tempo will vary smoothly between the handles you have set.

By pressing the Update Waveform button you can have Serato Pitch 'n Time 2 display a waveform overview as a visual aid behind the automation graph. Note: for large selections this can take a while to build.

Tempo automation can be as simple as a ramp from 120 bpm to 130 bpm, and as complex as you like. To help with detailed editing of automation data, the graphical editing modes of Serato Pitch 'n Time 2 include both horizontal and vertical zoom. These zoom sliders can be found to the left of the graph, and always zoom in on the center of the current view. The size of the scroll bars vary to reflect how much of the entire graph is visible.

Morphing Time-stretch Panel

This is the third time-stretching panel, and again provides a time-varying time-stretch facility. This panel is useful if you need to control *when* things happen, rather than how quickly. Just drop markers on the audio and move them where you want them to go. Serato Pitch 'n Time stretches and squashes the audio to fit! There are two graphs on the morphing panel, the lower of these shows the selection and markers



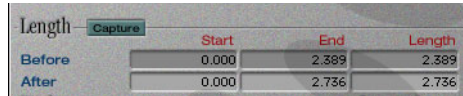
Here a note has been lengthened without altering the surrounding notes

before processing. The upper graph shows where the markers will go after processing. The output graph also has a guide waveform overview. The guide waveform is available as a visual reference and appears beneath the output waveform, which is shown as a dark outline.

There are buttons labeled GUIDE and SOURCE next to the graphs. Whichever one is pressed in controls which waveform overview will be updated when the Update Waveform button is pressed. So to load a guide waveform in, press GUIDE and then Update Waveform. To load the waveform for your source, just make sure SOURCE is pressed in and press Update Waveform. It is recommended that you load your guide waveform first, to avoid any confusion.

Markers are shown as vertical lines with handles at the top and bottom. The selected marker's handles are shown on both graphs in orange, and the corresponding input and output times are displayed at the bottom of the panel. Markers can be selected and moved in either graph by clicking anywhere on the line. Option-clicking a marker deletes it, as does dragging it outside the graph. New markers can be created by clicking anywhere except on an existing one.

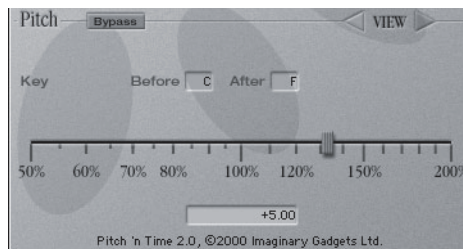
Length Panel



No matter which time-stretching mode you're in, the length panel is always available. It shows the start, end and length of your selection both before and after processing. You can change the output values at any time by typing into those fields. When you do, the current time stretch panel is altered to match.

This panel also features the "Capture" button, which can be used to easily match sample lengths. When pressed, the capture button memorizes the length of the current selection. As soon as a second region is selected, the current time-stretch panel is automatically adjusted to create the output length that was memorized.

Fixed Pitch-shift



This pitch-shift panel works similarly to the fixed time-stretch panel, applying a simple, single pitch shift factor.

In the preferences panel you can choose between working with percentage frequency change or semitones + cents. The two fields above the pitch slider provide a simple way to transpose your selection. Just enter the key of the source and the new key you would like; the plug-in calculates the required pitch shift.

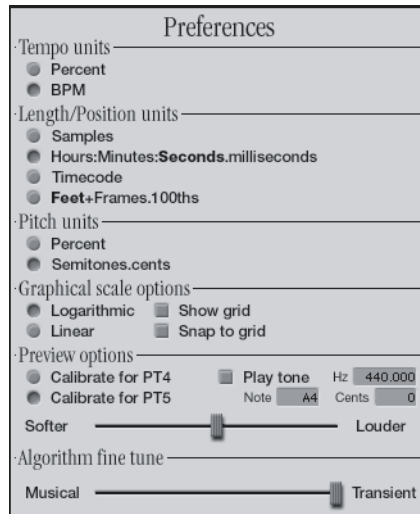
Varispeed Pitch-shift Panel



This panel has no controls, and forces the pitch shift to precisely match the time-stretch at any point in time. This recreates a classic varispeed effect, allowing you to make great sounding record/tape speed-up and slow-down effects. To go really slow, use the variable time-stretch panel on a linear vertical scale.

Preferences Panel

This is where you can change settings that apply globally to the plug-in, and are remembered every time you bring Serato Pitch 'n Time 2 up. This panel can be accessed at any time by pressing the button labelled Preferences. To put away the Preferences Panel, click anywhere outside it.



Time-stretch units

- Percent** Edit time-stretch values as a percentage of the original tempo.
- BPM** Work in terms of the output BPM. An input BPM must be specified for these units to make sense.

Length / Position units

- Samples** These are the smallest units of audio that Digital Audio Workstations work with. The largest value allowed in these fields is $2^{31}-1 = 2,147,483,647$ samples, or approximately 13 1/2 hours of audio at a sample rate of 44,100 samples per second.

Hours:Mins:Secs Display lengths in hours, minutes and seconds, in the format HH:MM:SS. Hours and minutes will not be displayed if the length is less than one hour or one minute respectively. The default units are seconds when entering values, but colons can be used to quickly enter larger values. For instance, typing "1:" enters 1 minute, and typing "2::" enters 2 hours.

Time code Use SMPTE time code.

Feet+Frames This refers to lengths of film in feet and frames, where 1 foot = 16 frames, and there are 24 frames in 1 second of audio. This relationship is independent of the SMPTE frame rate for the session.

Pitch units

Percent Edit pitch-shift values as percentage frequency change.

Semitones Show transposition in semitones and cents (1/100ths) on all pitch change displays.

Graphical scale options

Log / Linear This selects the vertical scale for automation graphs. The interpolation between handles is not affected by this setting on the variable time-stretch panel, so in log mode lines will appear bent. The variable pitch-shift panel alters its interpolation to match this setting, so lines are always straight.

Show grid Display grid lines on all graphical views.

Snap to grid When editing handles, snap them to nearby grid lines.

Preview options

Play tone Play a reference tone along with the preview, to facilitate tuning by ear. The note to play and detuning can be also be entered here, or the frequency can be entered in Hertz.

Gain Controls the volume level of preview mode. This gain change is not applied when you press Process.

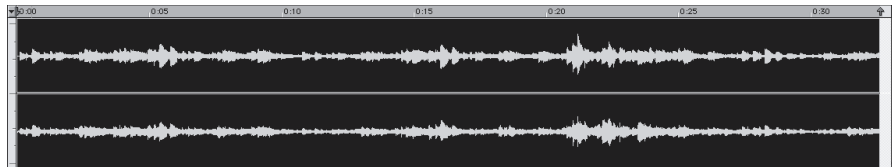
Algorithm fine tune

This slider lets you bias the Serato Intelligent Sound™ algorithm towards more tonal sounds (e.g. pipe organ) or more transient sounds (e.g. drums).

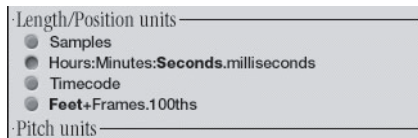
Production Examples

Example 1: Making a finished ad fit the available space.

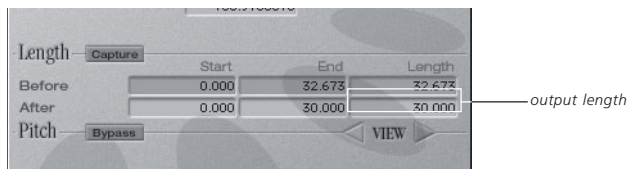
1. Fully mixed advertisement, must fit 30 second slot, but is 32.673 seconds long.



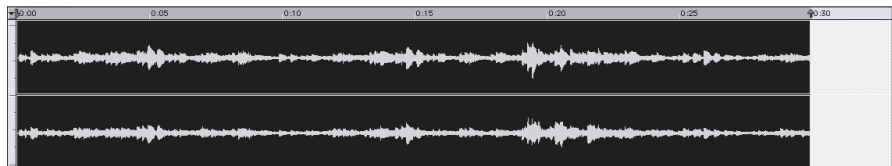
2. Bring down the preferences panel and set length units to seconds.



3. Type "30" into output length field.



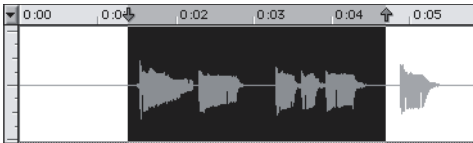
4. Press Process.



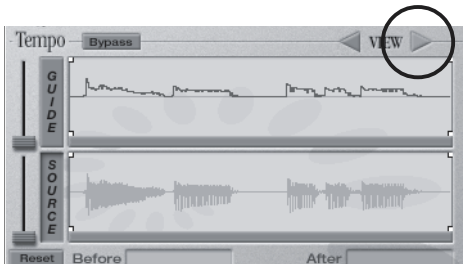
Example 2: Lengthening a note

In this example we're going to extend the sustain of a note that was played too short.

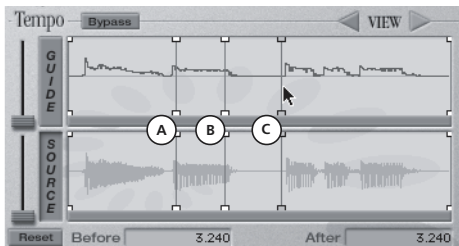
1. Make a selection around the note you wish to lengthen.



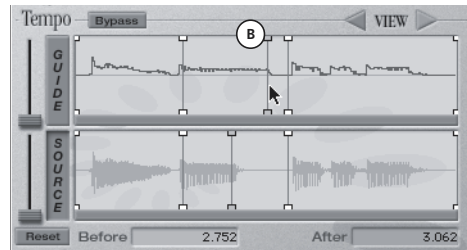
2. Scroll over to the Time-Morphing panel by clicking the right arrow then press the Update Waveform button.



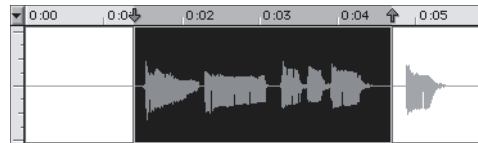
3. Click on the waveform to drop markers at (A) just after the start of the note (B) just before the end of the note and (C) just before the start of the next note.



- Click on marker **B** in the top (output) waveform, and drag it to where you want the note to end.



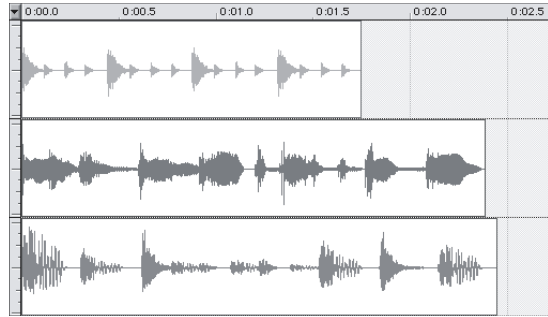
- Press **Process**.



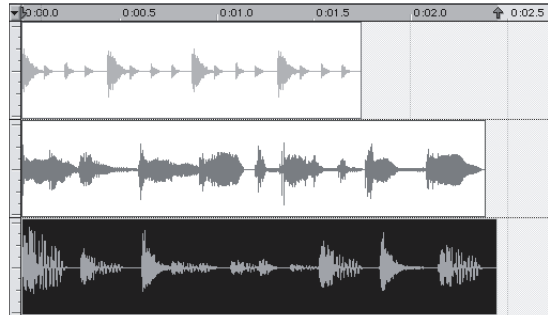
Example 3: Matching loop tempos

Here we will show how to use the **Capture** button to match several loops to the same tempo.

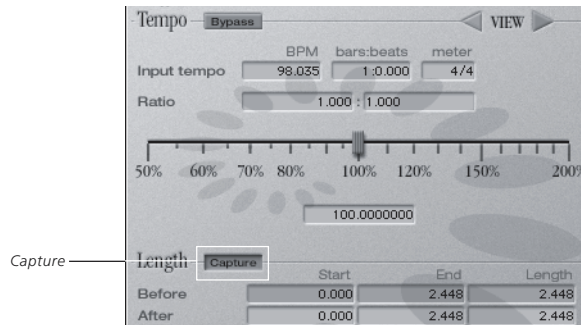
1. Some loops with differing tempos.



2. Select the loop with the correct tempo.



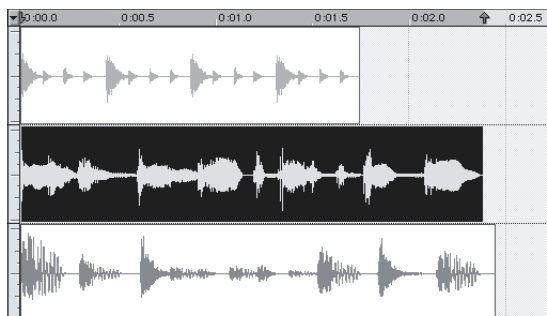
3. Press **Capture**.



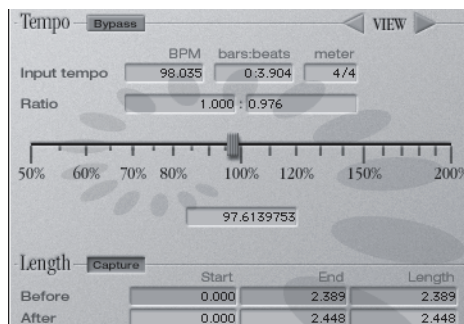
A screenshot of a DAW's Tempo control panel. The panel includes a 'Tempo' section with a 'Bypass' button and a 'VIEW' button. Below this, there are fields for 'Input tempo' (98.035 BPM), 'bars:beats' (1:0.000), and 'meter' (4/4). A 'Ratio' field shows '1.000 : 1.000'. A large slider is set to 100%, with a numerical display below it showing '100.0000000'. At the bottom, there is a 'Length' section with a 'Capture' button highlighted by a red box and a line pointing to the word 'Capture' on the left. Below the 'Capture' button is a table with columns for 'Start', 'End', and 'Length'.

	Start	End	Length
Before	0.000	2.448	2.448
After	0.000	2.448	2.448

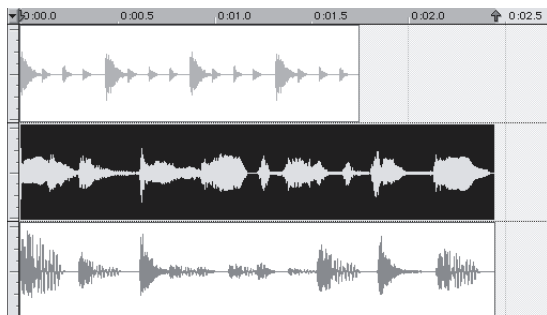
4. Select first loop with incorrect tempo.



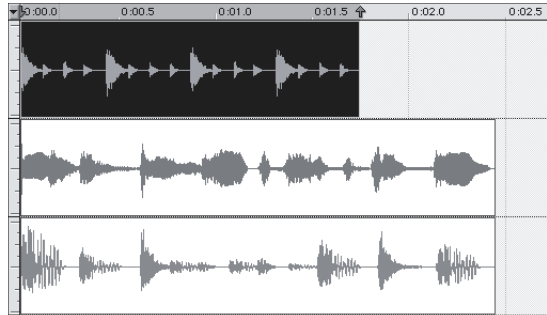
5. Notice that the controls auto update to show time stretch needed.



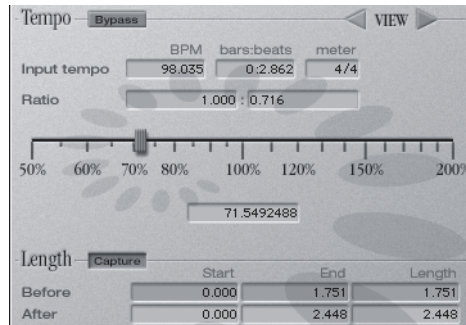
6. Press Process.



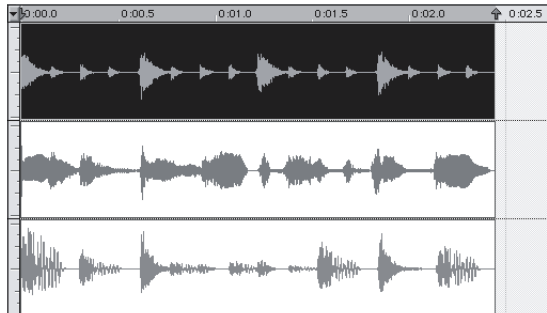
7. Select second loop to be processed.



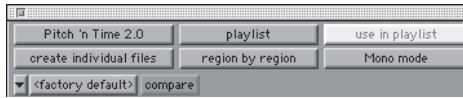
8. The controls auto update again.



9. Press Process.

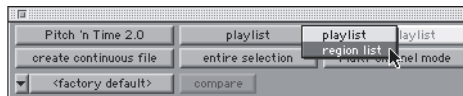
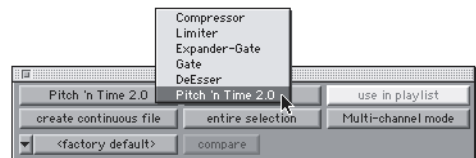


Pro Tools Plug-In Controls in Serato Pitch 'n Time



The top of the plug-in window contains several options that control the behavior of AudioSuite plug-ins:

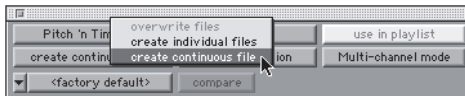
This pop-up menu displays the current AudioSuite plug-in and is used to switch between installed plug-ins.



There are two different ways of selecting the source of the audio to be processed by an AudioSuite plug-in, depending on what you wish to achieve. With **playlist** selected as the source, whatever audio is selected within the Pro Tools Edit Window is fed into the plug-in. This could include several regions, and/or several copies of the same region, but cannot include regions that do not appear in the Edit Window. If a region appears more than once, it is fed through the plug-in more than once. When **region list** is the source, the regions selected in the Pro Tools region list are fed through the plug-in. This can include regions that do not appear in the Edit Window.

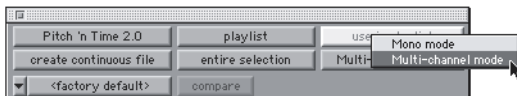
use in playlist

Serato Pitch 'n Time always works non-destructively. That is, it always creates a new region file and never overwrites the source. The **use in playlist** button controls whether the processed audio should automatically be used in the Edit Window in place of the source. With this option selected with **playlist** as the source, only the audio selected in the Edit Window is replaced. However if **use in playlist** is selected with **region list** as the source, every occurrence of the source region in the Edit Window is replaced - potentially a dangerous operation.

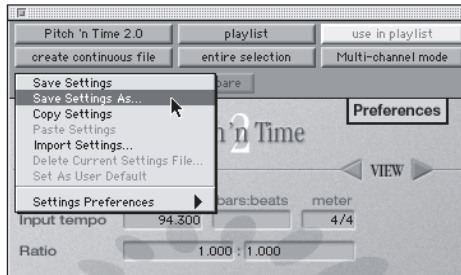


The **create continuous file** option is only available when **playlist** is selected as the source. In this mode the entire selection within the Edit Window is treated as a single region. The option to the right indicates **entire selection** to reflect this fact. All of the audio - including the silent gaps between regions - is fed into the plug-in, and a single audio region created to hold the output from the plug-in.

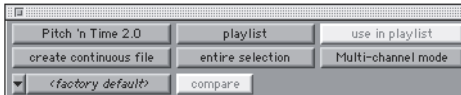
Conversely the **create individual files** option causes each selected region to be processed in turn, and corresponding regions are created from the output. When **create individual files** is used with **playlist** selected as the source, Serato Pitch 'n Time 2 re-spots the new regions to new locations to match the selected time stretch.



Multi-channel mode enforces phase coherency between all the selected tracks, up to the AudioSuite limit of 48 channels. Use this feature only when absolutely necessary, as enforcing phase coherency unnecessarily can be detrimental to the sound quality.



Pro Tools allows you to save your favorite plug-in settings for later retrieval. This button contains both a menu for saving your favorite settings, and a pop-up of any you have saved previously. At any time when you would like the current settings remembered, pull down the menu and choose **Save Settings As...** Type in a descriptive name and choose **save**.



If the current settings do not match the most recently selected preset, the **compare** button will illuminate and the preset name will be italicized.

Appendix A – Keyboard Controls

- Holding the **option** key and clicking on a slider will reset that control to its default value.
- Holding down the **command** (⌘) key and clicking on a slider will move the slider in “fine” mode. The slider moves 20 times slower than the pointer.
- Pressing the **tab** key will advance from one entry field to the next. If the contents of the field have been altered the new value will be accepted by the plug-in. Pressing **shift-tab** moves backward through the available fields.
- After typing a value in a field, pressing **return** will enter the value into the plug-in and deselect the entry field. Alternatively, pressing **enter** on the numeric key pad will enter the value, but will leave the entry field active to allow continued editing of fields from the keyboard.
- Holding down the **ctrl** key and tapping the up and down arrow keys will alter the pitch shift by plus and minus one semitone, respectively.
- Pressing **ctrl-z** presses the selection capture button.

Appendix B – Troubleshooting / Known bugs

- **Help! One of my regions has come out silent and in the wrong place!**

This is a bug in Pro Tools, including 5.0. It affects the right-most region of a selection when processing region by region with playlist as the source. If the selected source area in the Edit Window contains silence to the right of the last region, and if the position of the region after time-stretching falls entirely within that selected silence, the bug occurs.

Workaround: Don't select silence to the right of the rightmost region on a given track. If this is unavoidable, use the duplicate AudioSuite plug-in to create a small silent region to the right of the right-most region. This small silence then becomes the right-most region.

- **Help! Things are wandering across the stereo image!**

You've probably processed a stereo pair without multi-channel mode selected.

- **Why can't I process in multichannel mode region by region?**

This is a limitation of Pro Tools 5.0 or less.

- **Why doesn't the automation change when I time stretch a track?**

At this stage it is not possible for Serato Pitch 'n Time to alter track automation along with time stretched audio (however much we'd like to). The AudioSuite architecture does not support processing of automation data by Plug-Ins.

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