antares

Auto-Tune 5

Pitch Correcting Plug-in

Owner's Manual

Hi Five!

The Obligatory Legal Mumbo-Jumbo

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Whew! Now that that's over, let's get on to
the good stuff.

Contents

Welcome!

On behalf of everyone at Antares Audio Technologies, we'd like to offer both our thanks and congratulations on your decision to purchase Auto-Tune 5, the most powerful intonation correction tool in the world. Before you proceed any farther, we'd like to strongly encourage you to register and authorize your copy of Auto-Tune 5. (You can skip ahead to the Authorization and Installation instructions on page 5. We'll wait.) Also, if you're planning on discarding that lovely Auto-Tune 5 box, it's probably a good idea to write down the serial number that appears on the bottom of the box for future reference. (The inside cover of this manual would be a good place.)

As an Auto-Tune 5 owner, you are entitled to receive notification of any software upgrades, technical support, and advance announcements of upcoming products. But we can't send you stuff unless we know who and where you are. So please, register.

At Antares, we are committed to excellence in quality, customer service, and technological innovation. With your purchase of Auto-Tune 5, you have created a relationship with Antares which we hope will be long and gratifying. Let us know what you think. You can count on us to listen.

Again, thanks.

The Whole Antares Crew

Chapter 1: Getting Started

If you are new to Auto-Tune, we encourage you to read this manual and work through the tutorials in Chapter 4. It's the quickest way to become familiar with what Auto-Tune 5 does and how it does it.

If you are upgrading from a previous version of Auto-Tune, you will find that most of what you're already doing will continue to work in Auto-Tune 5, only better. To get up to speed quickly, just check out the new feature overview below and then refer to the detailed New Feature Quick Start Guide in Chapter 5, which will tell you everything you need to know to make use of Auto-Tune 5's new capabilities.

What's New in Auto-Tune 5

The following are the key new features that have been added in Auto-Tune 5:

General Features

- **Improved pitch detection algorithm:** While Auto Tune's patented pitch detection technology has always provided unmatched speed and accuracy, Auto-Tune 5 introduces improvements in performance with marginal quality (noisy, poorly isolated, etc.) audio.

- **A sleek new interface:** As Auto-Tune's features have proliferated from version to version, we have continually focused on maintaining its ease of use. With Auto-Tune 5, we have undertaken a complete graphic redesign. The result is both easy on the eyes and logically groups related controls for intuitive functionality.

- **Consolidated Pitch Tracking control:** The previously separate Automatic and Graphical Mode Tracking controls have been consolidated into a single control and relocated to the Options dialog for set-it-and-forget-it simplicity.

Automatic Mode Features

- **Humanize function:** For those concerned about pitch correction that is "too perfect," the Humanize function allows you to set a fast retune speed for short notes, while still allowing natural variation in held notes, for results that are even more natural and realistic.

- **Realtime natural vibrato adjustment:** The new realtime Natural Vibrato function allows you to modify (either increasing or decreasing) the depth of any vibrato that is present in the original performance.

Graphical Mode Features

- **Larger Pitch Edit Display:** As you've no doubt noticed, the Pitch Edit Display is now bigger. Lots bigger.

- **Sync to host transport (host dependent):** For hosts that provide valid time information, Auto-Tune 5 will now maintain sync with the host program. Once you have tracked audio and created correction curves, you can move around in your track at will. No more having to always start playback at exactly the same location.

- **Selectable Clock Source:** For hosts that do not provide valid time information, Auto-Tune 5's clock display and selection functions let you use an internal time reference for Auto-Tune 4 style operation.

- **Realtime pitch tracking display:** During the Track Pitch process, the graphic representation of the pitch will be displayed in realtime as the audio plays.

- **Full-time correction mode (host dependent):** Whenever Auto-Tune 5 is not specifically tracking audio (and correction curves exist), Auto-Tune 5 will be operating in correction mode. There is no longer any need to press a "Correct Pitch" button. Besides being convenient, that makes possible the following feature:

- **Multiple simultaneous Graphical Mode instances (host dependent):** You can now have multiple instances of Auto-Tune Graphical Mode operating on different tracks simultaneously, even if their windows are not open. In previous versions, since you had to have plug-in windows open to engage Correct Pitch mode, only open instances could be active. No longer.

- **Editing functions no longer modal**: You can now use all of the graphical editing features while Auto-Tune 5 is either tracking or correcting pitch.

- **Enhanced Envelope Display functionality:** We've made some changes to the Envelope Display to make it much more useful for quick and easy navigation around your audio:

  When in "ALL" mode, the display automatically scales to precisely encompass the tracked audio (rather than defaulting to the entire length of the buffer).

  The behavior of the various editing tools has been changed such that for every tool except the I-Beam, moving the cursor onto the Envelope Display causes the tool to temporarily change into the Magnifying Glass Tool (perfect for quickly moving to another portion of your audio without having to manually change tools).

Using the I-Beam to make a selection on the Envelope Display now automatically causes the Pitch Graph Display to move to the selected audio.

- **Realtime graphical vibrato depth adjustment:** The Adjust Vibrato control allows you to modify the depth of vibrato in your audio while preserving the contour of the original vibrato. Moving this control results in a real-time graphical representation of the resulting vibrato contour.

- **Dedicated Snap To Note button:** When using the Line Tool, clicking this button constrains the tool to exact scale notes.

- **Dedicated Clear All Data function:** Provides a convenient method to instantly clear all saved tracked audio and correction curve data.

How To Use This Manual

If this is your first experience of Auto-Tune, you will find that Auto-Tune 5 has a very friendly user-interface and is extraordinarily easy to use. However, because Auto-Tune 5 does things that have never been done before, a few aspects of the user-interface may not be immediately obvious. You should at least read either Chapter 3, Auto-Tune 5 Controls, or Chapter 4, Auto-Tune 5 Tutorial, to learn the essential information you will need to operate Auto-Tune 5.

And as we mentioned above, if you are upgrading from Auto-Tune 4, go straight to Chapter 5, the New Feature Quick Start Guide, to learn everything you need to know (about Auto-Tune's new features, anyway).

The Contents Of This Manual

Installing Auto-Tune 5

Any unique instructions for installing Auto-Tune 5 for your specific plug-in format are located in the Auto-Tune 5 Read Me file that accompanies the plug-in. This file may also contain any last-minute Auto-Tune 5 information that didn't make it into this manual.

Auto-Tune 5 is designed to work with a wide variety of digital audio applications. Please refer to your host application's user manual for more information on installing and using plug-ins.

Authorizing Auto-Tune 5

Authorization is the process by which this software is allowed to run on your computer. Detailed instructions covering the available authorization options will be found in the file "Authorization Read Me" which is included on the installation CD ROM or with your software download.

NOTE: When initially installed, this software will run for ten days without authorization.

So even if you can't authorize it right away you can still use your software in the meantime. (During this period, click the "Try It" button whenever you are presented with the Trial Period screen at launch.) But don't procrastinate too long. After those ten days are up, you will no longer be able to launch this software until it's authorized.

Technical Support

In the unlikely event that you experience a problem using Auto-Tune 5, first try the following

1. Make sure you have the latest version of the software. You can download and install the latest version of the software from the following web page:

   http://www.antarestech.com/download/update.shtml

2. If you are having problems authorizing your software, be sure that you have the latest version of the PACE Interlok drivers. You can download and install the latest version for your operating system from the following web page:

   http://portal.knowledgebase.net/article.asp?article=174703&p=5764

If your problem is not resolved after taking the above actions, try the following:

1. Make another quick scan through this manual. Who knows? You may have stumbled onto some feature that you didn't notice the first time through.

2. Check our web page for tips, techniques, or any late-breaking information:

   http://www.antarestech.com

3. Consult our searchable knowledgebase at:

   http://www.antarestech.com/support/index.html

4. Call your local Antares dealer.

Chapter 2: Introducing Auto-Tune 5

Some background

In 1997, Antares Audio Technologies first introduced the ground-breaking Auto-Tune Pitch Correcting Plug-In. Auto-Tune was a tool that actually corrected the pitch of vocals and other solo instruments, in real time, without distortion or artifacts, while preserving all of the expressive nuance of the original performance. *Recording Magazine* called Auto-Tune a "holy grail of recording." And went on to say, "Bottom line, Auto-Tune is amazing… Everyone with a Mac should have this program." (In fact, we know of quite a few people back then who bought kilo-buck ProTools™ systems just to be able to run Auto-Tune.)

In the intervening years, Auto-Tune established itself as the worldwide standard in professional pitch correction. Today, it's used daily by thousands of audio professionals to save studio and editing time, ease the frustration of endless retakes, save that otherwise once-in-a-lifetime performance, or even to create unique special effects.

Now, never content to leave a good thing alone, Antares has created Auto-Tune 5. Preserving the great sound quality, transparent processing, and ease of use of previous versions of Auto-Tune, Auto-Tune 5 adds significant new features as well as a sleek new user interface.

So what exactly is Auto-Tune 5?

Auto-Tune 5 is a precision tool for correcting intonation errors or creatively modifying the intonation of a performance. Auto-Tune 5 employs state-of-the-art digital signal processing algorithms (many, interestingly enough, drawn from the geophysical industry) to continuously detect the pitch of a periodic input signal (typically a solo voice or instrument) and instantly and seamlessly change it to a desired pitch (defined by any of a number of user-programmable scales, MIDI input, or through the use of graphical editing tools).

To take maximum advantage of the power of Auto-Tune 5, you should have a basic understanding of pitch and how Auto-Tune 5 functions to correct pitch errors. This chapter presents basic terminology and introduces Auto-Tune 5's operating paradigm, giving you information you need to use it effectively.

A little bit about pitch

Pitch is typically associated with our perception of the "highness" or "lowness" of a particular sound. Our perception of pitch ranges from the very general (the high pitch of hissing steam, the low pitch of the rumble of an earthquake) to the very specific (the exact pitch of a solo singer or violinist). There is, of course, a wide range of variation in the middle. A symphony orchestra playing a scale in unison, for example, results in an extremely complex waveform, yet you are still able to easily sense the pitch.

The vocalists and the solo instruments that Auto-Tune 5 is designed to process have a very clearly defined quality of pitch. The sound-generating mechanism of these sources is a vibrating element (vocal chords, a string, an air column, etc.). The sound that is thus generated can be graphically represented as a waveform (a graph of the sound's pressure over time) that is periodic. This means that each cycle of waveform repeats itself fairly

exactly, as in the periodic waveform shown in the diagram below:
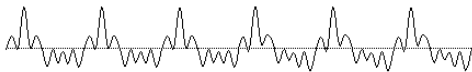
Because of its periodic nature, this sound's pitch can be easily identified and processed by Auto-Tune 5.

Other sounds are more complex. This waveform:
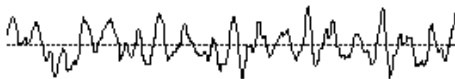
is of a violin section playing a single note in unison. Our ears still sense a specific pitch, but the waveform does not repeat itself. This waveform is a summation of a number of individually periodic violins. The summation is non-periodic because the individual violins are slightly out of tune with respect to one another. Because of this lack of periodicity, Auto-Tune 5 would not be able to process this sound.

Some pitch terminology

The pitch of a periodic waveform is defined as the number of times the periodic element repeats in one second. This is measured in Hertz (abbreviated Hz.). For example, the pitch of A3 (the A above middle C on a piano) is traditionally 440Hz (although that standard varies by a few Hz. in various parts of the world).

Pitches are often described relative to one another as intervals, or ratios of frequency. For example, two pitches are said to be one octave apart if their frequencies differ by a factor of two. Pitch ratios are measured in units called cents. There are 1200 cents per octave. For example, two tones that are 2400 cents apart are two octaves apart. The traditional twelve-tone Equal Tempered Scale that is used (or rather approximated) in 99.9% of all Western tonal music consists of tones that are, by definition, 100 cents apart. This interval of 100 cents is called a semitone.

The twelve equally-spaced tones of the Equal Tempered Scale happen to contain a number of intervals that approximate integer ratios in pitch. The following table shows these approximations:

INTERVAL	CENTS	NEARBY RATIO	RATIO IN CENTS
minor second	100	16/15	111.75
major second	200	9/8	203.91
minor third	300	6/5	315.64
major third	400	5/4	386.31
perfect fourth	500	4/3	498.04
tritone	600		
perfect fifth	700	3/2	701.65
minor sixth	800	8/5	813.69
major sixth	900	5/3	884.36
minor seventh	1000	16/9	996.09
major seventh	1100	15/8	1088.27
octave	1200	2	1200.00

As you can see, the intervals in the Equal Tempered Scale are NOT equal to the harmonious integer ratios. Rather, the Equal Tempered Scale is a compromise. It became widely used because once a harpsichord or piano is tuned to that scale, any composition in any key could be played and no one chord would sound better or worse than that same chord in another key.

How Auto-Tune 5 detects pitch

In order for Auto-Tune 5 to automatically correct pitch, it must first detect the pitch of the input sound. Calculating the pitch of a periodic waveform is a straightforward process. Simply measure the time between repetitions of the waveform. Divide this time into one, and you have the frequency in Hertz. Auto-Tune 5 does exactly this: It looks for a periodically repeating waveform and calculates the time interval between repetitions.

The pitch detection algorithm in Auto-Tune 5 is virtually instantaneous. It can recognize the repetition in a periodic sound within a few cycles. This usually occurs before the sound has sufficient amplitude to be heard. Used in combination with a slight processing delay (typically about 1 to 10 milliseconds), the output pitch can be detected and corrected without artifacts in a seamless and continuous fashion. (Although it must be kept in mind that some plug-in protocols introduce a certain amount of inherent and unpredictable delay.)

Auto-Tune 5 was designed to detect and correct pitches up to the pitch C6. (If the input pitch is higher than C6, Auto-Tune 5 will occasionally interpret the pitch an octave lower. This is because it interprets a two cycle repetition as a one cycle repetition.) On the low end, Auto-Tune 5 will detect pitches as low as 25Hz (when the Bass Instrument Input Type is selected). This range of pitches allows intonation correction to be performed on virtually all vocals and instruments.

Of course, Auto-Tune 5 will not detect pitch when the input waveform is not periodic. As demonstrated above, Auto-Tune 5 will fail to tune up even a unison violin section. But this can also occasionally be a problem with solo voice and solo instruments as well. Consider, for example, an exceptionally breathy voice, or a voice recorded in an unavoidably noisy environment. The added signal is non-periodic, and Auto-Tune 5 will have difficulty determining the pitch of the composite (voice + noise) sound. Luckily, there is a control (the Tracking control, discussed in Chapter 3) that will let Auto-Tune 5 be a bit more casual about what it considers "periodic." Experimenting with this setting will often allow Auto-Tune 5 to track even noisy signals.

How Auto-Tune 5 corrects pitch

Auto-Tune 5 provides two separate and distinct ways to approach pitch correction: Automatic Mode and Graphical Mode. The basic functionality of each is described on the following pages.
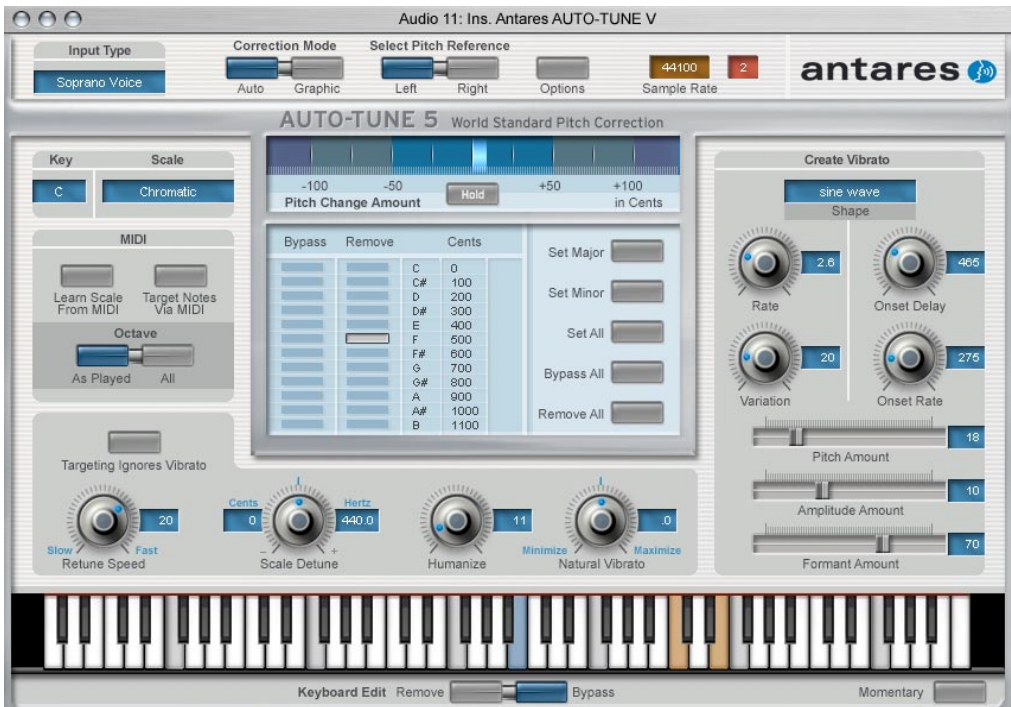
Automatic Mode

Auto-Tune 5's Automatic Mode works by continuously tracking the pitch of an input sound and comparing it to a user-defined scale. The scale tone closest to the input is continuously identified. If the input pitch exactly matches the scale tone, no correction is applied. If the input pitch varies from the desired scale tone, an output pitch is generated which is closer to the scale tone than the input pitch. (The exact amount of correction is controlled by the Retune Speed and Humanize settings, described below and in Chapter 3.)

Scales

The heart of Automatic Mode pitch correction is the Scale. Auto-Tune 5 lets you choose from major, minor, chromatic or 26 historical, ethnic and micro-tonal scales. Individual scale notes can be bypassed, resulting in no pitch correction when the input is near those notes. Individual scale notes can also be removed, allowing a wider range of pitch correction for neighboring pitches. The scale can be detuned, allowing pitch correction to any pitch center.

For added flexibility, you can also select the target pitches in real time via MIDI from a MIDI keyboard or a pre-recorded sequencer track.

Retune Speed

Auto-Tune 5 also gives you control over how rapidly, in time, the pitch adjustment is made toward the scale tone. This is set with the Retune Speed control (see Chapter 3 for more details).

- Fast Speed settings are appropriate for short duration notes and for mechanical instruments, like oboe or clarinet, whose pitch typically changes almost instantly. A fast enough setting will also minimize or completely remove a vibrato, as well as produce the infamous "Cher effect."

- Slow Speed settings, on the other hand, are appropriate for longer notes where you want expressive pitch gestures (like vibrato) to come through at the output and for vocal and instrumental styles that are typified by gradual slides (portamento) between pitches. An appropriately selected slow setting can leave expressive gestures intact while moving the average pitch to the correct tonal center.

Vibrato

Auto-Tune 5 allows real-time adjustment of the depth of any natural vibrato present in the input.

Auto-Tune 5 can also add a vibrato to an input that does not naturally exhibit one. You can program the vibrato rate along with individual vibrato depths for pitch, amplitude (loudness) and formant (resonant frequencies). You can also specify delayed vibrato with independently programmable onset delay and onset rate.

By combining a fast Retune Speed setting with Auto-Tune 5's Vibrato settings, you can even remove a performer's own vibrato and replace it with Auto-Tune 5's programmed vibrato, all in real time. Also, unusual combinations of Vibrato Waveform, Rate and Depth settings can be used for some interesting special effects.

An Example of Automatic Mode Correction

As an example, consider this before-and-after graphic representation of the pitch of a vocal phrase that contains both vibrato and expressive gestures.
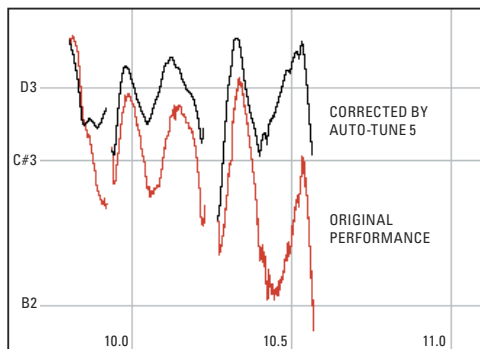
In the original performance, we can see that although the final note should be centered around D, the vocalist allowed the tail of the note to fall nearly three semitones flat. The "after" plot is the result of passing this phrase through Auto-Tune 5's Automatic Mode programmed to a D Major Scale (with C# and B set to "Remove") and a Retune Speed setting of 25. That Retune Speed causes the pitch center to be moved to D, while still retaining the vibrato and expressive gestures. (Setting C# and B to "Remove" is necessary to keep Auto-Tune 5 from trying to correct the seriously flat tail of the last note to those pitches. See Chapter 3 for more details.)
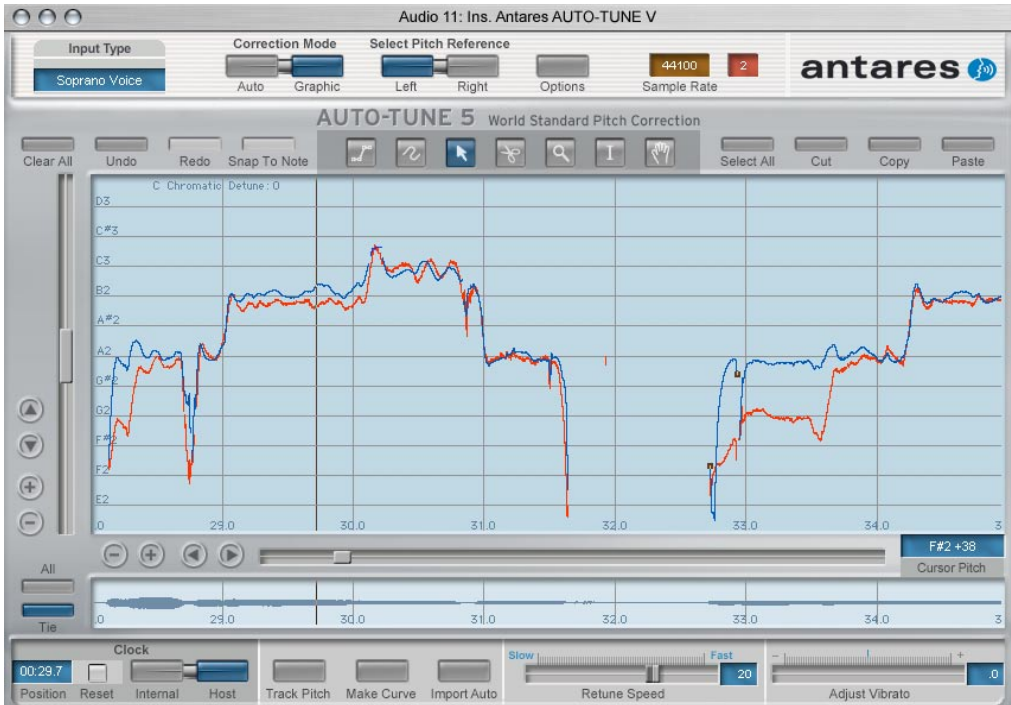
Graphical Mode

The Graphical Mode is similar to the Automatic Mode in that it also continuously tracks the pitch of the incoming sound and modifies the output pitch to be closer to a desired pitch. But in the Graphical Mode, the desired pitch is not a predefined scale tone, but rather is a graphical representation of your desired pitch.

As in Automatic Mode, the rate of change towards the desired pitch is controlled by the Retune Speed control.

The key feature of Graphical Mode is the Pitch Graph display. On this display, the vertical axis represents pitch (with higher notes towards the top) while the horizontal axis represents time.

The red curve represents the original pitch contour of the input track, while the desired target pitch or pitch contour is indicated in blue.

The horizontal grid lines represent scale pitches. The key annotation, scale name, scale pitches and Scale Detune value are those defined in the Automatic Mode. They do not affect the computations of the Graphical Mode in any way. They are merely a reference to guide you in setting the target pitches. If you wish to change them, you can select the Automatic Mode and change the Key pop-up, Scale pop-up, or the Scale Detune setting, respectively. (Changing the Scale Detune setting will also result in the scale pitch graph lines moving up or down relative to the tracked pitch.) Then, return to Graphical Mode.

The Graphical Mode also includes the Envelope Graph, which displays the amplitude (loudness) envelope of the sound whose pitch is shown in the Pitch Graph. The horizontal scale of this graph will either 1) show the envelope of the entire extent of the pitch-detected sound or 2) align with the horizontal scale and position of the Pitch Graph above it.

In Graphical Mode, you can draw the desired target pitches using line and curve drawing tools or selectively modify the existing pitch contours. Complete image scaling and scrolling controls are provided. A graphical editor allows easy editing, including cut, copy and paste functions.

The basic steps you will perform in Graphical Mode are:

- In your host application, select some sound for processing.
- Bring up Auto-Tune 5. Set the buffer length to at least the number of seconds from the beginning of the track to the end of the audio you are going to tune. Press the Track Pitch button, then play back the audio. The pitch will be detected and then displayed in the Pitch Graph as a red curve.
- When you have tracked all the audio you want to correct, click the Track Pitch button again to exit Track Pitch mode.
- Create a target pitch function using the graphical tools and adjust the Retune Speed for the desired effect.
- Play back the track. The pitch will be corrected as specified.

Chapter 3: Auto-Tune 5 Controls

This chapter is a reference for all of the controls used in the Auto-Tune 5 interface. How these controls are used together for intonation correction is demonstrated in Chapter 4, Auto-Tune 5 Tutorial.

If you are upgrading from Auto-Tune 4, you can probably skip ahead to Chapter 5, New Feature Quick Start Guide.

Common Controls

The following controls and displays are visible regardless of which operating mode is selected. Their settings affect both Automatic and Graphical Modes.

Input Type
As a result of Antares research into the unique characteristics of various types of audio signals, Auto-Tune 5 offers a selection of optimized processing algorithms for the most commonly pitch-corrected inputs. Choices include Soprano Voice, Alto/Tenor Voice, Low Male Voice, Instrument, and Bass Instrument. Matching the appropriate algorithm to the input results in even faster and more accurate pitch detection and correction.

To select the desired Input Type, click on the Input Type pop-up and then select the desired type from the pop-up list.

NOTE: Choosing the wrong Input Type (or just forgetting to set it at all) can result in compromised performance. Pay attention.

ANOTHER NOTE: When any Input Type other than Bass Instrument is selected, Auto-Tune 5 is reliably able to detect pitches down to A0 (55Hz). Selecting Bass Instrument lowers the lowest detectable frequency by about one octave to 25Hz. Since the lowest E string on a bass guitar is approximately 41Hz, Bass Instrument (as its

name so ably implies) allows you to apply pitch correction to those pesky fretless bass lines as well as other low bass range instruments. However, when Bass Instrument is selected, pitches above A4 may be incorrectly tuned by a perfect fifth, so be sure to select Bass Instrument only when correcting bass range tracks.

Correction Mode
Click the appropriate button to select either Automatic or Graphical Mode.

Select Pitch Reference
Auto-Tune 5 provides the ability to pitch correct stereo tracks while maintaining the tracks' phase coherence. (Refer to your host application's manual for instructions on assigning a plug-in to a stereo track.) Click the appropriate button to select which of the two stereo tracks (left or right) Auto-Tune 5 will use as a pitch reference.

NOTE: If there is a marked difference in the two tracks, pick the cleanest,

most isolated track. For example, if one track is a close mic'd vocal while the other is mic'd from farther away for ambience, or is heavily processed, select the close mic'd track.

ANOTHER NOTE: Auto-Tune 5 will only pitch correct true stereo tracks. If the second track (i.e., the track not selected as a pitch reference) is simply an independent unrelated track, unpredictable (and potentially unpleasant) sounds may result. On the other hand, something interesting might happen. You never know.

When Auto-Tune 5 is instantiated on a mono track, this control is inactive (grayed out).
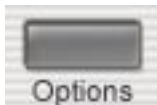
Options

Clicking the Options button will bring up a window containing a number of settings that fall into the "set and forget" category. They are:

At a 44.1k sample rate, each second of buffer requires 8,820 bytes of memory. (Higher sample rates require proportionally more memory.) For large buffers, you may need to increase your host application's memory allocation.

Enter buffer seconds (999 max): 240

Knob control:
◉ Vertical   ◯ Horizontal   ◯ Radial

☑ Use custom cursors in graphical mode?

The more Undo's allowed, the more memory will be used to store previous states of the graphic data.

Enter number of Undo's allowed (20 max): 10

For clean signals, this control should be left at its default setting (25). If your signal is noisy or not well-isolated, or you are dealing with a particularly breathy or guttural voice resulting in tracking problems, select a more "relaxed" setting. (However, a too relaxed setting may introduce distortion or popping.)

Pitch Tracking:
Relaxed   Choosy   25

Cancel   Save

TRACKING In order to accurately identify the pitch of the input, Auto-Tune 5 requires a periodically repeating waveform, characteristic of a voice or solo instrument. The Tracking control determines how much variation is allowed in the incoming waveform for Auto-Tune 5 to still consider it periodic.

If you are working with a well-isolated solo signal (e.g., tracking in a studio or off of a multi-track master) you can typically set the Tracking control to 25 and forget it.

If, on the other hand, your signal is noisy or not well-isolated (as might be more common in a live performance situation) or you are dealing with a particularly breathy or guttural voice, it may be necessary to allow more signal variation (higher Tracking numbers). However, under these circumstances tracking is not guaranteed and a too "relaxed" setting may introduce distortion and popping.

NOTE: The improved pitch detection algorithm in Auto-Tune 5 (in combination with the Input Type selection described above) results in noticeably more reliable pitch detection compared to previous versions of Auto-Tune. If you have used older versions of Auto-Tune, you may find that situations that previously required constant modifications of the Tracking control now track perfectly at the default setting.

BUFFER SIZE This controls the number of seconds of memory buffer space that are permanently reserved for pitch tracking and pitch correction data in Graphical Mode. (There is a separate buffer for each plug-in occurrence.) To change the buffer allocation, click in the data field and enter the required number of seconds.

NOTE: As buffer memory is typically allocated from within your host application, for large buffers, it may be necessary to increase the memory allocation of your host.

ANOTHER NOTE: For hosts that provide valid time information, Auto-Tune 5 will display all tracked pitch information at its correct time within the track. If your host supports this capability, setting the buffer to the length of the entire song and tracking the pitch in one pass will allow you to quickly and easily move to each section of audio to be corrected as necessary.

KNOB CONTROL Lets you select how you want to control the "knobs" in the Auto-Tune 5 interface.

VERTICAL: Position the cursor over a knob, press and hold the left mouse button (or the only mouse button, if you're using a one-button mouse) and move the cursor up to turn the knob clockwise or down to turn the knob counterclockwise. The current value of the knob's parameter appears in its associated numeric display.

HORIZONTAL: Position the cursor over a knob, press and hold the left mouse button and move the cursor to the right to turn the knob clockwise or to the left to turn the knob counterclockwise. The current value of the knob's parameter appears in its associated numeric display.

RADIAL: Click anywhere around the circumference of the knob, press and hold the left mouse button and "rotate" the knob in the desired direction. The current value of the knob's parameter appears in its associated numeric display.

NOTE: This setting applies to "knob" controls only. Controls that appear as sliders are not affected.

CUSTOM CURSORS Click the check box to use Custom Cursors in Graphical Mode.

Normally, Auto-Tune 5 displays different cursor shapes in the Pitch Graph Display to help you grab and drag objects (e.g., the object cursor, the anchor point cursor, etc.). However, some host applications mistakenly think that they own the cursor when it is in a plug-in window. This may cause the cursor to flash as the host and Auto-Tune 5 alternately try to set the cursor shape. If this annoys you, unclick this check box. It will stop the flashing, but you will no longer see Auto-Tune 5's custom cursors.

NUMBER OF UNDOS Auto-Tune 5 provides multiple Undo/Redo capability in Graphical Mode. Select the maximum allowable number here (up to 20). Choosing a higher number allocates more memory for saving intermediate states.

Sample Rate Display
This display indicates the sample rate of the current audio file as reported to Auto-Tune 5 by the host application.

NOTE: Auto-Tune 5 is high sample rate compatible. If your host application and audio hardware are capable of dealing with up to 192 kHz files, Auto-Tune 5 will process them correctly. However, it's important to remember that high sample rate files require substantially more DSP power than 44.1 kHz and 48 kHz files, so the number of possible simultaneous Auto-Tune 5 instantiations will be decreased.

ANOTHER NOTE: If you are using external A/D converters with independently selectable sample rates, it can be possible to establish a mismatch between the actual conversion sample rate and what the host application thinks is the sample rate. If this happens, Auto-Tune 5 will appear to be correcting pitch to the "wrong" key. If this appears to be happening, check to be sure that your converter sample rate and your host application sample rate (as displayed by Auto-Tune 5) match.

Instance ID
Some host applications assign numerical instance IDs to multiple instances of the same plug-in. If your host does this, the ID will appear in a red display to the immediate right of the Sample Rate display. Instance IDs are particularly useful if you are using any of Auto-Tune 5's MIDI functions, as they allow you to be sure that you are routing the MIDI stream to the correct instance of Auto-Tune on the desired track.

Bypass
Auto-Tune 5 does not include a dedicated Bypass control as that function is typically provided by the host application's plug-in interface. However, it is worth noting that Auto-Tune 5 is designed such that switching the bypass state will not cause any audio artifacts. It can safely be used in performance or in the middle of a recorded track.

Automatic Mode Controls

Knobs and Sliders

Auto-Tune 5's continuous controls are represented graphically as knobs or sliders.

Depending on your preference, you can control knobs by vertical, horizontal or radial mouse movement. Set your preference in the Options dialog described above. Double-clicking on a knob will return it to its default value. In some host applications, Command (Mac)/Control (PC) clicking on a knob will also reset it to default (see the Auto-Tune 5 Read Me and/or your host application manual for details).

To adjust a slider, click on the "thumb" indicator and move it to the desired value, or click anywhere on the display scale to instantly move the indicator to that position. Command (Mac)/Control (PC) clicking anywhere in the display scale will set a control to its default value.

Key Selection

To select the desired key, click on the Key pop-up and then select the desired note from the pop-up list. This determines the pitch of the first note of the scale according to the standard A3 = 440 Hertz.

Scale Selection

To select a scale, click on the Scale pop-up and then select the desired scale from the pop-up list.

NOTE: To avoid having to deal with scales containing those annoying double flats, double sharps and notes like Cb, E#, Fb and B#, Auto-Tune 5 will automatically choose the simpler of two enharmonically equivalent scales. For example, if you select Db Major, the Edit Scale Display will duly display the Db Major scale. However, if you then go to the Scale selection pop-up and select Minor, the Key will automatically be changed to C# and the Edit Scale Display will, in fact, display the much friendlier C# Minor scale. This will also be reflected on the Pitch Graph Display in the Graphical Mode.

The Scales

Auto-Tune 5 comes with 29 preprogrammed scales. The first three scales are equal tempered. These are the ubiquitous scales typically found in Western tonal music. The other scales are historical, ethnic, and micro-tonal scales. An in-depth discussion of these scales and their history is beyond the scope of this manual. The interested reader will find more information in *Tuning In — Micro-tonality In Electronic Music* by Scott R. Wilkinson, published by Hal Leonard Books.

The following is a brief synopsis of the scales:

MODERN EQUAL TEMPERAMENT
- major: a seven-tone equal tempered major scale.
- minor: a seven-tone equal tempered minor scale.
- Equal Tempered chrom.: a twelve-tone equal tempered chromatic scale.

HISTORICAL TUNINGS
- Ling Lun: a twelve-tone scale dating from 2700 B.C. China.
- Scholar's Lute: a seven-tone scale dating from 300 B.C. China.
- Greek diatonic genus: a seven-tone scale from ancient Greece.
- Greek chromatic genus: a seven-tone scale from ancient Greece.
- Greek enharmonic genus: a seven-tone scale from ancient Greece.
- Pythagorean: a twelve-tone scale dating from 600 B.C. Greece. This scale is derived

by tuning twelve pure perfect fifths upward and adjusting the octaves downward. This leads to some pure intervals and some very impure intervals.

- Just (major chromatic): a twelve-tone scale. Just intonation tunes the most frequently used intervals to be pure (integer ratios in frequency). These tunings depend on the mode (major or minor) and the key. This scale is tuned for major mode.
- Just (minor chromatic): (See Just (major chromatic), above)
- Meantone chrom.: a twelve-tone scale. This tuning is a combination of Pythagorean and just tunings so that music in a wider variety of keys could be usable.
- Werckmeister III chrom.: a twelve-tone scale. This scale was a first attempt (about Bach's time) to allow an instrument to be played in any scale. It was in response to this scale that Bach wrote Well-Tempered Clavier.
- Vallotti & Young chrom.: a twelve-tone scale. Another derivative of the Pythagorean scale designed to allow arbitrary keys.
- Barnes-Bach (chromatic): a twelve-tone scale. A variation of the Vallotti & Young scale designed to optimize the performance of Bach's Well-Tempered Clavier.

ETHNIC TUNINGS
- Indian: This 22 tone scale is used in India to perform ragas.
- Slendro: This five-tone Indonesian scale is played by ensembles called gamelans.
- Pelog: This seven-tone Indonesian scale is more interesting than Slendro and is now the primary scale in Balinese music.
- Arabic 1: This 17 tone scale is the original Arabic scale adopted from the Pythagorean scale.
- Arabic 2 (chromatic): This twelve-tone scale is the modern version of the Arabic scale popular in Arabic music today.

CONTEMPORARY TUNINGS
Equal tempered scales with a large number of tones are typically used to play common tonal harmony with greater purity of intervals and chords. The typical approach is to analyze a passage (or less) of music and select tones from a scale that will best approximate the desired pure intervals.

- 19 Tone: This scale has greater purity of minor thirds and major thirds (and conversely, minor and major sixths) than twelve-tone equal temperament. A disadvantage is that perfect fifths are narrower than those found in twelve-tone equal temperament.
- 24 Tone: Also know as the quarter tone scale, this scale is used for variety but has no advantage in terms of ratios that better approximate pure intervals.
- 31 Tone: In addition to intervals that better approximate pure intervals, this scale also contains good approximations to Indonesian pelog and slendro scales.
- 53 Tone: Related mathematically to the cycle of fifths, the 53-tone scale has very pure major and minor thirds, and fifths and fourths.
- Partch: Harry Partch is considered the father of modern microtonality. This scale was devised by him and used in instrument building and performances.
- Carlos Alpha: Wendy Carlos performed extensive computer analysis to devise a number of equal tempered scales with good approximations for the primary harmonic intervals and their inversions. This scale is good at approximating the primary intervals including 7/4. This scale divides the octave into 15.385 steps forming intervals of 78.0 cents.
- Carlos Beta: This scale divides the octave into 18.809 steps forming intervals of 63.8 cents.
- Carlos Gamma: This scale achieves perfect purity of the primary intervals 3/2, 4/3 and 5/4. This scale divides the octave into 34.188 steps forming intervals of 35.1 cents.
- Harmonic (chromatic): This twelve-tone scale is created in the partials in the fifth octave of the harmonic series. The scale degrees that correspond to the classic just intervals are the major second, major third, perfect fifth and major seventh.

The Edit Scale Display

The Edit Scale Display is used to create custom scales or to modify any of the preset scales. Edits made using this display are associated with each scale. That is, each scale retains its own edits independent of the other scales. For example, if you select C Major and Remove or Bypass certain notes and then change to C Minor and make other edits, when you return to C Major your previous edits associated with C Major will be restored.

The Edit Scale window displays each note of the currently selected scale in the currently selected key. If the selected scale includes more than twelve notes, Up and Down arrows will appear to allow scrolling through all of the available notes.

Beside each note name are two buttons: a Bypass button and a Remove button. Click on a button to toggle its state. The button will light to indicate that its mode is active.

If neither of these buttons are lit, Auto-Tune 5 treats this note as a normal scale note, i.e., when the input pitch is close to this note, Auto-Tune 5 will correct the pitch to this note at the rate set by the Retune Speed control.

If the scale selected in the Scale popup contains exactly 12 notes (e.g., Chromatic, Pythagorean, Meantone Chromatic, Just, etc.), the Virtual Keyboard (see below) will be active and any edits to the scale notes made in the Edit Scale Display will also be reflected on the Virtual Keyboard.

NOTE: Although Auto-Tune 5 allows setting scale note behaviors in individual octaves, any edits made via the Edit Scale Display will affect all octaves. To edit notes in individual octaves, use the Virtual Keyboard.

Bypass

If the Bypass button is lit, when the input pitch is close to this note the input will be passed through with no correction.

Why set Scale notes to "Bypass?"

There are two main reasons to set one or more scale notes to "Bypass."

1. If a performance includes pitch gestures around one or more specific notes that you want to preserve with no modification whatsoever, you can set just those notes to Bypass. This lets Auto-Tune 5 correct any pitch problems elsewhere in the scale but passes everything near the bypassed notes completely unprocessed.

2. If a performance contains only a single error, you can set all notes to Bypass except the one "sour" note. Auto-Tune 5 will then pass the entire performance through unprocessed except for the sour note, which will be corrected.

Remove

If the Remove button is lit, then the note is simply removed from the current scale. For example, selecting the Chromatic scale and then setting C#, D#, F#, G#, A# to Remove would cause a C Major scale to remain. In that case Auto-Tune 5 would always retune the input to the closest note of the C Major scale.

Why set Scale notes to "Remove?"

To understand why it is sometimes necessary to set even correct scale notes to "Remove," let's look again at the example from Chapter 2.
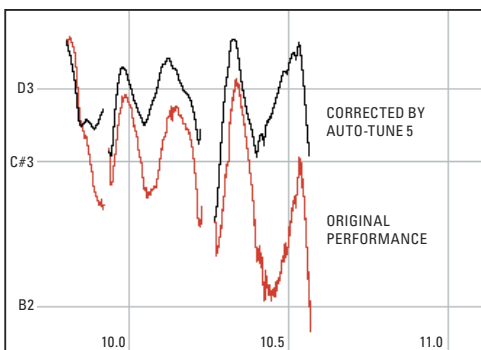
This phrase is in D Major and, if all the pitch errors were no greater than about 49 cents, would work fine with a standard D Major scale (D, E, F#, G, A, B, C#). However, the pitch error of three semitones at the end of the last note is so large that with B and C# present in the Scale, as the pitch fell, Auto-Tune 5 would see first C# and then B as the target pitch and therefore allow the error to remain. With C# and B removed from the Scale, Auto-Tune 5 continues to see D as the target pitch for the entire duration of the note and therefore pulls the phrase up to the correct pitch.

Cents

The number in the Cents column is the associated note's interval, in cents, from the root note of the scale. It's provided for reference purposes and to help you choose which notes of a micro-tonal scale to include or remove.

Set All

Clicking this button sets all notes in the current scale to Scale Notes in all octaves. This function is useful as a Reset button to instantly erase all previous Remove and/or Bypass settings and reset an edited scale to its default state.

Remove All

Clicking this button sets all notes in the current scale to Remove in all octaves.

Bypass All

Clicking this button sets all notes in the current scale to Bypass in all octaves.

Set Major Scale/Set Minor Scale

When any scale that includes more than seven notes (i.e., any non-diatonic scale) is selected, the Set Major Scale and Set Minor Scale buttons will appear. Clicking on either of these buttons will "Remove" all notes from the scale except for those notes closest to the notes of a traditional diatonic major or minor scale (depending, of course, on which button you clicked).

Virtual Keyboard

The Virtual Keyboard displays Auto-Tune 5's pitch detection range and acts as a realtime display of the currently detected pitch, a display of the current Scale settings, and as a tool for setting target note behaviors in specific octaves.

 NOTE: The keyboard is only active for scales with exactly twelve notes. It will be grayed out (hence inactive) when any other scale is selected. "But wait!" you might be thinking, "I want to edit Major and Minor scales in individual octaves and the keyboard is grayed out when I select either one." No problem. Simply select Chromatic, then use the Set Major or Set Minor button to set up the scale of your choice and edit away.

KEY COLORS The color of the keys of the Virtual Keyboard indicate their current state as follows:

COLOR	STATE
Blue	The currently detected input pitch
White or Black	Scale Note
Gray	Removed
Light Brown	Bypassed

KEYBOARD EDIT These buttons are used to select which state (Remove or Bypass) will be toggled when you click on a key.

When Remove is selected, clicking on any key that is not currently set to Remove will set that key to Remove. Clicking on any key that is currently set to Remove will set that key to a Scale Note.

When Bypass is selected, clicking on any key that is not currently set to Bypass will set that key to Bypass. Clicking on any key that is currently set to Bypass will set that key to a Scale Note.

 NOTE: In the descriptions above, "clicking" on a key refers to pressing the mouse button down and then releasing it. The edit action is executed when the mouse button is released. Therefore, if the Momentary button is Off (see below), dragging across the keyboard highlights each key in turn, but it is only when you release the mouse button that the resulting key will change state.

MOMENTARY When this button is not On (i.e., its color is gray), any edits made to the keyboard will latch -i.e., clicking a key will change its state and the key will retain that state until some other action causes it to change.

When the button is On (i.e., its color is blue), keyboard edits are only active for as long as the mouse is held down on a key.

 NOTE: Pressing and holding the Shift key on your keyboard will temporarily toggle the state of the Momentary button.

A TIP: The main purpose of the Momentary function is to allow you to deal easily with specific individual events in a performance. However, you can also use it to "play" the target melody notes in real time. To do this, set the scale to Chromatic and use the Scale Edit window Remove All button to remove all notes from the scale. Set Keyboard Edit to Remove and Momentary to On. Now use your mouse to play the target melody on the keyboard. It's not as easy as Target Notes via MIDI, but if you don't have a MIDI controller handy, it'll do in a pinch.

Auto-Tune 5 MIDI Functions

Auto-Tune 5 provides two functions that require it to receive MIDI data from the host application. Depending on your intent, this data could come in real time from a MIDI controller (typically a keyboard) or from a prerecorded MIDI sequencer track. Refer to your host application's manual for details on how to route MIDI to Auto-Tune 5.

Please note that some host applications may not support the routing of MIDI information to plug-ins. In that case the following two functions will not be selectable.

Target Notes Via MIDI
To use the Target Notes Via MIDI function, ensure that the desired MIDI source is routed to Auto-Tune 5, then click the Target Notes Via MIDI button. Its color will change to blue and the Edit Scale display will automatically be set

to a chromatic scale with all of the notes set to Remove. While in this mode, Auto-Tune 5 continuously monitors its MIDI input for Note On messages. At any instant, the scale used for correction is defined by all MIDI notes that are on. For example, if MIDI notes A, C and E are held, Auto-Tune 5's input will be retuned to an A, C or E, whichever is closest to the input pitch.

The source of the MIDI input would typically be a MIDI keyboard or sequencer track, and could consist of chords, scales, or, most powerfully, the exact melody that the input should be corrected to.

IMPORTANT NOTE: If you will not be defining Auto-Tune 5's target pitches via MIDI, be sure that the Target Notes Via MIDI button is off. If it is left on and no MIDI note data is present, Auto-Tune 5 will pass through all audio unprocessed — giving the impression that Auto-Tune 5 is not functioning.

Learn Scale From MIDI
In most cases, you will probably tell Auto-Tune 5 which notes to correct to using the Edit Scale Display and/or the Virtual Keyboard. However, there may be occasions when it is not clear exactly what key a melody line is in, or where the melody line has too many accidentals to fit comfortably into a conventional scale. For those occasions, the Learn Scale From MIDI function allows you to simply play the melody into Auto-Tune 5 from a MIDI keyboard or sequencer track and let Auto-Tune 5 construct a custom scale containing only those notes that appear in the melody.

To use the Learn Scale From MIDI function, ensure that the desired MIDI source is routed to Auto-Tune 5 and then click the Learn Scale From MIDI button. Its color will change to blue and the Edit Scale display will automatically be set to a chromatic scale with all of the notes set to Remove.

Now simply play the melody to be corrected from your keyboard or sequencer. Tempo and rhythm don't matter, so take your time and make sure you don't play any wrong notes.

As each note is played, the corresponding Remove button in the Edit Scale Display is turned off (adding that note to the scale as a Scale Note). Assume, for example, that your melody starts with D, B, and then A. After playing those notes the display would look the above.

When you have played the entire melody, press the Learn Scale From MIDI button again to end the process. The Edit Scale Display will now contain a scale containing only those notes that appeared in your melody.

If you happen to make an error during note entry, or want to try again for any other reason, simply click the Learn Scale From MIDI button and start the process again.

NOTE: When you start the process by pressing the Learn Scale From MIDI button, all notes are first Removed from the chromatic scale in preparation for adding just the notes you play. If you then press the Learn Scale From MIDI button again without playing any notes, you will be left with a chromatic scale with all notes removed. In this state, Auto-Tune 5 will pass all notes with no correction applied. So don't do that.

ANOTHER NOTE: We realize that there is some possibility of confusion between the Learn Scale From MIDI function and Target Notes Via MIDI function described above. To clarify: Target Notes Via MIDI is used to specify target pitches in real time while pitch correction is occurring, while Learn Scale From MIDI is used in advance of correction to create a custom scale.

Octave As Played/All Octaves
For both of the MIDI functions (Learn Scale from MIDI and Target Notes via MIDI), you can choose whether you want incoming MIDI notes to affect all octaves or just the notes in the specific octaves in which they are played.

Simply click the desired button. The button will change color to blue to indicate your choice.

Targeting Ignores Vibrato
This feature is designed to help with target note identification when the performance includes vibrato so wide that it approaches adjacent scale notes. The most common symptom of this problem is a pronounced "warbling" as the input is alternately tuned to each of the upper and lower adjacent notes.

When this function is "On," Auto-Tune 5 uses the impressively named Stochastic Optimal Linear Estimation Theory to attempt to recognize vibrato and differentiate between it and intended note changes. Our testing has shown that it works a lot of the time — but not always (it depends a great deal on the actual performance). When it works, Auto-Tune 5 ignores the wide vibrato as far as target note selection is concerned. When it doesn't, it works pretty much the same way it would work if the function were "Off."

The default state of this control is Off. When you've got a vibrato problem, try turning it on and see if it helps.

Retune Speed
Retune controls how rapidly the pitch correction is applied to the incoming sound. The units are milliseconds. A value of zero will cause instantaneous changes from one tone to another and will completely suppress a vibrato (note that any related volume changes will remain). Values from 10 to 50 are typical for vocals (unless you're going for the now-infamous "Cher effect," in which case use 0). Larger values let through more vibrato and other interpretative pitch gestures but also slow down how rapidly pitch corrections are made. Although the above suggestions can be used as starting points, finding the correct Retune setting for a particular performance is largely a matter of trial-and-error and depends on such attributes as song tempo, note duration and vocal style, among others. As always, let you ears be your guide.

The default Retune value is 20. Double-clicking or Command (Mac)/Control (PC) clicking the Retune knob will reset it to that value.

Scale Detune
The Detune parameter allows you to change the pitch standard of Auto-Tune 5 from the default A = 440Hz. The value is set in cents (100 cents = 1 semitone). The range of adjustment is from -100 to +100 cents. For convenience, the detune amount is also displayed in Hertz relative to A440.

The Detune function can be used to tune a vocal performance to some irreparably out-of-tune instrument (a piano or organ, for example), or to allow correction to other than the conventional 440Hz standard.

If you have a tone that you want to use as the pitch standard, select that tone and play it in a loop. Adjust Scale Detune until the Change meter reads zero. (You may be required to use the Edit Scale Display to remove adjacent notes so that Auto-Tune 5 doesn't tune to the wrong note.)

The default Scale Detune setting is 0 cents. Double-clicking or Command (Mac)/Control (PC) clicking the Scale Detune knob will reset it to that value.

Humanize
One of the criticisms occasionally (if, we feel, unfairly) leveled at pitch correction is that it results in performances that are "too perfect." Frankly, it's been our experience that for the skillful engineer, Auto-Tune has always offered the means to perform its magic in a way that makes it virtually impossible for the listener to hear that it has been used (without, of course, comparing the result to the original performance).

Nonetheless, one situation that could previously send you to Graphical Mode was a performance that included both very fast notes and longer sustained notes. The problem was that in order to get the fast notes in tune, you'd have to set a fast Retune Speed, which would then make any sustained notes sound unnaturally static. The solution was adjusting in Graphical Mode.

Now, with the new Humanize function, you can get the same results quickly and easily in Automatic Mode. The Humanize function differentiates between short and sustained notes and lets you apply a slower Retune Speed just to the sustained notes. Thus, the short notes are in tune and the sustained notes still allow the natural variations of the original performance.

Here's how it works:

Start by setting Humanize to 0 and adjusting the Retune Speed until the shortest problem notes in the performance are in tune. At this point, any sustained notes may sound unnaturally static. If so, start advancing the Humanize control. The higher the Humanize setting, the more the Retune Speed is slowed for sustained notes. The goal is to find the point where the sustained notes are also in tune and just enough of the natural variation in the performance is present in the sustained notes to sound natural and realistic. (If you set Humanize too high, any problem sustained notes may not be fully corrected.)

This is one of those settings where you have to let your ears be your guide. The optimum Humanize setting for any particular performance will depend on the performance style, the other Automatic Mode settings and the specific effect you desire.

The default Humanize setting is 0. Double-clicking or Command (Mac)/Control (PC) clicking the Humanize knob will reset it to that value.

Natural Vibrato

The Natural Vibrato function allows real-time modification (either increase or decrease) of the depth of any vibrato present in the input audio while preserving the original shape and character of the vibrato.

This function uses the same Stochastic Optimal Linear Estimation Theory as the Targeting Ignores Vibrato function to differentiate between vibrato and intended pitch changes, adjusting the vibrato depth while leaving intended pitch changes intact.

The Natural Vibrato function acts independently of the pitch correction functions. Of particular note is the fact that setting a scale note or notes to Bypass still allows vibrato adjustment for those notes. So, if you want to adjust a performance's vibrato while making no other pitch changes, you can simply set all scale notes to Bypass and still use the Natural Vibrato function to adjust vibrato depth.

NOTE: This function acts only on vibrato present in the original performance. If the original performance does not contain vibrato, this control will have no audible effect.

ANOTHER NOTE: Natural Vibrato adjustments function independently of the Create Vibrato functions described below. However, since both functions can operate simultaneously, they can interact in ways that may or may not be useful, depending on your intent. In most cases, you should probably use one or the other.

The default Natural Vibrato setting is 0. Double-clicking or Command (Mac)/Control (PC) clicking the Natural Vibrato knob will reset it to that value.

The Create Vibrato Section

The controls in this section are designed to add a synthesized vibrato to the input.

While vibrato is typically perceived to be a variation solely in pitch, careful analysis shows that, depending on the voice or instrument and the style of the individual performer, variations in amplitude (loudness) and formant resonances are also involved. Reflecting this, Auto-Tune 5 includes a plethora of vibrato functions to allow the creation of much more convincing vibratos. (And for the adventuresome, they can be abused to create some "interesting" effects.)

The controls are:
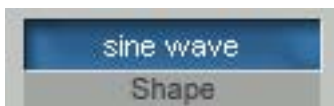
SHAPE MENU Selects the shape of the vibrato. The choices are:

NO VIBRATO Pretty self-explanatory.

SINE WAVE Changes smoothly from minimum to maximum and back again. The most common choice for a conventional vibrato.

SQUARE Jumps to maximum where it spends 50% of the cycle and then jumps to minimum for the remaining 50% of the cycle.

SAWTOOTH Gradually rises from minimum to maximum and then drops instantaneously to minimum to start the cycle again.

RATE
Sets the rate of the vibrato over a range of 0.1 Hz to 10 Hz. The default Rate setting is 5.5 Hz. Double-clicking or Command (Mac)/Control (PC) clicking the Rate knob will reset it to that value.

VARIATION
Sets the amount of random variation that will be applied to the Rate and Amount parameters on a note to note basis. Useful for humanizing the vibrato by adding random "errors."

The range is from 0 (no variation) to 100 (maximum variation). The default Variation setting is 20. Double-clicking or Command (Mac)/Control (PC) clicking the Variation knob will reset it to that value.

ONSET DELAY
Sets the amount of time (in msec) between the beginning of a note and the beginning of the onset of vibrato. The range is from 0 to 1500ms (1.5 seconds). The default value is 500ms. Double-clicking or Command (Mac)/Control (PC) clicking the Onset Delay knob will reset it to that value.

ONSET RATE
Sets the amount of time (in msec) between the end of the Onset Delay (set above) and the point at which the vibrato reaches the full Amounts set in the Pitch, Amplitude and Formant Amount settings. The range is from 0 to 1500ms (1.5 seconds). The default value is 500ms. Double-clicking or Command (Mac)/Control (PC) clicking the knob will reset it to that value.

Onset Example: As an example of the above parameters, assume an Onset Delay of 1000ms and an Onset Rate of 750ms. In that case, each time a new note started there would be no vibrato at all for the first second (1000ms) followed by a 3/4 second (750ms) period during which the vibrato depths would increase from none to the full amounts set in the various Amount parameters - for a total of 1.75 seconds from the beginning of the note to the time full vibrato depth was reached.
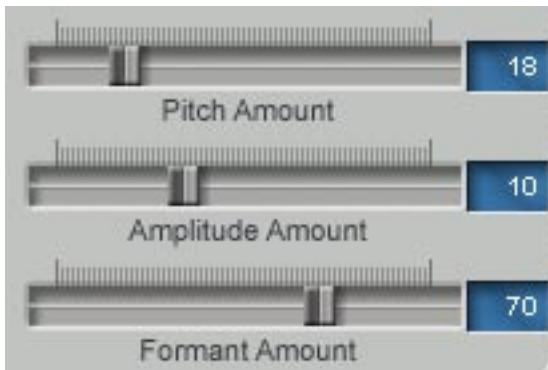
PITCH AMOUNT

Sets the amount that the pitch changes. The range is from 0 (no change) to 100 (maximum change). The default setting is 18. Command (Mac)/Control (PC) clicking the slider will reset it to that value.

AMPLITUDE AMOUNT

Sets the amount that the loudness changes. For the most realistic vibrato, the amount of amplitude change should be substantially less than pitch change, although for special effects, anything goes.

The range is from 0 (no change) to 30 (maximum change). The default setting is 10. Command (Mac)/Control (PC) clicking the slider will reset it to that value.

FORMANT AMOUNT

Sets the amount that the resonant timbre changes. The range is from 0 (no change) to 100 (maximum change). The default setting is 70. Command (Mac)/Control (PC) clicking the slider will reset it to that value.

The vibrato is re-started every time Auto-Tune 5 matches the incoming pitch to a different scale tone. Also, the vibrato is applied after the effects of the Retune Speed control. Hence, even with a slow retune value of 50, a square wave vibrato will make instantaneous changes in pitch.

NOTE: As mentioned above, although we perceive vibrato primarily as a variation in pitch, in most cases there is also matching (though more subtle) variations in amplitude and timbre. Setting Auto-Tune 5's Retune Speed to 0 will remove an existing vibrato's pitch variation, but the amplitude and timbral variation will remain. If you then apply a new vibrato using Auto-Tune 5's Create Vibrato section, the results may be less than convincing. Auto-Tune 5's Vibrato section is more often useful for adding a vibrato to an input that originally had none, or for various special effects.

ANOTHER NOTE: The Create Vibrato controls function completely independently of the Natural Vibrato function. Changes in that function have no direct effect on the depth of any vibrato resulting from the Create Vibrato controls. However, since both functions can operate simultaneously, they can interact in ways that may or may not be useful, depending on your intent. In most cases, you should probably use one or the other.
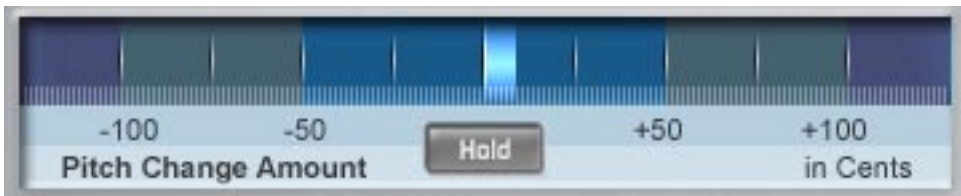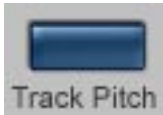
The Pitch Change Amount Indicator
The Pitch Change Indicator shows you how much the pitch is being changed, measured in cents (100 cents = one semitone). For example, if the indicator bar has moved to the left to -50, it indicates that the input pitch is 50 cents too sharp and Auto-Tune 5 is lowering the pitch by 50 cents to bring the input back to the desired pitch.

Hold Button
Clicking and holding the Hold button while Auto-Tune 5 is processing audio will freeze both the Pitch Change Amount Indicator and the blue Detected Pitch indication on the virtual keyboard for as long as you hold down the mouse button. This is useful for figuring out exactly what's going on with a particular note in a performance that would otherwise pass too quickly to see.

Graphical Mode Controls

Track Pitch

The Track Pitch function is used to detect the pitch of the audio to be processed so that it can be displayed on the Pitch Graph Display.

Locate the desired audio and press the Track Pitch button. (If you are using Auto-Tune 5's Internal clock (see below) you may (depending on your host) need to click the Reset button to reset the clock position to 00:00:0.) The Track Pitch button will flash red to indicate that Auto-Tune is in Track Pitch mode.

Next, start playback of the audio. A graphic representation of the pitch will be drawn to the display as the audio plays. When all of the audio you want to correct has played, stop playback. Note that Auto-Tune will remain in Track Pitch mode (the button will continue to flash red). If you are using the Host Clock and want to track the pitch of audio elsewhere in your track, simply use your host's transport controls to move to that audio and start playback again. Auto-Tune will continue tracking pitch at that point. When you have tracked all of the audio you want to correct, click the Track Pitch button again. You will exit Track Pitch mode and the pitch display will automatically scale in such a way as to include all of the tracked audio.

NOTE: If you are using Auto-Tune 5's Internal Clock (because your host does not provide valid clock information), you will not be able to navigate around your audio while tracking as described above. In that case you should either track all of the audio at once, or track an individual section, then correct it and bounce the changes (or use a destructive editor if available) and then move on to the next section.

ANOTHER NOTE: If the length of the audio to be processed exceeds the currently set size of the buffer as set in the Options dialog, playback will stop when the buffer is full. If this happens, increase the buffer size as necessary.

YET ANOTHER NOTE: Be cautious about changing the Tracking value (in the Options dialog) after performing the Track Pitch function. Auto-Tune 5 uses the Tracking setting during both the Track Pitch function and while correcting pitch. Changing the Tracking setting after Tracking Pitch, but before correcting, may result in unpredictable pitch modifications or strange (though possibly interesting) artifacts.

Correct Pitch (host dependent)

If you're new to Auto-Tune and following along here in the manual, you're probably scanning the Graphical Mode screen and wondering where the heck the Correct Pitch button is. And if you're an experienced Auto-Tune user, you're probably wondering the same thing. Well, you can stop looking. It's not there.

In all previous versions of Auto-Tune, after creating correction curves, you would have to press the Correct Pitch button in order to put Auto-Tune into correction mode. As a result, the Auto-Tune window always had to be open in order to use Graphical Mode. Well, no longer. Now, simply create your corrections and play. Essentially, anytime you are not tracking pitch, Auto-Tune 5 will be correcting. It is this basic change that allows you to use multiple instances of Auto-Tune 5 simultaneously in Graphical Mode without having to have their windows visible.

NOTE: This functionality is only available for hosts that provide valid time information. See the Selectable Clock Source section below for details.

Sync to host transport (host dependent)

If your host provides valid time information, once you have tracked audio and created correction curves (see below), Auto-Tune 5 will maintain sync with the host program, allowing you to move around in your track at will. No more having to always start playback at exactly the same location.

NOTE: In some cases, this functionality may require updating to the latest version of your host program. Check the Read Me file for details.

Additionally, if your host does not provide valid time information or does not strictly adhere to its plug-in format specification, sync problems could ensue. In that case, see the Selectable Clock Source section below. (Again, check the Read Me file for any specific examples.)

Selectable Clock Source
For hosts that do not provide valid time information, Auto-Tune 5's clock display and selection functions let you use an internal time reference for Auto-Tune 4 style operation.

Since all of the controls in the Clock section are used together, we will describe them as a group.

Determining if your host provides valid clock information
To determine if your host supplies valid clock information, click the Host button to select the host-supplied clock and put your host into Play. If Auto-Tune 5 is receiving valid timing information from your host, the Position display should constantly update to reflect your current position in the track. Moving forward or backward in the track should result in corresponding display updates. If this is in fact happening, you have confirmed your host's timing info. Simply leave the clock setting on Host and enjoy all of Auto-Tune 5's new features.

On the other hand, if the display does not update or if it does not accurately reflect your host's transport, Auto-Tune 5 may be getting bad (or no) clock information. In that case, you will need to use the Internal clock option.

Using Internal Clock Mode
To select Auto-Tune 5's Internal clock, click the Internal button.

To track and correct pitch in Internal Clock mode:

1. Use your host transport to move to the beginning of the section you want to correct and note that position, as you will need to return to that precise place for correction.

2. Click the Reset button to set the clock position to 00:00:0.

3. Click the Track Pitch button, play the desired audio and then stop the transport.

4. Use the various tools described below to create your pitch correction curves.

5. Use your host transport to return to the precise start location defined in step 1.

6. Click the Reset button to reset the clock position to 00:00:0.

7. Play your audio. Auto-Tune 5 will apply your corrections.

NOTE: Some hosts that require Internal Clock nonetheless have the capability to automatically reset the clock to 00:00:0. (Versions of Pro Tools HD and Pro Tools LE prior to v7.2 specifically have this capability.) In those cases, steps 2 and 6 above are not necessary.
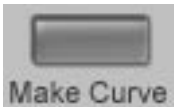
In Internal Clock Mode, the following features are unavailable:

• Sync to Host Transport (obviously)

• Multiple simultaneous Graphical Mode instances with windows not open

NOTE: As the various host developers are constantly updating their applications' functionality, it may be necessary to update to the latest version of your host to use Host Clock Mode.

In addition, we are working with host developers to ensure that as many as possible provide valid clock info, so even if yours doesn't now, it may well add that capability in a future version. (And if it doesn't now, you might want to drop the developers an email and let them know you'd like it to.)
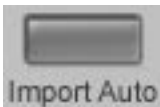
Make Curve

The Make Curve button is enabled whenever there is any red input pitch contour data present in the Pitch Graph (whether it is displayed in the current Pitch Graph view or not). Pressing the Make Curve button causes blue target pitch contour objects (curves for short) to be created from the input pitch contour data. These curve objects can then be dragged and stretched for very meticulous pitch correction. This is the central technique of Auto-Tune 5's Graphical Mode and is described in more detail in Chapter 4.

NOTE: If a range of time has been selected by using the I-Beam Tool (see below), the Make Curve button works only in the selected time range. Otherwise it works on all red pitch data.

Import Auto

The Import Auto button is enabled whenever there is any red input pitch contour data present in the Pitch Graph (whether it is displayed in the current Pitch Graph view or not).

Pressing the Import Auto button causes blue target pitch contour objects (curves for short) to be created from the red input pitch contour data. The blue curve(s) created by the Import Auto function is a precise representation of the pitch correction that would result from processing the tracked input pitch through the current settings of Auto-Tune 5's Automatic Mode. These include the Automatic Mode's Key and Scale selections, the Edit Scale settings, the Targeting Ignores Vibrato mode (if selected), and the Retune, Scale Detune, Humanize, Natural Vibrato and Create Vibrato settings.

NOTE: If a range of time has been selected by using the I-Beam Tool, the Make Auto button works only in the selected time range. Otherwise it works on all red pitch data.

Once you have used the Import Auto function to create a blue target pitch curve, setting the Graphical Mode Retune Speed to 0 will result in exactly the same output as you would have gotten by processing the audio through Automatic Mode. Alternatively, you can adjust the Retune Speed or further edit the blue curve using any of the Graphical Mode tools to get precisely the effect you want.

If you aren't satisfied with the results of the Import Auto function, simply switch to Automatic Mode, modify any of the settings as desired, and then return to Graphical Mode and click Import Auto again.

NOTE: In addition to its use as a Graphical Mode correction tool, the Import Auto function can also be used to provide an informative visual representation of the results of Automatic Mode settings. If there are times when you'd prefer to use Automatic Mode, but can't quite zero in on the ideal settings, examining the results of various settings with the Import Auto function can give you a visual picture of exactly what's going on. This will often make it readily apparent which Automatic Mode settings need to be changed to give your desired results.

STILL ANOTHER NOTE: One potentially confusing aspect of the Import Auto function is the relationship between the Automatic Mode Retune Speed setting and the Graphical Mode Retune Speed setting. To summarize:

- The Automatic Mode Retune Speed controls how the input audio would be processed in Automatic Mode. Changing this setting will change the shape of the blue curve that will be created by the Import Auto function.

- The Graphical Mode Retune Speed controls how quickly the pitch of the input audio will be changed to that of the blue target pitch curve. As mentioned above, to precisely duplicate the results of Automatic Mode, set the Graphical Mode Retune Speed to 0.
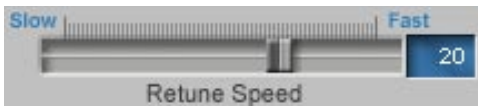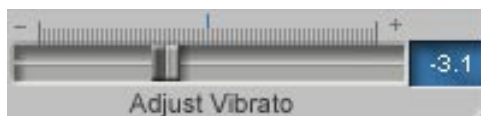
Retune Speed

The Retune Speed setting is used only during the pitch correction process. It's similar in function but separate from the Retune Speed control in Automatic Mode.

In Graphical Mode, the target pitch is not the scale tone nearest to the input, but rather the blue target pitch curve. The Retune Speed control allows you to specify how quickly Auto-Tune 5 will change the pitch of the input to that of the target pitch curve. A value of zero will cause the output pitch to precisely track the target pitch curve. Depending on the target pitch curve, this may or may not provide the desired results. Slower values will have the effect of "smoothing out" the target pitch curve. As ever, you should let your ears be your guide to selecting the proper value for a particular performance.

The default Retune Speed is 20. Command (Mac)/Control (PC) clicking the slider will reset it to that value.

 NOTE: Slower Retune Speed values may also allow you to use simple horizontal line segments to define the target pitches while still preserving the natural pitch gestures of the original performance. See Chapter 4 for details.

Adjust Vibrato

The purpose of this function is to let you quickly and easily change (either increasing or decreasing) the amount of an existing vibrato, while preserving the original shape and character of the vibrato.

To use this function, select the I-Beam tool and highlight the range of audio you'd like to edit. Set the desired amount of change using the Adjust Vibrato slider. A blue correction curve will be created that reflects your setting.

If a correction curve already exists in the selected range (as a result of Make Curve, Import Auto or the use of the Line or Curve tool), that curve will be replaced by the Adjust Vibrato curve. Consequently, if you need to both modify the vibrato and correct the pitch of a phrase, you should first adjust the vibrato and then manipulate the resulting blue curve to correct the pitch. (If you do it in the opposite order, your vibrato adjustment will wipe out your previously executed pitch correction, often resulting in exclamations of a possibly profane nature.)

The default Adjust Vibrato setting is 0. Command (Mac)/Control (PC) clicking the slider will reset it to that value.

 NOTE: This function is only available when some tracked audio has been selected with the I-Beam tool. If no audio is selected, the slider handle will not appear. Once some audio is selected, the handle will appear.

 ANOTHER NOTE: This function uses the same Stochastic Optimal Linear Estimation Theory as the Auto Mode's Targeting Ignores Vibrato function to attempt to differentiate between vibrato and intended pitch changes. Therefore, you can typically select a portion of your audio containing both vibrato and intended pitch change and the Adjust Vibrato function will scale the vibrato while leaving the intended pitch changes alone. But again, depending on the actual performance, sometimes this will work better than others. If Adjust Vibrato seems to be making changes to parts of the audio you'd like to leave alone, simply Undo the adjustment and use the I-Beam to select only the vibrato portions you wish to edit.

The Pitch Graph Display

The Pitch Graph displays the pitch contour of the audio to be processed as well as the target pitch contour objects that you create. On this display, the vertical axis represents pitch (with higher notes towards the top) while the horizontal axis represents time.

The red curve represents the original pitch contour of the input track, while the desired target pitch or pitch contour is indicated in blue.

The horizontal grid lines represent scale pitches. The key annotation, scale name, scale pitches and Scale Detune value are those defined in the Automatic Mode. They do not affect the computations of the Graphical Mode in any way. They are merely a reference to guide you in drawing the target pitches. If you wish to change them, select the Automatic Mode and change the Key pop-up, Scale pop-up, or the Scale Detune setting, respectively. (Changing the Scale Detune setting will also result in the scale pitch graph lines moving up or down relative to the tracked pitch.) Then, return to Graphical Mode.

Pitch Graph Scale

The Pitch Graph Scale Buttons control the horizontal (time) and vertical (pitch) scaling of the graph. Clicking the appropriate "+" button causes the view to zoom in, while clicking a "-" button causes it to zoom out.

NOTE: The horizontal scale buttons always control the Pitch Graph. They also control the Envelope Graph when it is set to "Tie" (see below).

Cursor Pitch Display

The exact pitch value of the cursor position on the Pitch Graph is constantly displayed as a note name +/- cents. This display is always relative to the currently selected scale (i.e., only scale notes will appear in the pitch display).

The Envelope Graph Display

The Envelope Graph displays the amplitude (loudness) envelope of the sound whose pitch is shown in the Pitch Graph.

All/Tie Buttons

The Envelope Graph's horizontal (time) scale is controlled by the "All" and "Tie" buttons.

Clicking the All button causes the envelope graph to display all of the currently tracked audio. This is useful for locating and selecting various portions of audio spread over the duration of a song.

Clicking the Tie button slaves the position of the Envelope Graph to that of the Pitch Graph. When this setting is selected, the horizontal scale of the Envelope Graph is controlled by the Pitch Graph horizontal scale buttons.

The End Of Editing Modality

In previous versions of Auto-Tune, tracking pitch, editing pitch objects and correcting pitch operated in a modal manner — i.e., when you were doing any one of those things, you couldn't do either of the others. With Auto-Tune 5, you are now free to use any of the graphical editing functions while either tracking or correcting pitch.

You can, for example:

- Draw new pitch objects while you are either tracking or correcting pitch.
- Edit existing pitch objects while correcting pitch — even when the position indicator is passing over the object you're editing (in which case the edit takes effect as soon as you release your mouse button).

- Click either Make Curve or Import Auto while tracking or correcting pitch. (If you do this while tracking pitch, the resulting curves will apply only to the audio that has already been tracked at the instant you click the respective button).
- Cut, copy or paste pitch objects while tracking or correcting pitch.

Now, just because you *can* do something, doesn't necessarily mean you would want to (or that it even makes sense to), but with this new functionality, you will have a lot more flexibility in developing whatever workflow works best for you.

The Graphical Tools

The graphical tools are used in conjunction with the edit buttons to create the desired target pitch contour.

NOTE: In addition to clicking on the various tools, if your host passes key presses to plug-ins, you can also select the various tools by pressing the number keys 1-7.

NOTE ALSO: Some hosts reserve the numeric keypad for host keyboard shortcuts even when a plug-in window is active. For that reason, the tool selection shortcuts mentioned above are specifically assigned only to the number keys that appear above the letter keys on the QWERTY portion of your keyboard.

The Line Tool (1)
The Line Tool is used to draw multi-segment straight lines on the Pitch Graph.

Start the process by selecting the Line Tool and clicking anywhere on the Pitch Graph to set an anchor point. As you move the cursor, a line will extend from the anchor point to the cursor position. Click again to set a second anchor point and define the first segment of your pitch contour. Continue clicking and defining lines until your contour is complete. End the process by double-clicking on the final anchor point or pressing <esc> on your keyboard.

Pressing Option/Alt on your keyboard during line entry will force the current segment to be perfectly horizontal.

NOTE: Due to issues in Pro Tools HD and LE for PC that are beyond our control, using the Alt key to constrain a line segment to horizontal does

not function in those versions. However, you can get an equivalent effect by using the Snap To Note function (see below) to constrain a line segment to a semitone, and then using the Arrow Tool to move that horizontal line segment to any intermediate pitch.

If you have enabled Snap To Note mode (see below), each segment will automatically snap to the nearest semitone. Pressing the Shift key on your keyboard while drawing a line temporarily toggles the state of the Snap To Line button. I.e., if Snap To Note mode is not enabled, pressing Shift will enable it for as long as Shift is pressed. Conversely, if Snap To Note mode is enabled, pressing Shift will disable it for as long as Shift is pressed.

If you move the cursor outside the Pitch Graph during point entry, the graph will automatically scroll.

To delete the last anchor point entered, press <delete> on your keyboard (you can do this repeatedly back to the very first anchor point).

Only one pitch contour object (line or curve) can exist at any time point on the Pitch Graph. When you complete the entry of a line object, any object(s) that previously existed at the same time will be deleted.

NOTE: If, while the Line Tool is selected, you move the cursor onto the Envelope Graph Display, it will temporarily change to the Magnifying Glass Tool, allowing you to quickly and easily move to any other point in your audio and then resume editing without needing to manually change tools.

The Curve Tool (2)
The Curve Tool is used to draw arbitrary curves on the Pitch Graph.

Start the process by selecting the Curve Tool and clicking anywhere on the Pitch Graph to set an anchor point. Hold down your mouse button and move the cursor to draw the desired pitch contour curve. End the process by releasing your mouse button.

Unlike the Line Tool, the Pitch Graph will not scroll if you attempt to move the Curve Tool cursor outside the current display area.

The Snap To Note mode does not affect the Curve Tool.

Only one pitch contour object (line or curve) can exist at any time point on the Pitch Graph. When you complete the entry of a curve object, any object(s) that previously existed at the same time will be deleted.

NOTE: If, while the Curve Tool is selected, you move the cursor onto the Envelope Graph Display, it will temporarily change to the Magnifying Glass Tool, allowing you to quickly and easily move to any other point in your audio and then resume editing without needing to manually change tools.

The Arrow Tool (3)
The Arrow Tool is used to select and drag existing target pitch contour objects (blue lines and curves) as well as to add or delete anchor points to existing lines.

The Arrow Tool behaves as follows:

MANIPULATING LINES AND CURVES
• Clicking on the background of the Pitch Graph and dragging horizontally selects objects' anchor points. Shift-clicking extends the selection.

• Dragging beyond the Pitch Graph boundaries automatically scrolls the graph.

• Moving the Arrow Tool over a pitch contour object causes the cursor to change to the object cursor (a horizontal bar). Clicking on an unselected curve or line segment with the object cursor causes the curve or segment and its anchor points to become selected and allows that object to be dragged. Clicking on an already selected curve or line segment with the object cursor allows that object, along with all other selected objects, to be dragged.

- Moving the Arrow Tool over a pitch contour object anchor point (whether that point is currently selected or not) causes the cursor to change into the anchor point cursor (four diagonal arrows). Clicking on an anchor point with the anchor point cursor deselects all other objects and anchor points and selects that anchor point so that it can be dragged. Dragging an anchor point stretches or compresses the pitch contour object relative to the nearest unselected anchor point(s).

- The extent to which you can drag selected objects is constrained by the position of neighboring unselected objects.

- In some host applications, holding down the Option/Alt key and then clicking to drag will restrict the cursor to vertical movements only (the cursor will change to indicate this state). The effect of this is to allow you to modify the pitch contour while preserving the object's location in time. This is particularly handy after using the "Make Curve" button, discussed above.

- Clicking on the background of the Pitch Graph deselects all selected objects.

ADDING AND DELETING ANCHOR POINTS

- Moving the Arrow Tool over an existing line segment and double-clicking will add an intermediate anchor point at that point. The cursor will change to the anchor point cursor and the new anchor point can then be dragged.

- Moving the Arrow Tool over an existing anchor point (except for end points) and double-clicking will remove that anchor point and cause a straight line to be drawn between the now adjacent anchor points.

- The Arrow Tool will not add or delete anchor points on curves, only on lines created with the Line Tool.

While the above may seem a bit mind-boggling on first reading, in practice it's quite intuitive. Spend a minute or two playing with the Arrow Tool and all will become clear.

NOTE: If, while the Arrow Tool is selected, you move the cursor onto the Envelope Graph Display, it will temporarily change to the Magnifying Glass Tool, allowing you to quickly and easily move to any other point in your audio and then resume editing without needing to manually change tools.

Scissors Tool (4)

Moving the Scissors Tool over an existing curve or line segment and clicking will break the line segment or curve in two at the point clicked. Although it will look like there is only one anchor point created at the break point, there are actually two (one for each of the two newly created line or curve segments). Simply use the Arrow Tool to move the top anchor point to reveal the other one.

NOTE: If, while the Scissors Tool is selected, you move the cursor onto the Envelope Graph Display, it will temporarily change to the Magnifying Glass Tool, allowing you to quickly and easily move to any other point in your audio and then resume editing without needing to manually change tools.

Magnifying Glass (5)

In the Pitch Graph, use the Magnifying Glass to click and drag a box around an area of interest. Dragging off the Pitch Graph automatically scrolls the graph. When you release the mouse button, the scale and position of the Pitch Graph will be changed to display the area enclosed by the box.

When the Magnifying Glass cursor is displaying the default "+", clicking the Magnifying Glass anywhere in the pitch display will increase the display's horizontal and vertical zoom factors one step (if possible).

Pressing Option(Mac)/Alt(PC) will cause the cursor to change to "-". In this state, clicking anywhere in the pitch display will decrease the display's horizontal and vertical zoom factors one step (if possible).

Dragging the Magnifying Glass in the Envelope Display will cause the selected time range to appear in the Pitch Display (most useful for navigating when the Envelope Display is in "All" mode). The pitch range of the Pitch Display will be automatically scaled such that all of pitch information in that time range is visible on the screen.

I-Beam Tool (6)
Drag the I-Beam Tool in either the Pitch or Envelope Display to select an area for Make Curve or Import Auto or Adjust Vibrato (see above). The selection area will be reflected in both displays.

If the Envelope Display is set to All, using the I-Beam Tool to make a selection anywhere in the Envelope Display will cause the selected audio to appear in the Pitch Display. This is handy for quickly moving around your track to make various edits.

Hand Tool (7)
Drag the Hand Tool in any direction in the Pitch Display to move the area displayed.

NOTE: If, while the Hand Tool is selected, you move the cursor onto the Envelope Graph Display, it will temporarily change to the Magnifying Glass Tool, allowing you to quickly and easily move to any other point in your audio and then resume editing without needing to manually change tools.

The Edit Buttons
Once some audio has been tracked and/or pitch contour objects created, they can be affected or edited in various ways with the Edit Buttons.

The Edit Buttons are context sensitive, i.e., only the buttons that are applicable to the current state of the pitch display are active. If a particular button does not have a valid function relative to the current pitch display state, it will be "grayed out." If it does have a valid function, it will appear dark gray.
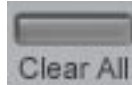
The Clear All Button
Clicking the Clear All button erases all tracking and correction information, whether or not it is currently visible on the Pitch Display. Since you can not undo this function (and accidentally executing it could be catastrophic), you must confirm your intent in a warning dialog.
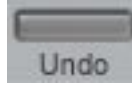
The Undo Button
The Undo button becomes active whenever you move or modify a target pitch contour object. Clicking the Undo button once will undo the most recent change. If you have made multiple changes, you can continue to click Undo to undo additional changes up to the limit that you set in the Options dialog.

The Redo Button
The Redo button becomes active whenever you have executed at least one Undo. Clicking the Redo button once will redo the most recent undone change. If you have executed multiple undos, you can continue to click Redo to redo additional changes up to the limit that you set in the Options dialog.
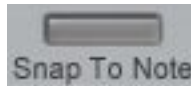
The Snap To Note Button
Press this button to enable Snap To Note mode when using the Line Tool. In Snap To Note mode, each line segment will automatically snap to the nearest semitone.

Pressing the Shift key on your keyboard while drawing a line temporarily toggles the state of the Snap To Line button. I.e., if Snap To Note mode is not enabled, pressing Shift will enable it for as long as Shift is pressed. Conversely, if Snap To Note mode is enabled, pressing Shift will disable it for as long as Shift is pressed.
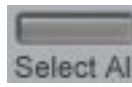
The Select All Button
The Select All button causes all pitch contour objects, whether currently visible on the Pitch Graph view or not, to become selected.

The Cut And Copy Buttons
The Cut and Copy buttons become active whenever a pitch contour object is selected. Cut removes selected objects. Both Cut and Copy copy selected objects to the Auto-Tune 5 clipboard. You can then paste the objects elsewhere in the Pitch Graph display.
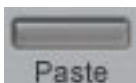
The Paste Button
The Paste button becomes active whenever an object has been Cut or Copied to the clipboard. Clicking Paste places the contents of the clipboard in the center of the current Pitch Graph view.

NOTE: Since only one pitch contour object (line or curve) can exist at any time point on the Pitch Graph, any object(s) that previously existed at the time where an object is Pasted will be deleted. Hence, before you press Paste, be sure that the Pitch Graph view does not contain any pitch contour object(s) that you want to keep.

Keyboard Equivalents
Some host applications support the following keyboard command equivalents for the above Edit Buttons. Others reserve these commands for their own use. Consult your host application's manual for details (or just try them and see if they work).

Command/Control-Z	Undo
Command-Shift-Z/Control-Y	Redo
Command/Control-X	Cut
Command/Control-C	Copy
Command/Control-V	Paste
Command/Control-A	Select All

Pen Tablet Input
If you do a lot of your pitch correction using Graphical Mode, you may want to consider using a USB pen tablet like the Wacom Graphire.

A pen tablet lets you control Auto-Tune 5's graphical tools (as well as all the other controls) using a familiar pen-style input device. Once you become comfortable with one (which usually only takes a few minutes), a pen tablet typically offers increased drawing accuracy with less wrist stress in long sessions. Some tablets also include programmable function keys for often-used keyboard commands.

Chapter 4: Auto-Tune 5 Tutorial

This chapter introduces you to how Auto-Tune 5 works by guiding you through a number of brief tutorials.

These tutorials make use of a number of audio and MIDI files. (We will assume that you are familiar with loading audio and MIDI files into your host application.)

If you purchased a packaged version of Auto-Tune 5, your will find the required files in the "Tutorial Audio" folder on the installation CD ROM.

If you purchased your copy of Auto-Tune 5 via download, you will have to separately download the Tutorial Audio files from the same web page that you downloaded Auto-Tune 5.

Tutorial 1: Automatic Mode Basics

This tutorial will guide you through the basic Automatic Mode functions using the file "A2-A3-A2 sweep." This is a simple synthesized waveform sweeping slowly from A2 up to A3 and back to A2. While it is unlikely that you'd ever need to process such an input with Auto-Tune 5, it provides a very clear example of what each of the main Auto-Tune 5 controls do.

Begin the tutorial by doing the following:

1. Load or import "A2-A3-A2 sweep" into a track of your host program. Play the track so that you are familiar with the original audio.

2. Set up Auto-Tune 5 to be an insert effect on that track.

3. Set Auto-Tune 5 to Automatic Mode.

4. Set the Key to "A" and the Scale to "Major."

5. Set the Retune Speed to zero.

6. Set "A2-A3-A2 sweep" to loop continuously and put your host program into Play mode.

What you will hear is an A major scale. This is because Auto-Tune 5 is continuously comparing the input pitch to the notes of the A major scale and instantaneously correcting the output pitch to the nearest of the scale tones.

Now do the following:

1. In the Edit Scale Display, click the Remove buttons next to the notes B, D, F# and G#.

2. Play "A2-A3-A2 sweep" again.

You will now hear an arpeggiated A Major triad because you have removed all the other notes from the scale.

To continue:

1. In the Edit Scale Display, click the Bypass button next to E.

2. Play "A2-A3-A2 sweep" again.

You will now hear the effect of not correcting the E. During the time that Auto-Tune 5 would normally be tuning the input to E, Auto-Tune 5 instead enters bypass mode and passes the input through uncorrected.

To continue:

1. Set the Retune Speed to about 30.

2. Play "A2-A3-A2 sweep" again. Compare the 30 setting to the 0 setting.

3. Try various other Speed settings.

The setting of 0 is fast: Auto-Tune 5 makes instantaneous pitch changes. The setting of 30 is slower. Auto-Tune 5 makes gradual pitch changes. This parameter controls how rapidly the pitch correction is applied to the incoming pitch. The units are milliseconds. A value of zero will cause instantaneous changes from one tone to another and will completely suppress a vibrato (note that related volume changes will remain). Retune values from 10 to 50 are typical for vocals.

To continue:

1. Set the Retune Speed to 0

2. In the Edit Scale Display, click the Remove buttons next to all the notes except F#.

3. Play "A2-A3-A2 sweep" again. As the sound is playing, move Scale De-tune knob.

The output pitch will be locked to F#, however, you will hear the output pitch change with the Detune slider movement. This is because the Detune knob is changing the pitch standard of the scale.

Finally:

1. Select "sine wave" from the Vibrato Type pop-up.

2. Play "A2-A3-A2 sweep" again.

3. Experiment with the various vibrato controls to hear their effects.

Tutorial 2: The Targeting Ignores Vibrato Function

This tutorial will demonstrate the purpose and use of the Automatic Mode's Targeting Ignores Vibrato function.

Begin the tutorial by doing the following:

1. Load or import "wide_vibrato" into a track of your host program. This is a recording of a male voice singing a sustained "G" with a pronounced vibrato. Play the track so that you are familiar with the original audio. Despite the wide vibrato, you will notice that the singer's pitch drifts alternately sharp and flat.

2. Set up Auto-Tune 5 to be an insert effect on that track.

3. Set Auto-Tune 5 to Automatic Mode.

4. Set the Key to "C" and the Scale to "Chromatic."

5. Set the Input Type to Low Male Voice

6. Set Retune Speed to a value of 24.

7. Use your host program's controls to Bypass Auto-Tune 5. Set "wide_vibrato" to loop continuously and put your host program into Play mode. Watch the blue Detected Pitch indication on Auto-Tune 5's Virtual Keyboard. As you will see, the singer's vibrato is so wide that it consistently gets closer to G# and F# than G, causing Auto-Tune to intermittently select those notes as target pitches.

8. Check that Targeting Ignores Vibrato is not selected and remove Auto-Tune 5 from Bypass. Watch the Detected Pitch indication and listen to the result. As you will hear, whenever Auto-Tune 5 thinks G# or F# is the target pitch, it will move the input closer to those notes, in effect making the situation worse.

9. Now, leaving all other settings the same, click Targeting Ignores Vibrato. With Targeting Ignores Vibrato engaged, Auto-Tune 5's vibrato identification algorithm recognizes the pitch excursions as vibrato and continues to use "G" as the target pitch.

Next, we'll use Graphical Mode for a dramatic graphic demonstration of the effect of Targeting Ignores Vibrato:

1. Still using "wide_vibrato," set up Auto-Tune 5 as described in Steps 1-5 above.

2. Set Retune Speed to 0.

3. Make sure Targeting Ignores Vibrato is Off.

4. Set Auto-Tune 5 to Graphical Mode.

5. Click the Track Pitch button and play wide_vibrato through Auto-Tune 5. A red curve representing the pitch contour of wide_vibrato will be drawn to the screen as the file plays.

6. Stop playback and click the Track Pitch button again to stop the tracking function.

7. Click the Import Auto button. A blue curve will appear. This curve represents the pitch correction that would result from processing the audio with the current Automatic Mode settings. Note all the instances in which Auto-Tune 5 identifies G# or F# as the target pitch.

8. Set Auto-Tune 5 back to Automatic Mode.

9. Set Targeting Ignores Vibrato to On.

10. Return once again to Graphical Mode.

11. Click Import Auto (there is no need to track pitch again, as the red pitch curve is still present in the Pitch Graph).

12. Notice that the blue curve is now a straight line on "G," indicating that the Improved Targeting algorithm has accurately identified the pitch excursions as vibrato and has therefore ignored it as far as target pitch selection is concerned.

Tutorial 3: The Natural Vibrato Function

This tutorial will demonstrate the use of the Natural Vibrato function using the same audio file we used in the previous tutorial.

Begin the tutorial by doing the following:

1. Load or import "wide_vibrato" into a track of your host program. This is a recording of a male voice singing a sustained "G" with a pronounced vibrato. Play the track so that you are familiar with the original audio.

2. Set up Auto-Tune 5 to be an insert effect on that track.

3. Set Auto-Tune 5 to Automatic Mode.

4. Set the Key to "C" and the Scale to "Chromatic."

5. Set the Input Type to Low Male Voice

6. Set Retune Speed to a value of 24.

7. Set "wide_vibrato" to loop continuously and put your host program into Play mode.

8. Set Natural Vibrato to 12 and note the effect on the vibrato. Set Natural Vibrato to -12 and note the effect on the vibrato.

9. Set all Scale notes to Bypass to disable any pitch correction. Again, adjust Natural Vibrato as in Step 8 and note that its effect is still active.

Tutorial 4: Using the Automatic Mode MIDI Functions

This tutorial will introduce you to Auto-Tune 5's two Automatic Mode MIDI functions: Learn Scale From MIDI and Target Notes Via MIDI.

With Learn Scale From MIDI, you can create the correct scale for a particular melody without knowing a G-sharp from a B-flat. Simply play the melody on a MIDI keyboard which is patched through your host application to Auto-Tune 5 or play an existing MIDI file with contains the MIDI notes of the melody to be processed.

Begin the tutorial by doing the following:

1. Load or import the audio file "somewhere" into a track of your host program. This is a recording of Somewhere Over the Rainbow sung with fairly extreme pitch errors. (Our very talented singer made us promise to tell you that she did this on purpose at our request.)

2. Set up Auto-Tune 5 to be an insert effect on that track.

3. Import the MIDI file "somewhere.mid" into your host program's MIDI sequencer.

4. Select Auto-Tune 5 as the target for the MIDI track.

5. Select Automatic Mode and click the "Learn Scale from MIDI" button so that it turns blue and its indicator changes to "On."

6. Click the All Octaves button so that it turns blue (if it is not already).

7. Play the MIDI file through once and watch as the scale develops on Auto-Tune 5's virtual keyboard and in the Scale Edit window. As each note is sung, it is added to the scale until the scale includes every note that appears in the melody.

8. Set the Retune control to 20 and play the audio track using this scale.

NOTE: You can also instantaneously define a scale by playing all of the notes of the scale as a chord (i.e., all scale notes played on the same beat) and recording that into a MIDI track. This is an ideal way to use Auto-Tune 5 in music with many key (scale) changes.

With Target Notes Via MIDI, Auto-Tune 5 looks at its MIDI input in real time to determine its current target note(s). Try the following with the provided audio and MIDI files:

1. Set up your host program and load or import the "somewhere" audio and MIDI files as described in steps 1–4 above.

2. Select Automatic Mode and click the "Target Note Via MIDI" button so that it turns blue and its indicator changes to "On."

3. Click the Octaves as Played button so that it turns blue (if it is not already).

4. Play the audio and MIDI track together and watch the current target note change in real time on the Virtual Keyboard — and listen to the results.

The most interesting part of the Target Notes Via MIDI feature is that it only operates for the duration of the MIDI note — that is, when there is no current MIDI Note On value, Auto-Tune 5 is effectively in Bypass mode. This means that if you delay the MIDI notes, then the audio performs its attacks as performed and then corrects to pitch when the MIDI note occurs (of course, at whatever Retune Speed is set). In the case of the 'Somewhere' vocal performance, most of the intonation problems happen during the notes' sustain portions. Try moving the notes in the MIDI file around and listen to the results. This gives far more subtle control than Automatic Mode alone, while not being quite as tweaky as operating in Graphical Mode.

NOTE: The MIDI functions look only at MIDI note values. Controller data such as Pitch Bend or Mod Wheel do not affect Auto-Tune 5's performance.

Long live MIDI!

Tutorial 5: Graphical Mode Basics

This tutorial will introduce you to the basic Graphical Mode functions, again using the "A2-A3-A2 sweep" file from Tutorial 1.

Begin the tutorial by doing the following:

1. Load or import "A2-A3-A2 sweep" into a track of your host program. Play the track so that you are familiar with the original audio.

2. Set up Auto-Tune 5 to be an insert effect on that track.

3. Set Auto-Tune 5 to Automatic Mode.

4. Set the Key to "A" and the Scale to "Major."

5. Set Auto-Tune 5 to Graphical Mode.

6. Click the Track Pitch button.

7. Play the sweep signal through Auto-Tune 5. A red curve representing the pitch contour of the signal will be drawn to the screen as the file plays.

8. Stop playback and click the Track Pitch button again to stop the tracking function.

To continue:

1. Select the Magnifying Glass tool and drag out a box on the Pitch Graph that encloses the red curve. The result will be something like the following:
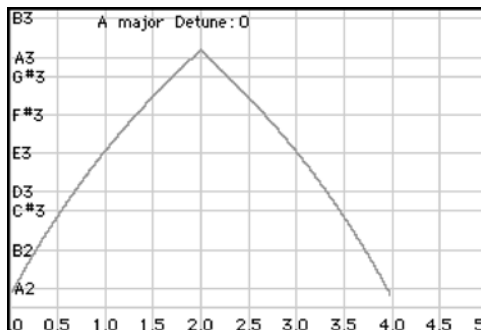

2. Select the Line tool and enter a line similar to that below. By clicking multiple anchor points on the Pitch Graph, line segments joining the points will be drawn.
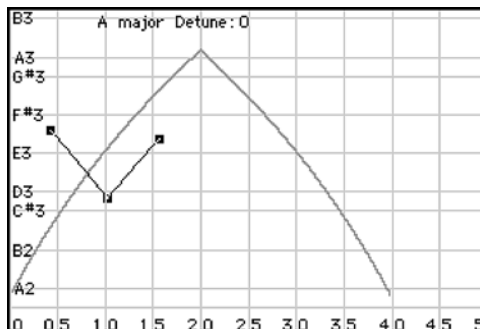
When done, double-click the last point or press <esc> on the keyboard.

To erase the last point entered, press <delete> on the keyboard (you can press <delete> repeatedly to erase back to the first anchor point).

3. Set the Retune Speed to 0 and play back the sound to hear the effect.

4. Select the Curve tool and create a curve similar to the one shown below. Click and hold the mouse button and drag to draw the curve. When done, release the mouse button.
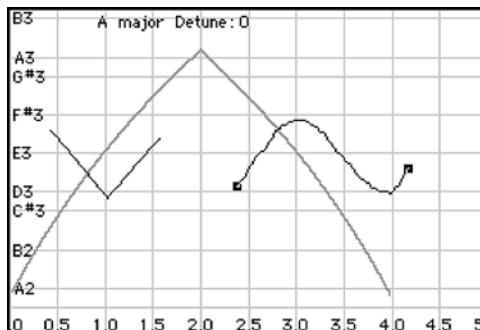
5. Play back the sound to hear the effect.

6. Vary the Retune Speed between 0 and 50 and note the effect.

Now that we have some blue lines and curves on the Pitch Graph Display, this would be a good time to become familiar with the functions of the Arrow and Scissors Tools. (Refer back to Chapter 3 for detailed descriptions of the Arrow and Scissors Tools' behaviors.)

As you experiment in the following steps, play back the file to hear the effect of each action.

7. Select the Arrow Tool.

8. Drag the Arrow Tool across the Pitch Graph to select objects.

9. Move the cursor over curves and anchor points. Practice selecting entire curves and individual anchor points.

10. Use the Arrow Tool to drag selected curves and individual anchor points.

11. Use the Arrow Tool to double-click anywhere on one of the existing line (not curve) segments to create a new anchor point. Use the Arrow Tool to drag the new point to a new position.

12. Still using the Arrow Tool, double-click on the new anchor point you created in Step 11 to delete it and return the line to its initial state.

13. Select the Scissors Tool and click on an existing line or curve to break it in two at that point. A stacked pair of anchor points will be created at the point you click. Select the Arrow Tool again and use it to drag each of the new end points in turn to new positions.

14. Select one or more objects and play with the Edit Buttons (Undo, Cut, Copy, Paste, Select All).

This would also be a good time to see if the Edit Button keyboard equivalents work in your host application:

Command/Control-Z	Undo
Command-Shift-Z/Control-Y	Redo
Command/Control-X	Cut
Command/Control-C	Copy
Command/Control-V	Paste
Command/Control-A	Select All

Tutorial 6: Precision

This tutorial is actually more of a demonstration to show the extraordinary precision with which Auto-Tune 5 can track and correct intonation problems. If this doesn't sound interesting, feel free to proceed to Tutorial 7 below.

(By this time, we'll assume you're comfortable loading files and calling up Auto-Tune 5.)

1. Arrange the files "C2 Ahhh v3" and "C2 Ohhh v1" so that they are on separate tracks and can be played simultaneously.

2. Assign a separate instance of Auto-Tune 5 to each of the two tracks and select Automatic Mode for each of them.

3. In each Auto-Tune 5, set the Retune slider to 0.

4. In each Auto-Tune 5, set the Key pop-up to B-flat.

5. Do whatever your host application requires to bypass both instances of Auto-Tune 5.

6. Play back the files so you can hear them together without processing.

   Believe it or not, these vocal samples from a sample CD are supposed to be the same pitch. Yikes!

7. Now enable Auto-Tune 5 on each of the tracks and play the files again.

If you've done everything right, you will hear the samples so well in tune that they sound like one voice.

Tutorial 7: The Make Curve Function

This tutorial will introduce you to the Make Curve function. The Make Curve function gives you by far the most precise control over pitch accuracy and inflection.

1. Setup to process the file "Crowd All" through Auto-Tune 5.

2. Select Graphical Mode.

3. Press the Track Pitch button.

4. Play the "Crowd All" file.

5. Select the Magnifying Glass Tool and drag out a box on the Pitch Graph that encloses the red curve for the "-gether" part of the last word, "together." You will see something like the following:
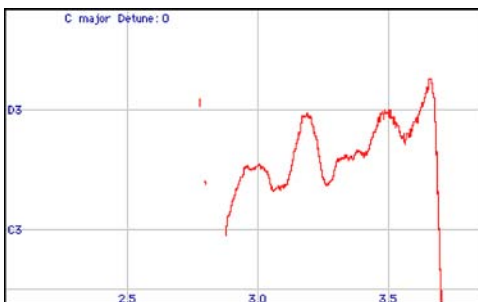
6. Use the I-Beam Tool to drag a selection of "-gether" in the Pitch or Envelope Display. The result will be something like the following:
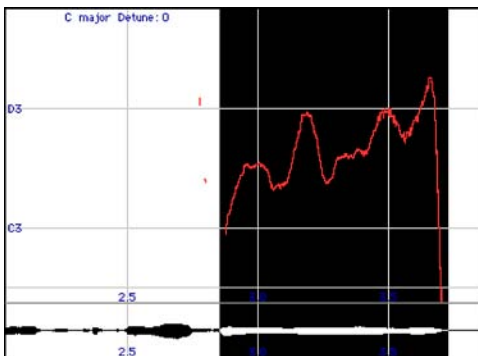

7. Click the Make Curve button. Auto-Tune 5 will compute a new blue curve object from the existing pitch data. (The new curve may be difficult to see at first because it will exactly overlay the red curve.) Click the I-Beam Tool on the background of the Pitch Graph to cancel the area selection.

8. Both anchor points of the new curve will be selected. Select the Arrow Tool and click precisely on the left end of the curve to select only the left anchor point (you'll know you're over the anchor point when the cursor changes to the four-pointed arrow cursor). Drag this straight up, stretching the curve so it is centered around the D3 graph line. (If you press Option/Alt on your keyboard before clicking the anchor point, your movement will be constrained to the vertical, assuring that you maintain the time relationship of the curve.)

9. Move the Arrow Tool over the body of the blue curve so that the cursor changes to the horizontal bar. Press and hold Option/Alt on your keyboard (to constrain movement to the vertical) and click and drag the curve straight down so it is centered on the C3 graph line. The Pitch Graph should now appear as follows:
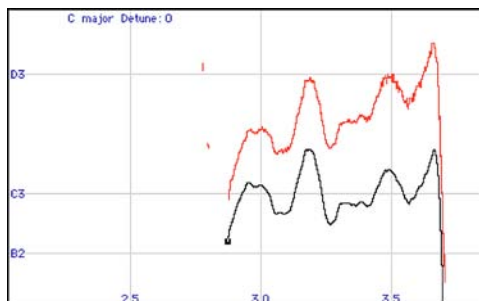
10. Set the Retune Speed to 0 and play back the sound. Note that the errant note is now in tune.

To continue, here is an alternative approach to the same pitch problem using the Line Tool.

1. Click the Clear All button to delete the blue curve created above.

2. Use the Line Tool to draw a horizontal line as shown below (press the Option/Alt key to constrain the line to horizontal):
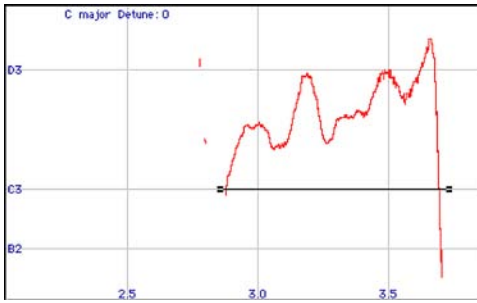
3. Set the Retune Speed to 20 and play back the sound. Experiment with other Retune Speeds to hear their effects.

Vibratos and other pitch gestures typically occur with related loudness gestures. Specifically, with vibratos, some vocalists produce mostly pitch variations and little loudness variations while others produce small pitch variations and a lot of loudness variations (the latter is often called tremolo). Nonetheless, almost all voices seem to produce a combination of both pitch and related loudness variations. Therefore, trying to take an existing vibrato and change it (say speed it up) often sounds unnatural because the new pitch variation does not correspond to the original (and still present) loudness variation.

These considerations are also important when correcting pitch. It's rarely effective to draw in a new pitch gesture at the desired pitch, even though that gesture may have worked well in another performance.

As this tutorial has demonstrated, the following two techniques are the most commonly successful approaches to Graphical Mode pitch correction:

• The first technique uses the Make Curve button to create a curve of the existing pitch, allowing you to drag that curve up or down, or stretch it by dragging one end vertically. The Retune slider can then be set very fast (0 to 5). This will force a precise re-tuning, but will sound extremely natural since the target pitch curve will precisely synchronize with the original loudness gestures of the voice.

• The second technique is to draw a flat line segment across the duration of a tone at the desired pitch and then set the Retune Speed in the range of 20 to 40. This has the effect of gently moving the input pitch towards the desired pitch. The slower values of 20 to 40 will let through a vibrato but still draw the overall pitch closer to being in tune. The average pitch will eventually settle to the given line and the pitch gestures will occur both sharper and flatter relative to that line. The settling time is about twice the Retune Speed setting (in milliseconds). 20 to 40 will let through about one-half of a typical vibrato. Slower settings will let through more vibrato but will cause the new pitch to be reached more slowly.

Tutorial 8: The Import Auto Function

The Import Auto function allows you to display and edit the pitch corrections that would result from specific Automatic Mode settings.

1. Setup to process the file "Crowd All" through Auto-Tune 5.

2. Select Automatic Mode and set the Key and Scale to C Major and the Retune Speed to the default of 20.

3. Select Graphical Mode.

4. Press the Track Pitch button.

5. Play the "Crowd All" file.

6. Select the Magnifying Glass Tool and drag out a box on the Pitch Graph that encloses the red curve for the words "crowd all rushed." You will see something like the following:
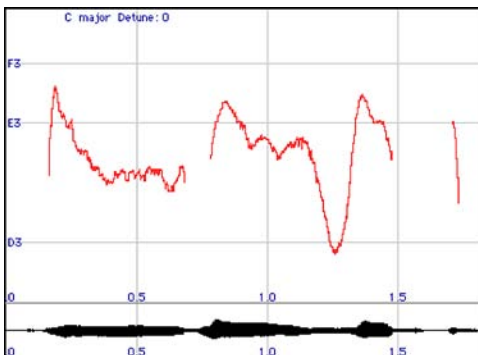
7. Use the I-Beam Tool to drag a selection in the Pitch or Envelope Graph as shown:
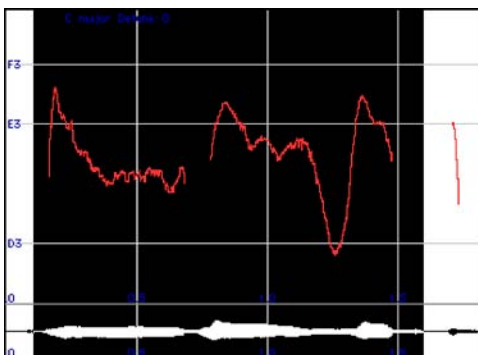
8. Click the Import Auto button. Auto-Tune 5 will compute a new blue curve object from the existing pitch data:
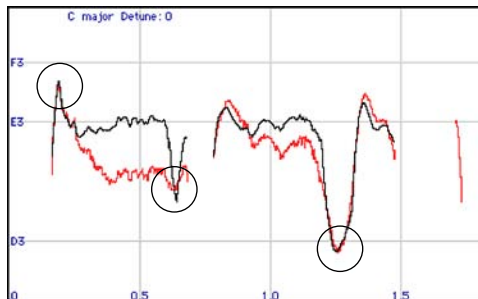
PITCH DRAWN TO NEIGHBORING TONE

Assuming that this entire phrase should be centered around E3, there are several problem spots, indicated above, where the pitch is being incorrectly adjusted towards neighboring tones.

9. To hear the pitch corrections that would be produced in Automatic Mode, set the Graphical Mode Retune Slider to 0, (fast) and play back the file.

10. Switch to the Automatic Mode and click the Remove buttons next to C, D and F.

11. Return to the Graphical Mode and use the I-Beam tool to drag out a selection in the Envelope Graph, as in Step 7.

12. Press the Import Auto button. Auto-Tune 5 will compute a new blue curve from the existing pitch data:
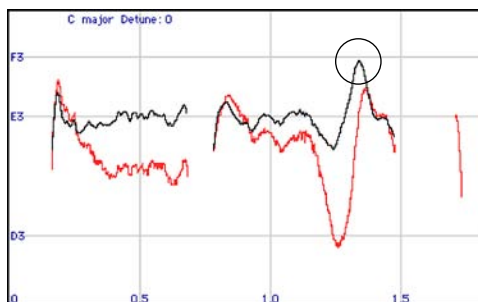
RAISED PITCH

Note how the pitch errors from the previous curve have been removed. Also, note the "raised pitch" indicated above. This occurs because the Automatic Mode Retune slider value of 20 is slow compared to the rapidly increasing pitch that is occurring at that point in time. But even with the raised pitch, the average output pitch is centered on E3 and the phrase sounds in tune.

Chapter 5: New Feature Quick Start Guide

This chapter brings all of the new Auto-Tune 5 features together in one place to help experienced Auto-Tune 4 users learn the new features without having to slog through all of the stuff they already know. (The items below also appear in their appropriate places elsewhere in the manual.)

With a few exceptions, the new features in Auto-Tune 5 are additions to the current Auto-Tune 4 functionality. In other words, pretty much everything that isn't a new feature works pretty much the same as it did in Auto-Tune 4. The exceptions are noted below.

General Features

- **Improved pitch detection algorithm:** While Auto Tune's patented pitch detection technology has always provided unmatched speed and accuracy, Auto-Tune 5 introduces improvements in performance with marginal quality (noisy, poorly isolated, etc.) audio.

- **A sleek new interface:** As Auto-Tune's features have proliferated from version to version, we have continually focused on maintaining its ease of use. With Auto-Tune 5, we have undertaken a complete graphic redesign. The result is both easy on the eyes and logically groups related controls for intuitive functionality.

Options Dialog

- **Consolidated Pitch Tracking control:** The Automatic and Graphical Mode Tracking controls have been consolidated into a single control and relocated to the Options dialog for set-it-and-forget-it simplicity.

- **Graphical Mode color schemes:** Auto-Tune 4 introduced an optional color scheme designed for readability by people with the most common forms of color blindness. For Auto-Tune 5, we have designed the standard Graphical Mode color scheme to be equally readable. Consequently, the optional color schemes are no longer necessary and have been removed from the Options dialog.

Automatic Mode Features

Highlights

- Humanize function
- Realtime natural vibrato adjustment
- Improved Targeting function renamed

Details

Humanize

One of the criticisms occasionally (if, we feel, unfairly) leveled at pitch correction is that it results in performances that are "too perfect." Frankly, it's been our experience that for the skillful engineer, Auto-Tune has always offered the means to perform its magic in a way that makes it virtually impossible for the listener to hear that it has been used (without, of course, comparing the result to the original performance).

Nonetheless, one situation that could previously send you to Graphical Mode was a performance that included both very fast notes and longer sustained notes. The problem was that in order to get the fast notes in tune, you'd have to set a fast Retune Speed, which would then make any sustained notes sound unnaturally static. The solution was adjusting in Graphical Mode.

Now, with the new Humanize function, you can get the same results quickly and easily in Automatic Mode. The Humanize function differentiates between short and sustained

notes and lets you apply a slower Retune Speed just to the sustained notes. Thus, the short notes are in tune and the sustained notes still allow the natural variations of the original performance.

Here's how it works:

Start by setting Humanize to 0 and adjusting the Retune Speed until the shortest problem notes in the performance are in tune. At this point, any sustained notes may sound static. If so, start advancing the Humanize control. The higher the Humanize setting, the more the Retune Speed is slowed for sustained notes. The goal is to find the point where the sustained notes are also in tune and just enough of the natural variation in the performance is present in the sustained notes to sound natural and realistic. (If you set Humanize too high, any problem sustained notes may not be fully corrected.)

This is one of those settings where you have to let your ears be your guide. The optimum Humanize setting for any particular performance will depend on the performance style, the other Automatic Mode settings and the specific effect you desire.

The default Humanize setting is 0. Double-clicking or Command (Mac)/Control (PC) clicking the Humanize knob will reset it to that value.

Natural Vibrato
The Natural Vibrato function allows real-time modification (either increase or decrease)of the depth of any vibrato present in the input audio while preserving the original shape and character of the vibrato.

This function uses the same Stochastic Optimal Linear Estimation Theory as the Targeting Ignores Vibrato function to differentiate between vibrato and intended pitch changes, adjusting the vibrato depth while leaving intended pitch changes intact.

The Natural Vibrato function acts independently of the pitch correction functions. Of particular note is the fact that setting a scale note or notes to Bypass still allows vibrato

adjustment for those notes. So, if you want to adjust a performance's vibrato while making no other pitch changes, you can simply set all scale notes to Bypass and still use the Natural Vibrato function to adjust vibrato depth.

NOTE: This function acts only on vibrato present in the original performance. If the original performance does not contain vibrato, this control will have no audible effect.

ANOTHER NOTE: Natural Vibrato adjustments function independently of the Create Vibrato functions described below. However, since both functions can operate simultaneously, they can interact in ways that may or may not be useful, depending on your intent. In most cases, you should probably use one or the other.

The default Natural Vibrato setting is 0. Double-clicking or Command (Mac)/Control (PC) clicking the Natural Vibrato knob will reset it to that value.

Targeting Ignores Vibrato
For (what we hope is) clarity, what was previously called the "Improved Targeting" function has been renamed "Targeting Ignores Vibrato". The functionality remains the same.

Graphical Mode Features
Highlights
- Larger Pitch Edit Display
- Sync to host transport
- Selectable clock source
- Realtime pitch tracking display
- Full-time correction mode
- Multiple simultaneous Graphical Mode instances
- Editing functions are no longer modal
- Make Auto renamed
- Enhanced Envelope Display functionality
- Realtime graphical vibrato depth adjustment
- Dedicated Clear All Data function
- Dedicated Snap To Note button

Details

Larger Pitch Edit Display
As you've no doubt noticed, the Pitch Edit Display is now bigger. Lots bigger.

Track Pitch
The Track Pitch function is used to detect the pitch of the audio to be processed so that it can be displayed on the Pitch Graph Display.

Locate the desired audio and press the Track Pitch button. (If you are using Auto-Tune 5's Internal clock (see below) you may (depending on your host) need to click the Reset button to reset the clock position to 00:00:0.) The Track Pitch button will flash red to indicate that Auto-Tune is in Track Pitch mode.

Next, start playback of the audio. A graphic representation of the pitch will be drawn to the display as the audio plays. When all of the audio you want to correct has played, stop playback. Note that Auto-Tune will remain in Track Pitch mode (the button will continue to flash red). If you are using the Host Clock and want to track the pitch of audio elsewhere in your track, simply use your host's transport controls to move to that audio and start playback again. Auto-Tune will continue tracking pitch at that point. When you have tracked all of the audio you want to correct, click the Track Pitch button again. You will exit Track Pitch mode and the pitch display will automatically scale in such a way as to include all of the tracked audio.

NOTE: If you are using Auto-Tune 5's Internal Clock (because your host does not provide valid clock information), you will not be able to navigate around your audio while tracking as described above. In that case you should either track all of the audio at once, or track an individual section, then correct it and bounce the changes (or use a destructive editor if available) and then move on to the next section.

ANOTHER NOTE: If the length of the audio to be processed exceeds the currently set size of the buffer as set in the Options dialog, playback will stop when the buffer is full. If this happens, increase the buffer size as necessary.

YET ANOTHER NOTE: Be cautious about changing the Tracking value (in the Options dialog) after performing the Track Pitch function. Auto-Tune 5 uses the Tracking setting during both the Track Pitch function and while correcting pitch. Changing the Tracking setting after Tracking Pitch, but before correcting, may result in unpredictable pitch modifications or strange (though possibly interesting) artifacts.

Correct Pitch (host dependent)
If you're an experienced Auto-Tune user, you're probably wondering where the Correct Pitch button is. Well, you can stop looking. It's not there.

In all previous versions of Auto-Tune, after creating correction curves, you would have to press the Correct Pitch button in order to put Auto-Tune into correction mode. As a result, the Auto-Tune window always had to be open in order to use Graphical Mode. Well, no longer. Now, simply create your corrections and play. Essentially, anytime you are not tracking pitch, Auto-Tune 5 will be correcting. It is this basic change that allows you to use multiple instances of Auto-Tune 5 simultaneously in Graphical Mode.

NOTE: This functionality is only available for hosts that provide valid time information. See the Selectable Clock Source section below for details.

Sync to host transport
For hosts that provide valid time information, Auto-Tune 5 will now maintain sync with the host program. Once you have tracked audio and created correction curves, you can move around in your track at will. No more having to always start playback at exactly the same location.

NOTE: In some cases, this functionality may require updating to the latest version of your host program. Check the Read Me file for details.

Additionally, if your host does not provide valid time information or does not strictly adhere to its plug-in format specification, sync problems could ensue. In that case, see the Selectable Clock Source section below. (Again, check the Read Me file for any specific examples.)

Selectable Clock Source

For hosts that do not provide valid time information, Auto-Tune 5's clock display and selection functions let you use an internal time reference for Auto-Tune 4 style operation.

Since all of the controls in the Clock section are used together, we will describe them as a group.

Determining if your host provides valid clock information

To determine if your host supplies valid clock information, click the Host button to select the host-supplied clock and put your host into Play. If Auto-Tune 5 is receiving valid timing information from your host, the Position display should constantly update to reflect your current position in the track. Moving forward or backward in the track should result in corresponding display updates. If this is in fact happening, you have confirmed your host's timing info. Simply leave the clock setting on Host and enjoy all of Auto-Tune 5's new features.

On the other hand, if the display does not update or if it does not accurately reflect your host's transport, Auto-Tune 5 may be getting bad (or no) clock information. In that case, you will need to use the Internal clock option.

Using Internal Clock Mode

To select Auto-Tune 5's Internal clock, click the Internal button.

To track and correct pitch in Internal Clock mode:

1. Use your host transport to move to the beginning of the section you want to correct and note that position, as you will need to return to that precise place for correction.

2. Click the Reset button to set the clock position to 00:00:0.

3. Click the Track Pitch button, play the desired audio and then stop the transport.

4. Use the various tools described below to create your pitch correction curves.

5. Use your host transport to return to the precise start location defined in step 1.

6. Click the Reset button to reset the clock position to 00:00:0.

7. Play your audio. Auto-Tune 5 will apply your corrections.

NOTE: Some hosts that require Internal Clock nonetheless have the capability to automatically reset the clock to 00:00:0. (Versions of Pro Tools HD and Pro Tools LE prior to v7.2 specifically have this capability.) In those cases, steps 2 and 6 above are not necessary.

In Internal Clock Mode, the following features are unavailable:

- Sync to Host Transport (obviously)
- Multiple simultaneous Graphical Mode instances with windows not open

NOTE: As the various host developers are constantly updating their applications' functionality, it may be necessary to update to the latest version of your host to use Host Clock Mode.

In addition, we are working with host developers to ensure that as many as possible provide valid clock info, so even if yours doesn't now, it may well add that capability in a future version. (And if it doesn't now, you might want to drop the developers an email and let them know you'd like it to.)

Realtime pitch tracking display

During the Track Pitch process, the graphic representation of the pitch will be displayed in realtime as the audio plays.

Multiple simultaneous Graphical Mode instances

You can now have multiple instances of Auto-Tune Graphical Mode operating on different tracks simultaneously, even if their windows are not open. In previous versions, since you had to have plug-in windows open to engage Correct Pitch mode, only open instances could be active. No longer.

The End Of Editing Modality

In previous versions of Auto-Tune, tracking pitch, editing pitch objects and correcting pitch operated in a modal manner — i.e., when you were doing any one of those things, you couldn't do either of the others. With Auto-Tune 5, you are now free to use any of the graphical editing functions while either tracking or correcting pitch.

You can, for example:

- Draw new pitch objects while you are either tracking or correcting pitch.
- Edit existing pitch objects while correcting pitch — even when the position indicator is passing over the object you're editing (in which case the edit takes effect as soon as you release your mouse button).
- Click either Make Curve or Import Auto while tracking or correcting pitch. (If you do this while tracking pitch, the resulting curves with apply only to the audio that has already been tracked at the instant you click the respective button).
- Cut, copy or paste pitch objects while tracking or correcting pitch.

Now, just because you *can* do something, doesn't necessarily mean you would want to (or that it even makes sense to), but with this new functionality, you will have a lot more flexibility in developing whatever workflow works best for you.

Import Auto

What was previously called the "Make Auto" function has been renamed "Import Auto". The functionality remains the same.

Enhanced Envelope Display functionality

- When in "ALL" mode, the Envelope Display automatically scales to precisely encompass the tracked audio (rather than defaulting to the entire length of the buffer).
- The behavior of the various editing tools has been changed such that for every tool except the I-Beam, moving the cursor onto the Envelope Display causes the tool to temporarily change into the Magnifying Glass Tool (perfect for quickly moving to

another portion of your audio without having to manually change tools).

- Using the I-Beam to make a selection on the Envelope Display now automatically causes the Pitch Graph Display to move to the selected audio.

Adjust Vibrato

The purpose of this function is to let you quickly and easily change (either increasing or decreasing) the amount of an existing vibrato, while preserving the original shape and character of the vibrato.

To use this function, select the I-Beam tool and highlight the range of audio you'd like to edit. Set the desired amount of change using the Adjust Vibrato slider. A blue correction curve will be created that reflects your setting.

If a correction curve already exists in the selected range (as a result of Make Curve, Import Auto or the use of the Line or Curve tool), that curve will be replaced by the Adjust Vibrato curve. Consequently, if you need to both modify the vibrato and correct the pitch of a phrase, you should first adjust the vibrato and then manipulate the resulting blue curve to correct the pitch. (If you do it in the opposite order, your vibrato adjustment will wipe out your previously executed pitch correction, often resulting in exclamations of a possibly profane nature.)

The default Adjust Vibrato setting is 0. Command (Mac)/Control (PC) clicking the slider will reset it to that value.

NOTE: This function is only available when some tracked audio has been selected with the I-Beam tool. If no audio is selected, the slider handle will not appear. Once some audio is selected, the handle will appear.

ANOTHER NOTE: This function uses the same Stochastic Optimal Linear Estimation Theory as the Auto Mode's Targeting Ignores Vibrato function to attempt to differentiate between vibrato and intended pitch changes. Therefore, you can typically select a portion of your audio containing both vibrato and intended pitch

change and the Adjust Vibrato function will scale the vibrato while leaving the intended pitch changes alone. But again, depending on the actual performance, sometimes this will work better than others. If Adjust Vibrato seems to be making changes to parts of the audio you'd like to leave alone, simply Undo the adjustment and use the I-Beam to select only the vibrato portions you wish to edit.

The Clear All Button
Clicking the Clear All button erases all tracking and correction information, whether or not it is currently visible on the Pitch Display. Since you can not undo this function (and accidentally executing it could be catastrophic), you must confirm your intent in a warning dialog.

The Snap To Note Button
Press this button to enable Snap To Note mode when using the Line Tool. In Snap To Note mode, each line segment will automatically snap to the nearest semitone.

Pressing the Shift key on your keyboard while drawing a line temporarily toggles the state of the Snap To Line button. I.e., if Snap To Note mode is not enabled, pressing Shift will enable it for as long as Shift is pressed. Conversely, if Snap To Note mode is enabled, pressing Shift will disable it for as long as Shift is pressed.

Have fun!

Chapter 6: Creative Applications for Auto-Tune

Auto-Tune 5 works on vocals so well you may think that's all it can do. Actually, lots of instruments can use it to great advantage. Fretless bass, electric violin, trombone, even the theremin, all feature continuous pitch potential, unconstrained by frets or keys. Here are some other ideas for using Auto-Tune 5:

- **Produce instant double tracking in one take!** Record onto two tracks, processing only one of the tracks through Auto-Tune 5. If you're going for a tight double track, set Retune Speed rather fast and Detune Auto-Tune 5 slightly. Increase both of these parameters to broaden the doubled effect. You can also use some Vibrato to make a more dynamic effect (small depth and rate values are best, with medium delay). Of course, you can also decide to record a single virgin track, and bounce that to another, processing through Auto-Tune 5. This way you can dial in the effect while auditioning the mix.

- Recording with two mics (as above) while improvising can also **produce heterophonic effects** (the effect of two players and instruments playing the 'same' melody, which actually varies with some different pitch material). The more constrained your scale is in Auto-Tune 5, the more variation there will be between the two performances.

- **To set up a drone or ambient aura** behind a melodic performance, try sending some of the signal to Auto-Tune 5 with an extremely constrained scale (for example, in the key of C: C, F, G, A#) and then on to a lush, long reverb. The effect produced will be a steady backdrop of chanting tones behind the main melodic material.

- **Don't be afraid to use just as little of Auto-Tune 5 as you need.** It's quite possible that a performer has really quite good intonation, but fails consistently on one or two notes. In this case, use Auto-Tune 5's individual Bypass function (using the Edit Scale display or on the Virtual Keyboard) to bypass all the notes except the one(s) which need the retuning. This way, Auto-Tune 5 is working in a completely transparent mode, and only when needed.