PUREPITCH™

Extreme Vocal Processing
for Pro Tools

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Intro

PurePitch™ is the original high-quality pitch processing plug-in for Pro Tools TDM systems. It is designed to detune or transpose vocal or instrumental tracks over a wide pitch range and still maintain the original, natural sound.

The PurePitch plug-in is a versatile tool that can be used to create a wide variety of harmony and detuning effects. It can create 'virtual' backing vocals, creating new harmony lines from a single lead vocal track. With independent control over pitch and formants, PurePitch can create truly realistic vocal doubling, mutate vocal character and gender, or create other-worldly creatures. With the built-in delay, LFO, and flexible parameter modulation, PurePitch can add vibrato, tremolo, or create extreme sonic modulations. For dialogue processing, the unique expression controller can be used to enhance, reduce, eliminate, or invert the pitch inflections of vocal dialogue tracks, or to create instant robotic effects.

PurePitch is completely real-time, which means you don't have to take a coffee break while the computer is chewing on your audio track. Move the parameter knobs, and hear the effect instantly.

System Requirements

PurePitch™ is a software plug-in for the Digidesign TDM environment. To use PurePitch, you must have a Digidesign Pro Tools system, version 5.0 or later, equipped with TDM, running on a Macintosh computer with OS 9.1 or later.

Each PurePitch processor uses one DSP chip on the DSP farm card. Your current setup must have at least one free DSP of sufficient memory resource.

This manual assumes that you are familiar with the Digidesign Pro Tools TDM environment. If you are uncertain about how DSP plug-ins work within the TDM environment, please read the Digidesign documentation and spend some time getting comfortable with the basic TDM system and the DSP plug-ins that come with it before using this package.

Installation

PurePitch™ software comes on a UltraTools CD-ROM and uses an iLok USB hardware key device for software *authorization*. The UltraTools CD-ROM contains software for every current Wave Mechanics Pro Tools TDM plug-in in the UltraTools family. The PurePitch plug-in that is authorized by the iLok will run without restriction whereas other Wave Mechanics plug-ins (not authorized) will run in Demo Mode for a limited period of time.

Install PurePitch (Macintosh):

- Exit from Pro Tools and any other applications that use the Digidesign 'DAE'.

- Insert the WaveMechanics™ Plug-ins CD-ROM into your computer and double-click the WaveMechanics™ installer application. Click on the *Continue* button with the mouse when the initial 'splash' screen appears.

- Read the license agreement. If you agree to these terms, click the *Accept* button. If you don't agree, click *Decline*, and the installation will be terminated.

- Read the *Read Me* file for last minute updates and important information. Click on the *Continue* button.

- In the installer dialog box, select either the UltraTools product (non-authorized plug-ins will run in demo mode) or use the Custom Install option and select the PurePitch™ product and any other plug-ins you wish to install.

- In the installer dialog box, select the drive on which to install PurePitch™. Select the same drive on which Pro Tools is installed.

- In the installer dialogue box, click on the *Install* button.

- When authorizing any or all of the component plug-ins of the UltraTools bundle, the iLok USB key is used (the older key disks are no longer used for authorization). All Digidesign HD and current Mix and 001 systems ship with the iLok key. If you have purchased an upgrade to UltraTools or any of its component plug-ins, a license card is included in the package and you can proceed to authorize your component plug-ins

- If you purchased UltraTools or any of its component plug-ins for the first time, you must contact Wave Mechanics to register your product and receive the authorization appropriate to your platform. Any of the plug-ins can run, fully functionally, for 30 days until your authorization is completed.

- If you have a Mac with the USB, the iLok is the means of authorization. If your Digidesign system does not already have an iLok key, one can be purchase from Wave Mechanics at a nominal cost. When you register your purchase with Wave Mechanics, an iLok license card will be promptly sent to you to permanently authorize your plug-ins. Be sure to **carefully** remove the small license card (15mm x 25mm) from the larger plastic card.

- If you have an older, pre-USB Mac then the challenge and response codes are the appropriate means of authorization. To obtain the challenge code, while starting up Pro Tools (or the authorizer application), the challenge code will be displayed. The challenge code can be copied and sent to Wave Mechanics by email (support@wavemechanics.com) if your purchase is already registered with Wave Mechanics or along with your registration. Be sure to include the product name and serial number as listed on your product registration card along with the challenge code. A response that permanently authorizes your plug-ins will be promptly returned.

- If you have an iLok and the iLok license card for the plug-ins you wish to authorize, simply start up Pro Tools or the authorizer application for that product. Displayed is a window with two button options: *Authorize*, or *Quit*. Click on the *Authorize* button to authorize. Confirm that "Use license card" is checked and click on *Next>*. If the license card is not inserted into the iLok, you will be prompted to insert a valid license card for the plug-in purchased, then click on *Next>* and your plug-in is authorized.

If the installation completed successfully, PurePitch™ should now appear in the *inserts* dialog box next time you start Pro Tools. The installation should have installed the following on your computer:

- A *Wave Mechanics* folder (located in the drive or folder you specified during installation), containing a 'readme' file and the user manual.

- A copy of the PurePitch™ plug-in, located in your *TDM Plug-Ins* or Plug-Ins folder, located within your *DAE Folder*, which is located in your *System Folder*.

- The PurePitch settings files, located in your *Plug-In Settings* folder, located within your *DAE folder,* which is located in your *System Folder*.

- If you are upgrading, the previous version of PurePitch will be moved to the *Removed Items* folder within the *Wave Mechanics* folder.

Please take a moment to fill out the enclosed registration card.

Basics

Within Pro Tools, to process a track with PurePitch, 'click' on the *Inserts* button for that track, and select PurePitch from the pop-up menu.
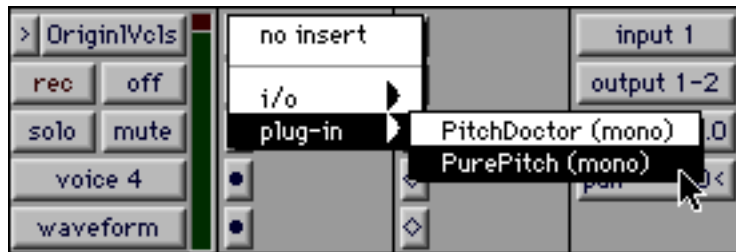
Each time this is done, a new PurePitch processor is created. You may create as many PurePitch processors as you want, until you run out of DSP resources (each processor uses one of the four DSPs available on the DSP farm card).

To access the control panel for PurePitch within Pro Tools, click on the PurePitch™ insert button, in either the Edit window, or the Mix window.

Using PurePitch™

The control panel for PurePitch is accessed as described previously in the basics section. It should appear as below:

About Box
Click the Wave Mechanics logo to display program version, hardware key serial number, credits and other info.

Mixer Control Panel
Controls Wet/Dry Mix, Feedback and Delay.

Shift Mode Control Panel
Selects the type of algorithm used for pitch alteration.

Expression Control Panel
Controls for altering the pitch inflections of dialogue tracks.

Modulation Control Panel
Applies periodic modulations to pitch, formant, or level of the input signal.

Tweak Control Panel
Fine-tunes the operation of the PurePitch processor.

Pitch Control Panel
Controls for altering the pitch and formant of the signal being processed.

Status Panel
Displays the state of the mute and bypass switches, the pitch shift quality, and the hardware key.

The *About Box*, accessed by clicking on the Wave Mechanics logo, is used to display the program version, credits, and other info.
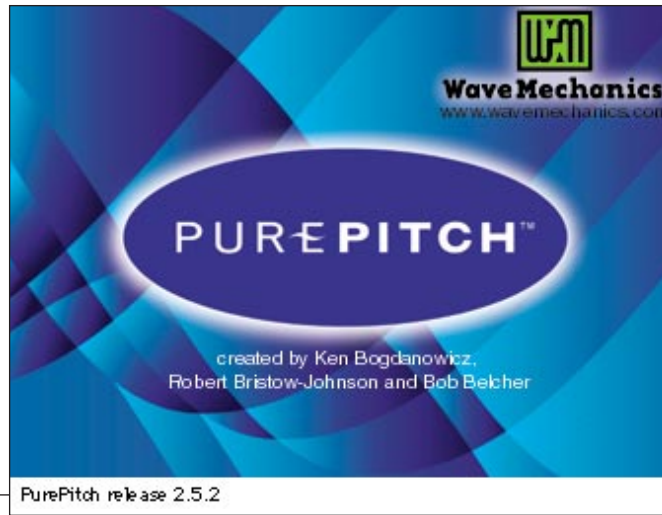
Release Version Number

Block Diagram

Below is a simplified block diagram showing the signal flow through the PurePitch processor.

FEEDBACK

IN

+

SHIFT
DELAY

PITCH
SHIFTER

FORMANT
SHIFTER

WET
MIX

EXPRESSION
PROCESSOR

PITCH
MOD

FORMANT
MOD

LEVEL
MOD

+   OUT

LFO

DRY
DELAY

DRY
MIX
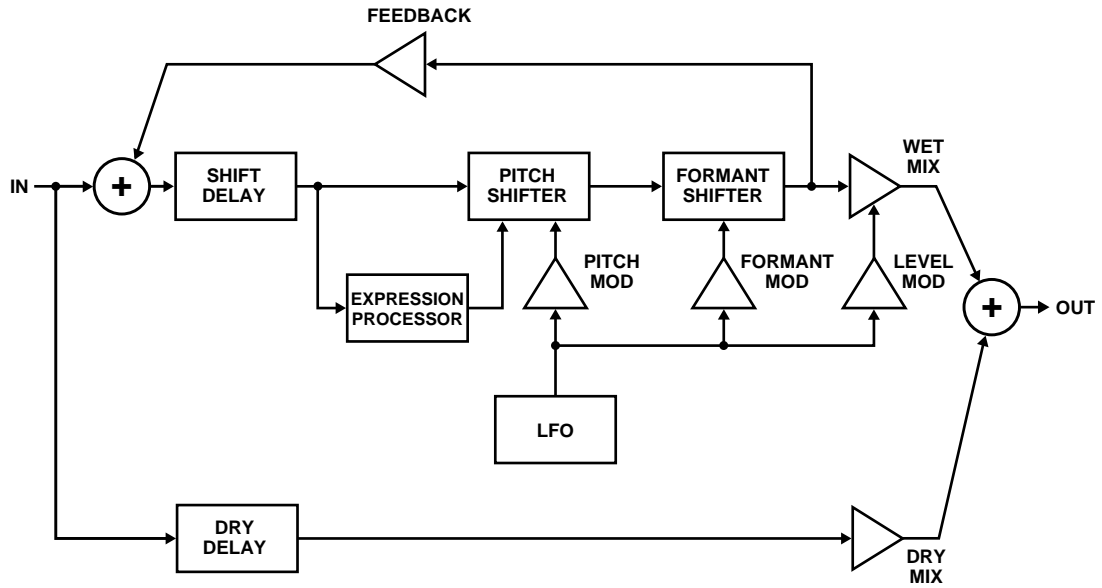
Legend

⊕ Summing Junction
(2 signals added together)

▷ Adjustable Gain Block

Pitch Control Panel

Pitch Keys

Pitch Bend Slider

Formant Shift Slider
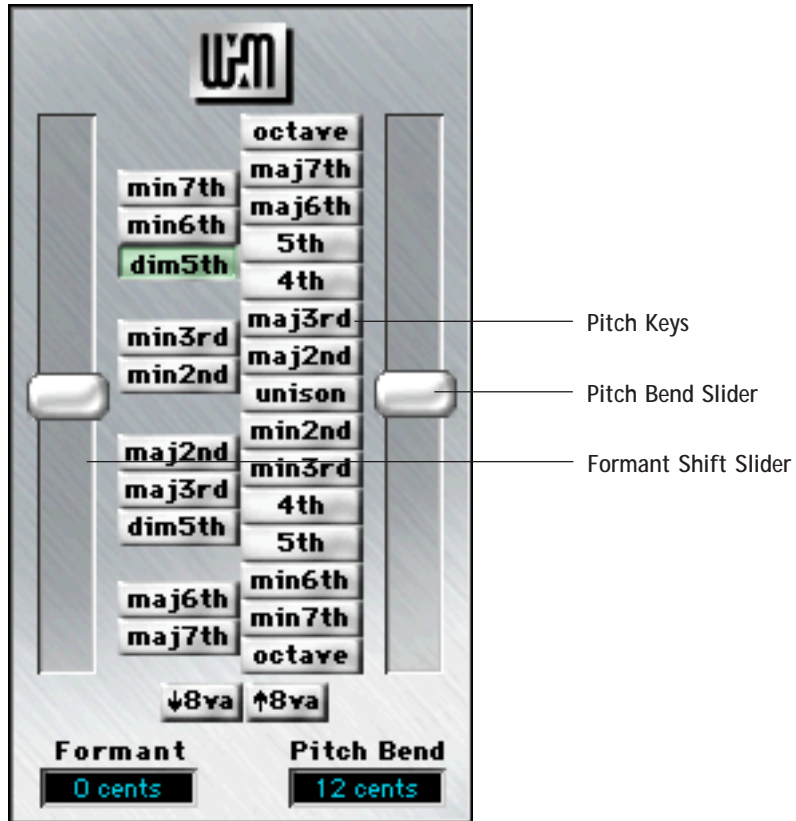
Pitch Keys

Click on one of the *Pitch Keys* to select a musical interval for pitch shifting. The Pitch Keys, together with the *Pitch Bend* slider, function similar to a MIDI keyboard. If you would like to detune the pitch from one of the diatonic intervals, to get an in-between note, you can add some additional pitch shift with the Pitch Bend slider.

The pitch keys are laid out like a sideways piano keyboard, with the unison key corresponding to middle C. For easier harmony

generation, there are also quick keyboard accelerators that mirror the function of clicking on these keys with the mouse. (See the Keyboard Shortcuts section)

To shift the pitch by more than 1 octave, click on the ⬆8va or ⬇8va buttons.

Pitch Bend

The *Pitch Bend* slider adds an additional pitch shift to the interval programmed by the Pitch Keys. The Pitch Bend slider alters the amount of pitch shift by a given number of cents. There are 1200 cents per octave, and 100 cents equals 1 semitone. For double-tracking, or detuning, use Pitch Bend amounts in the range of +/- 5 to 15 cents.

Formant Shift

A powerful feature of PurePitch is the ability to shift the pitch of vocals without affecting the *formant* structure. Formants are what gives each vocal sound, and each person, a unique character. A formant is simply a resonance, a narrow peak in the frequency spectrum, similar to the peak created by a parametric equalizer with a narrow bandwidth and high gain. Each vocal sound has several of these resonances, all at different frequencies, with different bandwidths. These formant characteristics are also different from person to person. Many pitch processors distort the location of these resonances, yielding the familiar 'chipmunk' effect when shifting pitch by more than a hundred cents or so.

While it's usually desirable to preserve the formant structure when changing the pitch, the *Formant Shift* slider gives you the ability to warp the formant structure independent of the amount of pitch change. Small amounts of formant shift can be used to create more realistic harmonies or double-tracking, by subtly altering the character of the original voice. More extreme changes in the formant can be used to deepen voices, or to perform digital gender-changes, without the need to visit your plastic surgeon.

Hint:

To get finer adjustment of the Pitch Bend amount (or any other parameter), hold down the ⌘ or Ctrl key while dragging the slider. To return to the default, 0 cents value, option-click or Alt-click on the slider.

Hint:

To get more realistic-sounding downward pitch-shifting, set the Formant Shift slider to somewhere between -100 and -300 cents.

Even more extreme formant shifts can be used to recreate the familiar animated chipmunk sounds, or evil alien humanoid voices.

Positive amounts of formant shift will make the source sound more female, then more childlike, and ultimately like a 'chipmunk'. A negative formant shift acts like digital testosterone, yielding deeper, more masculine sounds.

Shift Mode Control Panel
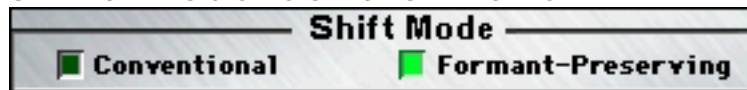
PurePitch can shift the pitch using one of two different pitch shifting algorithms, depending on the setting in the Shift Mode Control panel. The two algorithms are provided because each has different strengths and weaknesses.

The *Conventional* mode is, in general, the cleanest of the two algorithms, but will give rise to the 'chipmunk-effect' for large amounts of pitch shift. This effect is caused by a warping of the formant structure of vocal sounds. (For an explanation of formants, see the above Formant Shift control description.)

Conventional pitch-shifting should be used when you are making small modifications in pitch, roughly plus or minus 50 or 100 cents. At larger shift amounts, vocals may start to suffer from the 'chipmunk effect' with this mode. This mode should also be used with non-vocal source material or material that doesn't shift well with the *Formant-Preserving* mode.

The Formant-Preserving mode will maintain the original character of the source vocal for larger shift amounts than Conventional mode. However, this algorithm is a bit more fragile, and may have difficulty shifting certain types of material. Typically very rough or raspy vocal sounds are more difficult to shift with this algorithm, and may on occasion produce some objectionable artifacts.

Hint:

When mixing the wet and dry signals, you may hear some unnatural phase-cancellation. To eliminate this, set the Dry Delay and the Shift Delay to slightly different settings, creating a more realistic mix.

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Mixer Control Panel
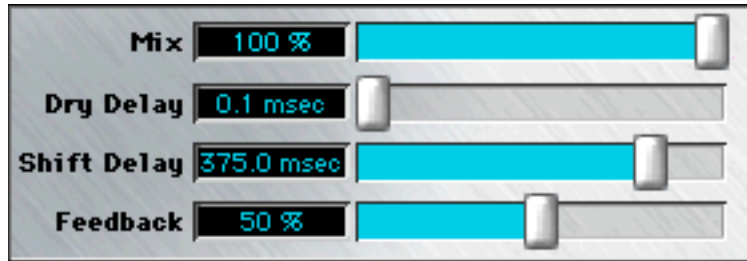
Mix

The *Mix* slider controls the relative amounts of the dry, unprocessed signal, with the wet, pitch-shifted output. A setting of 100 percent will produce a pure pitch-shifted output. A setting of 0 will yield a totally dry signal.

Dry Delay

The *Dry Delay* parameter adjusts the amount of delay applied to the unprocessed signal, before mixing with the pitch-shifted signal. By having separate parameters for wet and dry delay, the relative timing of the original signal and the pitch-shifted signal can be completely controlled.

Shift Delay

The *Shift Delay* parameter adjusts the amount of delay applied to the pitch-shifted signal, before mixing with the dry signal. The Shift Delay also affects the amount of delay in the feedback loop.

Feedback

The *Feedback* slider controls how much pitch-shifted, delayed signal gets fed back into the input. Non-zero settings here will create regenerative digital delay effects, and interesting pitch sweeps.

Hint:

For the best pitch-shift quality, a minimum amount of delay is necessary. If the delay is too small for optimal shifting, the quality LED will turn yellow or red.

Hint:

Use fairly large amounts of Shift Delay when trying to create regenerative pitch effects. Try using only formant shifting, with a lot of delay and a fair amount of feedback (with no pitch shift) to create some interesting sounds.

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Expression Control Panel

The expression processor built into PurePitch is designed to manipulate the pitch inflections of dialogue tracks. The expression processor compresses or expands the pitch envelope of the voice, similar to what a dynamics processor does to the level of a signal. By compressing the pitch envelope, the pitch inflections are reduced, creating a more monotone dialogue track. By expanding the pitch envelope, the pitch inflections are enhanced, creating a more expressive dialogue track.

Expression Ratio

The *Expression Ratio* control is similar to the ratio control on a traditional compressor. The setting of this parameter indicates how much the output pitch changes for each unit of input pitch variation. A Ratio setting of 1:1 means that the output pitch changes one unit for every unit the input pitch changes, or in other words, the pitch inflection is unchanged. A setting of 1.0:0.5 means that the output pitch will move half as much as the input pitch moves, compressing the pitch inflections, resulting in a more monotone dialogue track. A setting of 1.0:2.0 means that the output pitch will change twice as much as the input pitch, expanding the pitch inflections, creating a more expressive vocal. A setting of 1.0:0.0 will completely eliminate pitch inflections, which is an easy way to create a monotone, classic robot sound. The pitch inflection can even be *inverted* by setting Ratio to a negative value

In general, small amounts of expression variation will give the most natural results. A Ratio setting of 1.0:1.1 will slightly enhance vocal tracks without adding unnatural artifacts.

Current Frequency Display

The *Current Frequency* display is a continuously updating readout of the pitch of the input to the PurePitch processor. It is used in setting the Rotation Frequency, below.

Rotation Frequency

The Rotation Frequency control is used together with the expression ratio in altering pitch inflections of dialogue tracks. When the pitch inflection is compressed, the pitch envelope will be compressed inward, towards the rotation frequency. During expansion, the pitch envelope will be expanded outward, away from the rotation frequency.

This is easier to picture when the expression ratio is set to 1.0:0, yielding a monotone output. In this case, the output frequency will always be at the rotation frequency. As the ratio is gradually increased, the pitch inflection will increase, but will remain centered around the rotation frequency (assuming the input frequency is approximately "centered" around the rotation frequency.)

In general, the result will be most natural when the rotation frequency is set to the pitch center (average pitch) of the original signal. This is accomplished by clicking on the copy button between the current frequency readout and the rotation frequency control. This causes the current average pitch value to be copied into the rotation frequency control.

Each time a new dialogue track is processed, the rotation frequency should be re-adjusted. This is easily done by playing the new track through PurePitch and clicking on the copy button during a typical dialogue section.

Shift Limit

The *Limit* control is used to control the maximum amount of pitch shift that is applied by the expression controller. Usually, it's desirable to keep the amount of pitch shift applied to a dialogue track limited to a small amount, so that the final result will be as

natural-sounding as possible. Limit places a hard limit on the amount of pitch shift. For example, if Limit is set to 200 cents, the pitch of the dialogue track will not be altered by more than two semitones in either direction.

Expression Examples

The following graphs illustrate how the expression processor modifies the pitch inflections.

In example 1, below, the expression ratio is set to 1:0.5, which will compress any pitch inflections in signal to be processed. The first graph shows how the output, or processed pitch will vary as the input pitch varies. The input pitch is indicated along the horizontal axis, and the output pitch is indicated along the vertical axis. The diagonal lines in the plot indicate what the output pitch will be for any given input pitch. The solid diagonal line represents a 1:1 expression ratio, and is included for reference. The dotted line shows what happens for an expression ratio of 1:0.5.

The graph to the right shows how the pitch inflection of a typical signal is modified. The solid line shows a plot of the pitch variation of the original signal, and the dashed line shows the pitch variation after processing. In this example, the pitch variation is compressed, resulting in half as much variation on the output as on the input. Pitches above the rotation point are shifted down, while pitches below the rotation point are shifted up. The pitch at the rotation frequency is not modified at all.

Example 1:
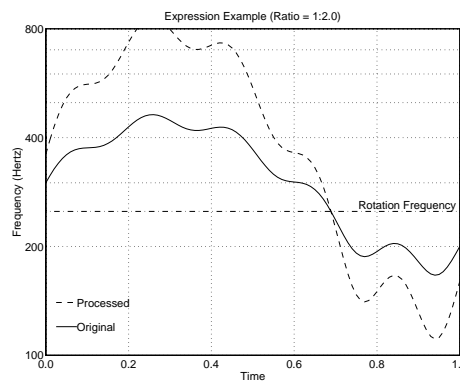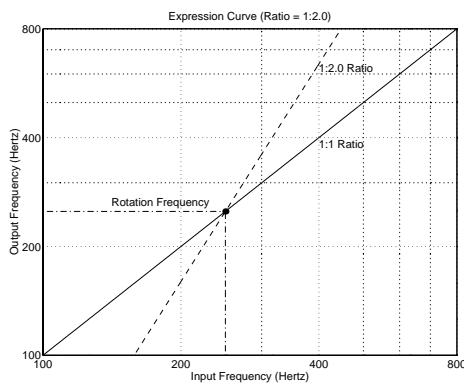
In example 2, on the following page, the ratio is set to 1:2.0, which will result in an expansion of any pitch inflections. In this example, the pitch inflection in the processed

signal is expanded, resulting in twice as much pitch variation as in the original signal. Pitches above the rotation frequency are increased, and pitches below are decreased. As in the previous example, the pitch at the rotation frequency is not modified.

Example 2:
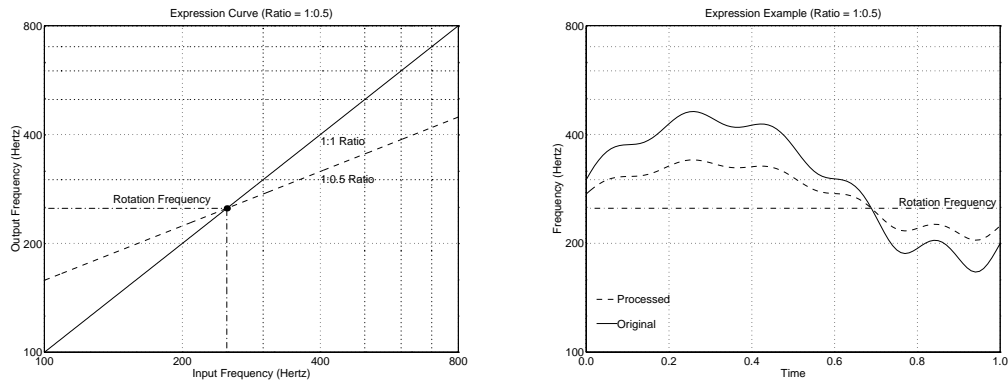
In example 3, the expression ratio is set to 1:-1. This example shows how negative values for ratio will invert the pitch inflection. Every time the pitch goes up in the original signal, the pitch will go down in the processed output. This is easily seen in the pitch inflection graph below, where the processed signal's pitch is a mirror image of the pitch of the original signal.

Example 3:
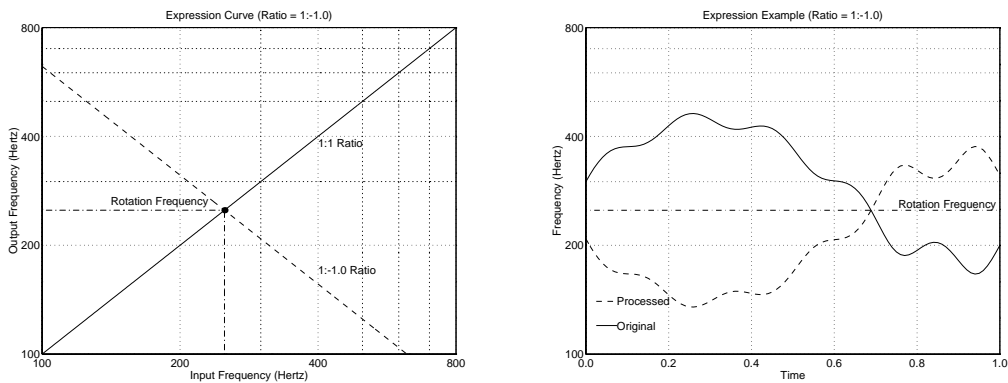
Example 4 illustrates the effect of changing the rotation frequency. In this example the ratio is 1:0.5, which is the same value as in the first example. The rotation frequency here is set to 500 Hertz. Because the pitch of the input signal is always below 500 Hertz, the pitch of the processed signal is always shifted up, towards the rotation frequency. If the ratio setting had been greater than 1.0, the pitch would have been shifted down, away from the rotation frequency.

Example 4:
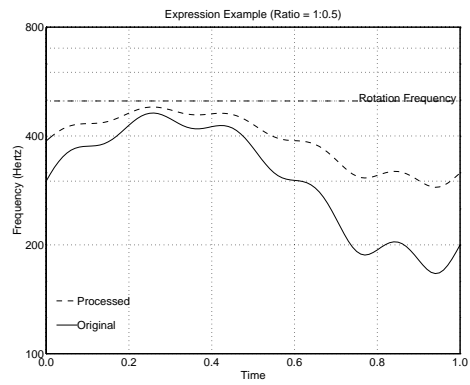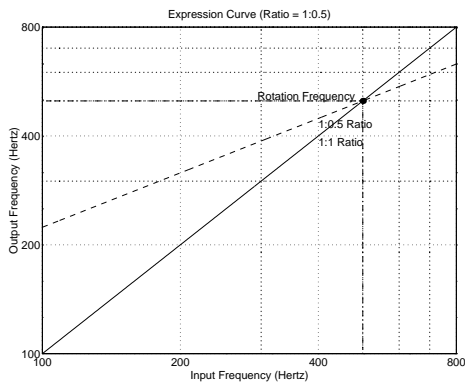
Modulation Control Panel

The modulation controls are used to add periodic variation to the pitch shift amount, formant shift amount, or the output level. This is useful to create vibrato, tremolo, chorus effects, or other more wild modulations.

Waveshape

The *Waveshape* control determines the shape of the modulation signal. With the mouse, click on the button with the waveshape graphic until it shows the modulation shape that you want. The available shapes are:

To add vibrato, the sine waveshape is usually the best choice,

sine   square   triangle

sawtooth   pseudo-random   sample hold

since it gives a very smooth pitch modulation. The square wave can be used to create trill effects. The sample-hold waveform creates a stepped random function, similar to using a sample-hold with a noise generator on an analog synth. This is useful for random shift amounts to create realistic doubling effects. The pseudo-random shape is a bit different from the others. At very slow modulation rates, it is useful for creating a natural-sounding random detune. At higher rates it will distort the vocal signal, creating a rough, noise-like effect on the processed sound.

Rate

The *Rate* control adjusts the speed of the pitch modulation effect, in Hertz. A setting of 1 Hertz means that the pitch, formant, or level will be modulated once per second. Adjust this to your taste.

Pitch Mod

The *Pitch Mod* control adjusts how much the pitch shift amount is modulated. To add vibrato to the signal, set this in the range of about 50 to 100 cents, with a sine wave modulation shape, and a rate of 1 to 10 Hertz. A more extreme setting of 1200 cents would modulate the pitch shift amount over a range of plus or minus one octave.

Formant Mod

The *Formant Mod* control is used to add modulation to the formants of the input signal. See the Formant control for a description of formants and formant shifting. Formant modulation will sound something like a swept filter, or wah-wah applied to the input signal. The formant modulation control is in cents, like the formant slider. A setting of 1200 cents means that the formant will be modulated over a range of plus or minus one octave.

Level Mod

The *Level Mod* control is used to add level modulation or tremolo to the processed signal. This can be used to create more realistic harmonies by adding a slight tremolo to the harmony output, or can be used to create radical pulsating effects. The adjustment is in percent where a setting of 100 percent will modulate the amplitude from fully off to fully on, and lower settings will modulate the level to a lesser degree.

Tweak Control Panel

Min Freq

The *Min Freq* parameter is used to optimize the quality of the pitch processing. This parameter should be set to be less than the lowest frequency in the audio track that is being processed. Usually, it is best to set this parameter no lower than is necessary for optimum quality. For most vocal tracks, a setting of 50 Hertz usually works quite well. For high-pitched vocals, you may want to try increasing this setting, and for extremely low-pitch vocals, or for other instruments, you may need to decrease this setting.

Max Freq

The *Max Freq* parameter works together with the Min Freq parameter to optimize the pitch processing quality. This parameter should be set to be at least as high as the highest frequency in the audio track being processed. A setting of 1000 Hertz works well for most vocal tracks. For higher pitched sounds, this may need to be increased. For audio tracks that are difficult to process, this should be set to the smallest value possible.

Highpass

The *Highpass* parameter controls a highpass filter that is built in to the pitch processing algorithm. This filter removes undesirable DC and very low frequency signals that may degrade the performance of the pitch shifter. While the setting of this parameter is not extremely critical, it may improve the pitch shift quality for some difficult tracks.

Pitch Slew

The *Pitch Slew* parameter acts as a portamento control on the pitch shift amount. When composing harmonies using PurePitch, it is often useful for the pitch to smoothly glide between the various intervals being programmed. Use this to control how fast the pitch will glide from one setting to the next.

Status Panel

The status panel indicates the state of Mute, Bypass, pitch shift Quality.

Mute

When the red *Mute* LED is illuminated, the output of the PurePitch processor is muted. Mute is toggled with a keyboard shortcut, (Mac: control-M, Win: 'M') or through a DAE-aware application that supports the mute function.

Bypass

When the red *Bypass* LED is illuminated, PurePitch is in the bypass state, meaning that it simply passes the audio signal without modifying it in any way. Bypass is toggled with a keyboard shortcut, (Mac: control-B, Win: 'B') or by pressing the *bypass* button above the PurePitch control panel.

Quality

The *Quality* LED turns yellow or red when the Shift Delay control has been set too low, A yellow indicator indicates that PurePitch is possibly producing less than optimum pitch shift quality. A red indicator indicates severe quality degradation, and that the delay should be increased to obtain cleaner pitch shifting.

Caveats

No pitch shifter is perfect. If you've had experience with other pitch processors, you probably know this already. PurePitch is quite good, but occasionally you'll find a track that causes PurePitch to 'glitch' (our technical term for a pitch-shifting artifact that you'd rather not hear). If this is the case, first try to adjust the Min Freq and Max Freq parameters. Also experiment with the Shift Mode control, using the pitch-shifting mode which gives the best results. Also, check our web site to make sure you have the latest version of PurePitch. We are constantly working on improving our algorithms, and occasionally we will release new, improved versions of PurePitch.

If everything you try fails, send us a DAT of the offending track, and we'll try to come up with settings that work. We can't promise you anything, but we'll try.

Use PurePitch on dry tracks only. Reverberation and other effects will degrade the pitch shift quality. If you want reverb or other effects on your pitch-shifted track, add the processing after PurePitch.

Use a bit of delay. PurePitch needs a bit of time to analyze the audio before it processes it. This is accomplished with the Pitch Delay parameter. If you set this parameter to zero, you will notice a slight degradation of the pitch shift quality. For the best pitch-shifting quality, leave this parameter at its default setting, or greater. If this small amount of delay throws off the feel of your mix, you can always bounce the processed track, and slide it ahead in time to compensate for the delay. Possibly, future versions of Pro Tools will automatically compensate for the processing delay of DSP plug-ins.

PurePitch is designed to work on monophonic audio tracks only. If you try to run a mix through it, you might not get what you expect.

Keyboard Shortcuts (Macintosh)

In combination with the control, option, and shift keys, the top two rows of the keyboard have been arranged to function like the pitch keyboard on the main screen of PurePitch.
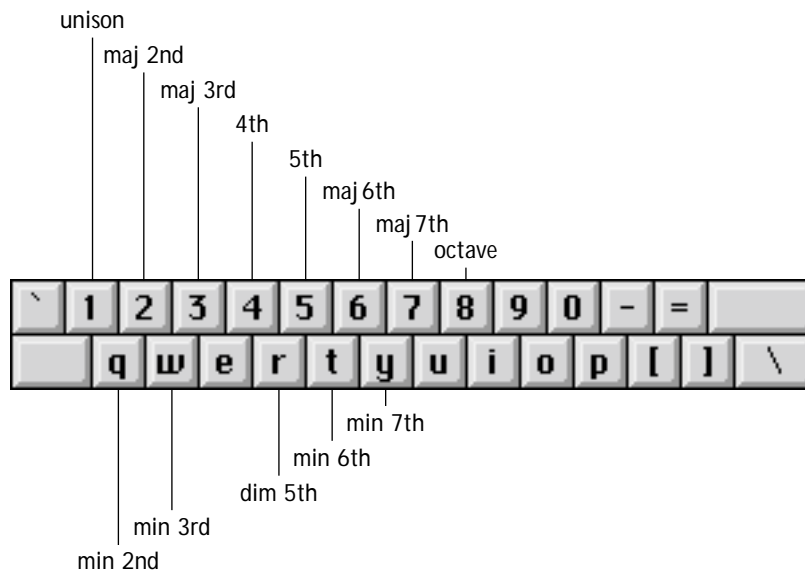
To shift up, hold down the control key, and press one of the above keys - this will function just like the upper half of the keyboard on the PurePitch control panel. To shift the pitch down, hold down control and option, and press the above keys - this is like the lower half of the keyboard on the control panel. Holding the shift key while doing any of the above will shift the pitch an additional octave up or down - like the octave keys on the control panel.

Here's a summary of all keyboard shortcuts for PurePitch:

- *control-b* bypasses the PurePitch processor. When bypass is engaged, the bypass LED will be illuminated.

- *control-m* mutes the output of the PurePitch processor. When mute is engaged, the mute LED will be illuminated.

- *control-* and *1,2,3,4,5,6,7,8* or *q,w,r,t,y* will imitate the upper half of the keyboard on the control panel.

- *control-option-* and *1,2,3,4,5,6,7,8* or *q,w,r,t,y* will imitate the lower half of the keyboard on the control panel.

- *control-shift-* and *1,2,3,4,5,6,7,8* or *q,w,r,t,y* will imitate the upper half of the keyboard on the control panel, with the octave up button engaged.

- *control-option-shift-* and *1,2,3,4,5,6,7,8* or *q,w,r,t,y* will imitate the lower half of the keyboard on the control panel, with the octave down button engaged.

- *control-* and , , , or nudge the pitch bend and formant values in 10 cent increments. The control- key combination moves the pitch bend value up, and control- moves it down. The control- combination moves the formant value up, and control- moves the formant down.

- *control-option-* and , , , or move the pitch bend and formant values in 1 cent increments.

- *control-shift-* and , , , or move the pitch bend and formant values in 100 cent (1 semitone) increments.

- The ⌘ key is used to get finer resolution of all parameter slider adjustments. Hold the ⌘ key and then drag the control slider with the mouse.

- The *option* key is used to return a parameter control to its default value. Hold option, and then click the parameter control with the mouse.

Keyboard Shortcuts (Windows NT)

In combination with the control, option, and shift keys, the top two rows of the keyboard have been arranged to function like the pitch keyboard on the main screen of PurePitch.
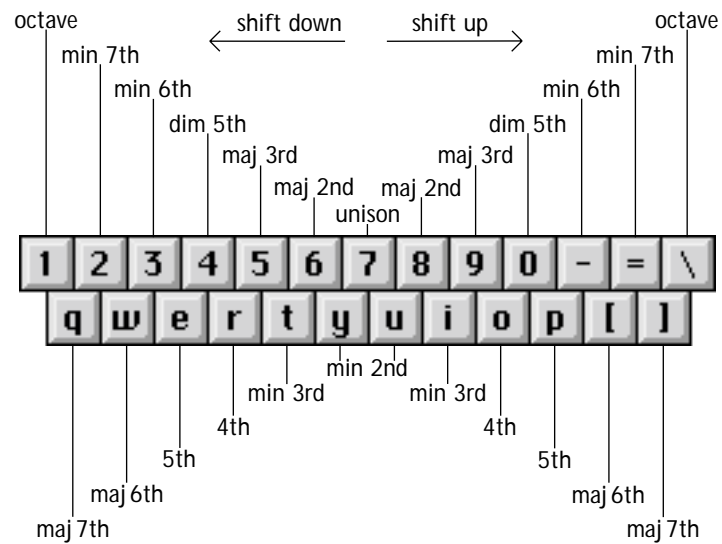

To shift up, or down, press one of the above keys - this will function just like the keyboard on the PurePitch control panel. Holding the shift key while pressing any of the above keys will shift the pitch an additional octave up or down - like the octave keys on the control panel.

Here's a summary of all keyboard shortcuts for PurePitch:

- '*B*' bypasses the PurePitch processor. When bypass is engaged, the bypass LED will be illuminated.

- '*M*' mutes the output of the PurePitch processor. When mute is engaged, the mute LED will be illuminated

- The keys *1,2,3,4,5,6,7,8,9,0,-,=,\\,* and *q,w,e,r,t,y,u,i,o,p,[,]* will imitate the keyboard on the control panel.

- *Shift* and *8,9,0,-,=,\\ ,* and *u,i,o,p,[,]* will imitate the upper half of the keyboard on the control panel, with the octave up button engaged.

- *Shift* and *1,2,3,4,5,6,* and *q,w,e,r,t,y* will imitate the lower half of the keyboard on the control panel, with the octave down button engaged.

- , , , or nudge the pitch bend and formant values in 10 cent increments. The key moves the pitch bend value up, and moves it down. The key moves the formant value up, and moves the formant down.

- *Alt* and , , , or move the pitch bend and formant values in 1 cent increments.

- *Shift* and , , , or move the pitch bend and formant values in 100 cent (1 semitone) increments.

- The *Ctrl* key is used to get finer resolution of all parameter slider adjustments. Hold the *Ctrl* key and then drag the control slider with the mouse.

- The *Alt* key is used to return a parameter control to its default value. Hold down *Alt* then click the parameter control with the mouse.

Automation

With Pro Tools 4.0 or later, parameter adjustments to PurePitch may be automated. For basic information about how to use automation, refer to your Pro Tools user guide.

Virtually all parameters on the control panel of PurePitch are available for automation. To enable a parameter for automation, click on the automation button at the top of the PurePitch
control panel.

The *Plug-In Automation* window will appear. At the left is a list of parameters available for automation. On the right is the list of parameters currently enabled for automation. To enable a parameter for automation, select one or more of the parameters in the list at the left, and click on the *Add* button. The parameter will appear on the list at the right, enabled for automation.

To begin recording automation data, bring up the Pro Tools automation enable
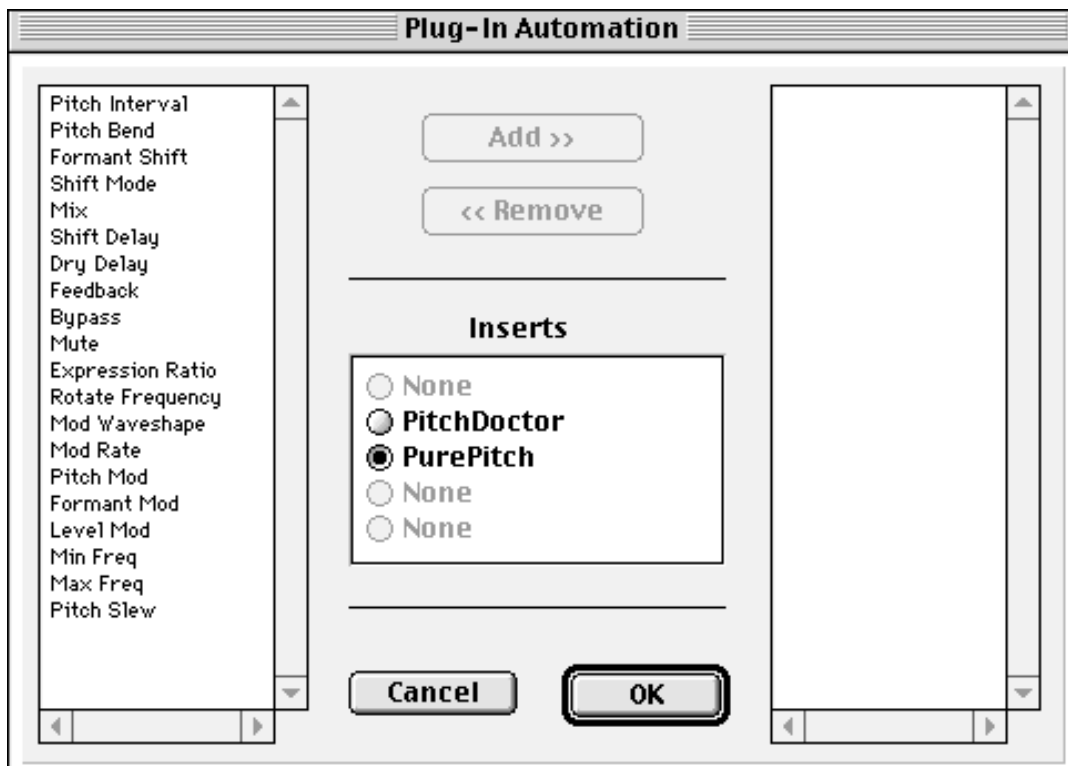
window, and make sure *plug-in* is enabled for automation. In the track you're working on, select *auto-write* to enable automation data to be written for that track. Now, when you press *play* and manipulate the parameters within PurePitch, the data will be recorded by Pro Tools. When the transport is stopped, the automation will automatically switch to *auto-touch*. The next time you press play, the parameter changes you recorded will be played back along with the audio. With *auto-touch* enabled, as long as the mouse is clicked, new parameter changes will be written over the previous automation data.

The most obvious use for automating the parameters of PurePitch is to re-harmonize a vocal track. For information on how to do this, see the next section.

Fixing Out-Of Tune Vocal and Instrumental Tracks

To correct out-of-tune performances, use the PitchDoctor™ plug-in, which is specifically designed for this task.

Creating Realistic Harmonies

With the current version of PurePitch, an easy way to create a harmony track is to arrange it using one of the *Harmonist™* presets combined with the pitch keyboard on the control panel, or the pitch keyboard shortcuts. This gives you ultimate control over the harmony line, like playing a musical instrument. Using the automation feature of Pro Tools 4.0, the harmony line that you create can be stored and edited just like a MIDI sequencer track.

- First, insert PurePitch on the vocal track that you want to use as your source.

- Next, select the Harmonist™ preset that is in the same key as the vocal track. When you play the track, you'll notice that the harmony output is always at the same note, by default the root note of that key.

- To perform a harmony, simply click on the pitch keyboard (or use the keyboard shortcuts), just like playing a piano keyboard.

- To record the harmony sequence, click on the automation button for PurePitch, and enable automation for Pitch Keys, and any other parameter you may wish to automate (possibly Pitch Bend and Formant Shift),

- Bring up the Pro Tools automation enable window, and make sure plug-in is enabled for automation.

- In the track you're working on, select auto write to enable automation data to be written. Now, when you press play and create harmonies with the pitch keys, the data will be recorded by Pro Tools.

- When the transport is stopped, the automation will automatically switch to auto touch, which is a convenient way to add new notes, or edit the harmony line on the fly.

To edit the harmony line graphically, select Pitch Keys, in the Pro Tools waveform selection pop-up menu for this track. A graph of the harmony notes will appear on top of the audio waveform display. Use the mouse to edit the harmony note values, locations, and to add new pitch transitions. The screenshot below shows an example of this:

To make the result sound more natural, the default Harmonist preset adds some vibrato to the synthetic harmony. To control the amount of vibrato, adjust the Pitch amount in the modulation
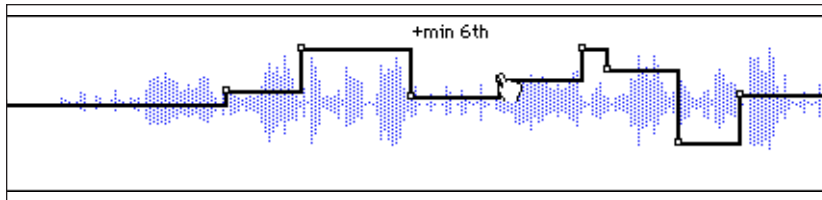
control panel. To set the vibrato rate, simply adjust the modulation Rate. To add a bit of tremolo, set the Level amount in the modulation control panel.

Re-Scoring Vocal and Instrumental Tracks

Because PurePitch is quite good at shifting the pitch by large amounts, it is possible to actually edit the original melody line of a vocal or instrumental track.

- Start out using the default setting of PurePitch (the setting that comes up when the PurePitch plug-in is inserted).

- To set up automation for pitch correction, click on the automation button for PurePitch, and enable automation for the *Pitch Bend* parameter.

- Bring up the Pro Tools automation enable window, and make sure *plug-in* is enabled for automation.

- In the track you're working on, select *auto-write* or *auto-touch* to enable automation data to be written.

- In Pro Tools, locate and select the note that you want to adjust. It is helpful to set Pro Tools to *Loop Playback*. Loop the selected section, and use the *Pitch Keys* to transpose the highlighted segment to the note you'd like

- Once you've adjusted the pitch, store this setting as automation data using *Write Automation*.

The transition to the new note can be smoothed by using the *Pitch Slew* parameter in the *Tweaks* control panel. If Pitch Slew is set to 0, the pitch transition will be instantaneous, which can be a bit unnatural. The purpose of the Pitch Slew parameter is to smooth out these unnatural-sounding pitch transitions. Set Pitch Slew so that the transition sounds good to you. The default setting of 25 milliseconds usually works well for most applications.

The presets for the PurePitch™ processor are organized into folders according to how we expect you might use them. The folders are:

Chorus: Chorus and thickening effects for solo vocal and instrument tracks.

Dialogue: Dialogue inflection manipulation, using the expression processor.

Harmony: Musical harmony effects, for solo vocal and instrument tracks.

Spacey: Spacey long delay effects, typically with lots of feedback.

Tremolo/Vibrato: Tremolo and vibrato effects created using level and pitch modulation.

Vocal Transforms: Effects for manipulating the character of spoken word and musical vocals.

Wacky: This is what you get when you've been staring at a computer screen and listening to the same vocal track for months.

Chorus Presets

Ambient Chorus

Random microtuning and some delay regeneration are used to create an ambient chorus effect. Useful for thickening vocal or instrumental tracks.

Doubler

A not-so-subtle doubling effect created with formant shifting and a fair amount of delay

Double Tracker

A fairly tight double-track effect created by using a small amount of formant shifting. Useful for vocals.

Formant Phasor

A unique twist on the classic phase shifter, created by modulating the formants with a slow triangle sweep.

Microtune Chorus

A classic pitch shifter effect created by simply detuning by -12 cents and mixing with unprocessed signal. Useful for thickening just about anything.

Random Microtune

A more realistic chorus effect created by randomly detuning the signal. Useful for thickening just about anything.

Unison

A subtle, but realistic doubling effect created with small amounts of formant and pitch modulation.

Dialogue Presets

Less Expression

This preset will slightly reduce the pitch inflections of a dialogue track. Make sure to set the rotation frequency according to your source vocal, so that the pitch will not be altered at the speaker's average speaking pitch. To exaggerate the effect, reduce the ratio.

Monotone

This preset will completely eliminate pitch inflection in a dialogue track. Make sure to set the rotation frequency according to your source vocal, so that the pitch will not be altered at the speaker's average speaking pitch. This is an easy way to create a robot sound.

More Expression

This preset will slightly exaggerate the pitch inflections of a dialogue track. Make sure to set the rotation frequency according to your source vocal, so that the pitch will not be altered at the speaker's average speaking pitch. This is useful for enhancing a voice-over to add a bit more impact or excitement.

Robotic

An intentionally synthetic sounding vocal effect. This preset uses the expression processor to create a monotone voice, and then adds extreme pitch and formant shifting to make it sound even more synthetic. Useful for special effects or animation voices.

Harmony Presets

Deep Octave

This preset illustrates how formant shifting can be used to make large downward pitch shifts sound more natural. This patch is useful for harmony doubling of vocal tracks.

Deeper and Longer

Like above, with a long delay, and a deeper sound. This could be used to create a male accompaniment to a female vocal track.

Harmonist™ (A, Ab, Bb, B, C, C#, ...)

Use one these presets to compose synthetic harmonies using the pitch keys as a piano keyboard. The unison key becomes the root note of the key that you're working in, and the output will be at whatever pitch you play on the keyboard. For Harmonist C, the unison key will shift the audio to middle C. By playing the keyboard, you can compose completely new harmony lines. See the keyboard shortcuts to use the keyboard to control the pitch. To adjust the tuning use the rotation pitch control to set the frequency for middle C. By automating the pitch control, you can compose completely arbitrary melodies using any vocal track as source material.

This preset adds a bit of tremolo and vibrato to the source to make the synthetic harmonies more realistic. To adjust the depth of the vibrato, adjust the *Pitch* control in the modulation control panel. To adjust the depth of the tremolo, adjust the *Level* control. The *Rate* control will affect the vibrato and tremolo speed.

Octave Doubler

Octave doubling, using a slight detune on the octave to make a more pleasing and realistic harmony. Greate on vocals.

Octave Tremolo Slap

A simple slap delay with an octave up pitch shift.

Perfect Intervals Above

Parallel intervals, in perfect tune. Use the pitch keys to select the interval. For shifting down, see the next preset.

Perfect Intervals Below

Parallel intervals, but with a tweak in the formant to make the shifted output more natural for down-shifting. Use the pitch keys to select the interval.

Stretched Intervals Above

To fix the flat effect of perfectly tuned intervals, this preset adds a few cents of pitch bend to make the intervals more pleasant and realistic. Use the pitch keys to select a harmony interval.

Stretched Intervals Below

Like above, except that the formant is tweaked for more realistic downward pitch shifting.

Spacey Presets

Altered States
An interesting octave-modulated reverberant sound, created with square wave modulation on level and pitch, with lots of delay and feedback.

Ascension
Ascending formants on tremolo echo trails. Cool.

Cyberia
Sounds like your computer's starting to get an attitude.

MicroTuned Echoes
Sweet long echoes, with random microtuning. Nice on vocals or instruments.

Space Monkeys
Beautiful, spacey, modulated echoes up an octave. This one is really nice.

Tremolo/Vibrato Presets

Ambient Tremo-Vibe
A nice big vibrato, with ambience. Adjust the tremolo by tweaking the level mod amount. Adjust the vibrato with the pitch mod. Great on guitar.

Delayed Tremo-Vibe
A straight delay, with tremolo and vibrato.

Delayed Tremolo
Tremolo and delay. Use the level mod control to control the intensity, and the modulation rate to control the speed.

Delayed Vibrato

Vibrato and delay. Use the pitch mod control to control the intensity, and the modulation rate to control the speed.

Tremolo

Just tremolo. Use the level mod control to control the intensity, and the modulation rate to control the speed.

Vibrato

Just vibrato. Use the pitch mod control to control the intensity, and the modulation rate to control the speed.

Vocal Transforms Presets

Diva

This preset can turn your singer into an operatic soprano, without the ego.

Estrogen

A combination of pitch and formant shifting capable of turning the most macho man into a certifiable wimp. Play with the pitch and formant knobs to suit your taste. Useful for turning men into women.

Munchkinizer

How to create that old chipmunk sound, without changing the pitch. Twiddle the formant slider to tweak this to your needs.

Little Tyke

A preset that turns adults into children.

Testosterone

Put your singer on steroids, without the side effects. Great for creating a basso profundo, or turning women into men.

Tinkerbell

For those rare occasions when you need a fairy godmother. Works best on female vocals.

Wacky Presets

Acid

Our impression of a bad trip. (Not that we'd know...)

Bad Connection

A bad telephone connection, in the days before digital phone lines.

Evil Aliens

Sort of like that movie classic villain, Darth something.

Military Radio

The sound of highly compressed battle-field communications.

Not Enough Coffee

A really bad Monday morning!

Small Furry Animals

Another classic of a sort. Here to remind you what your old pitch shifter sounded like.

Tone Deaf

This turns the best trained vocalists into tin ears.

Too Much Coffee

Starting to get that shaky feeling?

How do I get finer resolution on parameter adjustments?

Mac: Hold down the ⌘ key while dragging the parameter slider. WinNT: Hold down the **Ctrl** key while dragging the parameter slider.

How do I return to the default value for a parameter control?

Mac: Hold down the **option** key and click on the parameter control. WinNT: Hold down the **Alt** key and click on the parameter control.

The pitch shifted output sounds chopped up or 'glitchy'.

First, make sure that you are only trying to process a monophonic, or single instrument sound. Also, make sure that the track is as dry as possible, which means making sure that any reverb or other effects are inserted after PurePitch. Try changing the shift mode to the Conventional pitch-shifting mode. Finally, in PurePitch, adjust the Min Frequency and Max Frequency parameters (see the description of these parameters in the Using PurePitch section.)

Pro Tools says that the DSPs are 'maxed out' when trying to insert PurePitch.

You've run out of DSPs on your DSP farm card. You must either remove some other DSP plug-ins from your current session, or add more DSP power by purchasing another DSP farm card from Digidesign.

Wave Mechanics offers free technical support for all registered users. We love to hear from our users, but if you are having problems, first try to look in the manual for an answer. Also, check our web site for technical notes and product updates. If you are still stumped, please e-mail us with the following info (keep in mind that we won't be able to help you with questions about Pro Tools, Apple, Windows hardware or software, or any other non-Wave Mechanics stuff):

- The product version and serial number.

- The version number of your Pro Tools system, and type of hardware (e.g. HD, Mix, 'classic' PCI, or NuBus.)

- Your computer type and operating system version number (e.g. System 9.1, etc.)

- A detailed description of the problem.

The e-mail address for support is:

support@wavemechanics.com

If you don't have access to e-mail, please fax the same info to:

fax: 802-951-9799

If you don't have e-mail or a fax, you can call us at:

phone: 802-951-9700

Finally, if you are completely un-wired, you can write to us at:

Wave Mechanics, Inc.
P.O. Box 528
Burlington, VT 05401

Notes