

# PITCHSCOPE USER'S GUIDE



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# System Requirements & Installation

## System Requirements

To use this software, your PC should have:

- A Microprocessor running at 500 MHz ( 1.0 GHz or faster is recommended ).
- At least 64 MB of RAM ( 128 MB or more is recommended ).
- A graphics display with at least 256 colors.
- Direct X, Version 4.0 or later ( usually comes with Windows 98 or later ).
- Microsoft Windows 98, Windows ME, Windows XP, Windows Vista.
- A Sound Card or Sound Chip.
- A CD-ROM or DVD drive for installing the software.

## Installation

Insert the PitchScope CD into your CD-ROM or DVD drive. The Installation Utility should then start up. Then follow the instructions of the simple on-screen Setup Utility.

If on-screen instructions do NOT eventually appear on the screen after inserting the CD, you will have to find a file on the CD named "Setup.exe". First launch a *My Computer* window by double mouse-clicking on the Desktop's *My Computer* icon. You can also launch a *My Computer* window by first mouse clicking on the *My Computer* icon to select it, and then push down on the mouse's RIGHT button, and then select the "Open" command from the popup menu. Once the *My Computer* window is opened, you can view the contents of the CD by double mouse-clicking on the CD or DVD drive's name. You will then see the file called "Setup.exe" on the CD. Double mouse-click on Setup.exe to launch the installation process. If you have any trouble installing PitchScope, contact Customer Service on the Internet at [www.CreativeDetectors.com](http://www.CreativeDetectors.com)

### **Known Issues:**

**Microsoft Vista Only** - After installing on Vista, PitchScope's Online Help (F1 on keyboard, or from the Help Menu) may not launch. This is because PitchScope uses an earlier version of Microsoft Help (WinHlp32.exe) which was not included in the first version of Vista. IF the Online Help files for PitchScope do NOT launch, you can correct the situation by downloading and installing the patch for WinHlp32.exe from Microsoft at:  
<http://www.microsoft.com/downloads/details.aspx?FamilyID=6ebcfad9-d3f5-4365-8070-334cd175d4bb&DisplayLang=en>

There are 2 types of download files to choose from: Windows6.0-KB917607-x64.msu and Windows6.0-KB917607-x86.msu. Choose Windows6.0-KB917607-x64.msu if your computer uses 64-Bit Addressing, and use Windows6.0-KB917607-x86.msu if your computer uses 32-bit Addressing. In future versions of Vista (Service Pack 1 and beyond?) this patch may be included and thus the download would be unnecessary. First confirm that PitchScope's Online Help will NOT launch before installing the patch.

## Registration

Be sure to register your copy of PitchScope at [www.CreativeDetectors.com](http://www.CreativeDetectors.com) so that you may receive customer support and notifications of future upgrades and bug fixes.

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# Introduction

PitchScope was originally designed to help musicians figure out and write down the notes in a recording of a musical instrument's solo, such as a solo from a saxophone or an electric guitar. PitchScope is a type of music analysis software that is designed to detect the most dominant *pitch* (i.e. a musical note) at any given moment in time of a MP3 or Wave(.wav) music file. Wave and MP3 music files can be downloaded from the Internet, or copied from your Audio CDs with the aid of *CD Ripping Software* or Microsoft Windows *Media Player*. CD Ripping Software is often available for free on the Internet or can be inexpensively purchased. PitchScope is designed to work on musical instrument solos, and is not really intended to detect the pitch of a human voice. PitchScope can not detect multiple *simultaneous* notes, but will resort to just finding the loudest pitch at any given moment in time.

Once a Wave or MP3 music file has been loaded into the program, PitchScope can detect the notes and create a Notelist from the instrumental solo. After a Notelist is created, it is graphically displayed in a type of Piano Roll format, and its notes can be played back at *various speeds* with Microsoft Windows' internal Midi Software Synthesizer *along with* the original Wave Recording. Or the Notelist can be played alone, and the Wave Recording can be played alone. When playing back at slower speeds the sound does *not* drop in pitch, but remains in the same octave and pitch as when playing at normal play speed. The *slowed-down* play speeds allow the user to gradually learn how to finger the notes on their instrument as they play along. When a Notelist is played back it also creates graphic animations that help the user anticipate the upcoming notes while they play along. A Notelist can also be saved to a hard drive and later reloaded for user practice sessions, as the user proceeds to master the notes of the solo.

Pitch detection upon *polyphonic* (multiple instruments playing at once) recordings has long been a major puzzle for audio research scientists. While this detection problem has not been fully solved, PitchScope can make accurate note detections in many circumstances. However, PitchScope's note detector is not absolute and sometimes makes errors and might miscalculate some notes. Since the note detector is not entirely accurate, PitchScope also comes with a Graphic Editor that allows the user to quickly correct the initial Notelists that the note detector creates. To help the user find and evaluate errors from the note detector, PitchScope also comes with features such as slowed-down play speeds, and various listening options. And of course the corrected notelist can be saved to hard drive for later animated playback during future practice sessions. *Harmonically dense* instruments like electric guitars, saxophones, blues harmonicas, clarinets, etc. will detect better with PitchScope than *harmonically sparse* instruments, such as a flute or piano.

PitchScope is a type of educational software and is simple enough for children over 12 years, if an adult or older child will read this document and help the child get familiar the program's commands. The software does not require a child to know how to read music, or even how to play a musical instrument. As such, PitchScope can be used as a *discovery tool* that introduces a child to some of the building blocks of music -- almost like a microscope with which to observe the notes of an instrumental solo.

## About this Document

Technical terms particular to PitchScope are placed with *first letters in capitals* (example: **Detection Zone**), and can be looked up in the *Glossary Of Terms* section at the end of this document.

Definitions in the *Glossary Of Terms* section of this document are listed in *alphabetical order*.

Definitions of buttons and other mechanisms in the *Windows Diagrams* section of this document are also listed in *alphabetical order*.

Before you go ahead and read all the features, menus, and commands of PitchScope, it might be best to step through *Tutorial A* (see document's section, *Tutorials*) in order to get a basic feel for the application. But before you proceed with *Tutorial A*, you might also want to first review this document's section named *Window Diagrams*, and familiarize yourself with the Toolbox and other PitchScope windows. During the tutorials you will find these diagrams very useful in identifying the Toolbox's buttons, and other window mechanisms. And don't forget, any time you see a technical term whose *first letters are in capitals* (ex: **Detection Zone**), you might want to read its definition in the *Glossary Of Terms* section.

This user's guide is organized to deliver information about the use of PitchScope through the use of hands-on *tutorials*. Rather than present the functions of PitchScope through a series of disconnected and abstract definitions, we feel that the easiest way to learn this type of software is to take the user step by step through actually situations. For this reason, this *Basic Topics* and *Detection Topics* sections are short, and are really intended as an overview of the application as a whole. However, the *Basic Topics Topics* and *Detection Topics* sections do contain references to specific sections of the Tutorials, so that the user may branch off into areas of more depth, if they so choose. It is recommended that after first glancing at this document, the user step through *each of the five* tutorials. The tutorials are ordered so that the easiest and most important lessons are presented first, and the more difficult and less used techniques are discussed last.

# Basic Topics

## Microsoft Windows Basics

In order to use PitchScope you will need to know how to do some standard Microsoft Windows maneuvers. This list should give you a brief introduction to the use of the mouse and the Windows operating system. But if you are new to Microsoft Windows or any of these topics seem unfamiliar, you may have to go to *Windows Help* to better learn how to use the mouse and the operating system. Also, if you are unfamiliar with how to create a new folder, you might want to look that up in Windows Help. To find Windows Help, mouse-click the "Start" button in the lower left of the screen, and choose "Help."

**1. Mouse-Clicking or Clicking** - This means to position the mouse's cursor over an item like a button, and then quickly press and release the mouse's left button. If you need to click with the *right* button, this document will *specifically say* to click with the *right* button. Sometimes this document will use the phrase "*hit* the button" which mean "*mouse-click* on the button".

**2. Double Clicking** - This means quickly clicking *twice* on an item with the *left* mouse button.

**3. Mouse-Dragging** - This refers to the act of pressing down the mouse's *left* button, dragging the mouse while still holding the button down, and finally releasing the button at a specified location.

**4. Control Clicking** - This means holding down the keyboard's *Control Key* ("CTRL") while mouse-clicking with the *left* mouse button. Pressing down the Control Key while clicking alters the behavior of the current mouse tool.

**5. Shift Clicking** - This means holding down the keyboard's *Shift Key* ("Shift") while mouse-clicking with the left mouse button. Pressing down the Shift Key while clicking alters the behavior of the current mouse tool.

## Working With Sound Files

As mentioned in this document's *Introduction*, PitchScope's purpose is to help musicians figure out and remember the notes of musical instrument solos. The digital file formats for music that PitchScope can work with are the Wave format and the MPEG Layer-3 (MP3) format. The file extension for Wave format is ".wav", and the file extension for MPEG Layer-3 format is ".mp3".

In order to detect the notes in a digital recording, PitchScope must have access to a Wave File in *uncompressed stereo Wave(.wav) file format at 44.1 kHz with 16 bit samples*. That is the same Wave File format that is used to store songs on your Audio CDs. If you have *CD Ripping Software*, you should be able to *copy* the song files from your Audio CDs to your hard drive in that Wave format. *CD Ripping Software* is inexpensive, and is often found for free on the Internet. However, you may only have access to recordings in MP3 format, or a Wave format *other than* uncompressed stereo Wave(.wav) file format at 44.1 kHz with 16 bit samples. In that case, PitchScope also comes with a built-in file converter that can convert most MP3 and Wave files to *stereo 44.1 kHz with 16 bit samples*. If you have Windows XP or later, you probably have a version of Microsoft's *Windows Media Player* which can also be used to extract music files from Audio CDs to your hard drive in the MP3 format (discussed in *Tutorial B*). (For later versions of Media Player, as with Vista, you can also extract directly to the preferred Wave format.) And from that MP3 file, PitchScope's internal file converter can create the necessary Wave file in the preferred format. Certain copyright laws may pertain to copying, duplicating, or distributing the MP3 and/or Wave(.wav) files that you may extract from Audio CDs. Make sure that you are familiar with these laws and their possible implications.

See *Wave File*, *MP3 File*, and *CD Ripping Software* in this document's *Glossary of Terms*. And also see *Tutorial B: Extract a Song from an Audio CD, and Convert a MP3 File to Wave Format*.

## Wave File Navigation

The first step in analyzing the notes of a Wave Recording is to load the Wave File into PitchScope by creating a new transcription Project (see *Tutorial A, Doing a Simple Note Detection*, Step 3 and the *Glossary of Terms*'s definition of *Project*). Once the Wave file is loaded, you will see a graph of its vertical amplitude bars in the Note Detector Window, and will be able to play the Wave with the buttons on the Toolbox (see *Window's Diagram* section, *Toolbox* sub-section). With the Toolbox, you can navigate to any point in the Wave recording, magnify or reduce the window's image of the Wave Recording, and be able to play the Wave at various *slowed-down* speeds. Playing the wave at different slowed-down speeds allows the user to more closely hear the instrumental solo, but without suffering a change in pitch.

Also on the Toolbox are four *magnifying glass* buttons (Zoom-Up, Zoom-Down buttons) that can enlarge or reduce the Wave File's graphic image in either the Pitch Viewer or Note Detector Windows. Using the Zoom-Up and Zoom-Down buttons can help the user focus on a certain *section* of the Wave Recording while detecting notes. Those two windows also contain standard Windows Scroll Knobs to shift the Wave's image in time to any part of the recording. And at the top of these windows are the Wave's Time Rulers, which display the visual image's *time position* (minutes, seconds, milliseconds) into the recording.

See document's *Window Diagrams* section, *Note Detector Window* sub-section and *Toolbox* sub-section. Also see *Tutorial A: Doing a Simple Note Detection*, step 4: *Navigating from the Toolbox Window* for more details

# Detection Topics

## Creating Detection Zones

### **About Projects**

Within PitchScope, note detection and musical *transcription* begin by first creating a *Project*. To create a new transcription Project, the user would select the "New Project" command from the File Menu. In creating the new Project the user selects a Wave File(.wav) to work on. Once the new Project is created, the Wave File is loaded into PitchScope and is graphically displayed in the Note Detector Window as a series of vertical bars that represent the volume of the Wave File at various points in time.

It is within the Project that Detection Zones will be created and stored. A Project is forever linked to the source Wave(.wav) File that it was made from. Never try to rename a Project File, and never modify the Wave(.wav) File after a Project has been created. For more information about creating Projects, read Tutorial A, step 3 in this document.

### **Why Detection Zones?**

As pitch detection can sometimes be slow and consume much memory, it would be *very inefficient* to detect notes for the *entire length* of a song. For that reason the Detection Zone allows the user to only devote computer resources to the necessary areas of instrumental solos within a song file. However, the entire song can still be listened to and practiced with -- only that when the playing song enters a Detection Zone, PitchScope will then start to graph the pitch activity and also play the *detected notes* (the Notelist) through the SoftWare Synthesizer. It is within Detection Zones that the user can *automatically* detect Notes and store them into Notelists. A Project and its Detection Zones can spawn any number of Notelist Files, but each Notelist File is forever linked to the Project and Detection Zones it came from. And remember, as pitch detection can sometimes be slow and consume much memory, *never* make a Detection Zone for the *entire length* of a song.

### **Stereo-Mix Channels**

Before the user can create a Detection Zone within a Project, he or she must first decide in which Stereo-Mix Channel the instrumental solo is the most dominant and loudest. Since we will be detecting notes from a *stereo* Wave File, we must choose to detect from:

- 1) just the left stereo channel (Display Left Stereo)
- 2) just the right stereo channel (Display Right Stereo)
- 3) both the left and right channels combined together (Display Center)

*Display Left Stereo*, *Display Right Stereo*, *Display Center* are menu commands on the View Menu, and allow the user to change the visual and audio focus to one of the three Stereo-Mix Channels. After loading the Wave Recording by creating a Project, the user must listen to the instrumental solo upon each of the 3 Stereo-Mix Channels and carefully decide which of the 3 channels presents the solo instrument the loudest, and with the least interference from other melodic instruments. For most instrument solos, *Display Center* will be the best setting for detection because most solos are typically mixed 'to the center' (between left and right stereo microphones). After the user has picked the best Stereo-Mix Channel to use for detection, then he or she is ready to create a new Detection Zone.

### **Detection Zone Creation**

Now from the Note Detector Window, the user must zoom-down and horizontally scroll the Wave's graphic image, until the entire instrument solo can fit inside the window. To do this the user will have to play the Wave Recording while noticing the time positions in the Wave's Time Ruler, until they know the time-start and time-finish of the solo.

Next the user chooses the Selection Tool, and then creates a Time-Zone Selection. With the Selection Tool, the user mouse-clicks at the start of the solo and then drags the mouse to the end of the solo and releases the depressed mouse button. After the button is released, a Time-Zone Selection Box will show an image in *reversed* gray colors and have two Handles on both of its boundaries. The Handles may be mouse-dragged to fine tune the Time-Zone Selection's boundaries.

Then with the Time-Zone Selection Box in view, the user chooses "Create DetectionZone" from the Detection Menu, the calculations for the new Detection Zone are started. The calculations may take a while, and a progress bar will show its pace. The new Detection Zone box will have a black background. Detection Zones are stored within the Project File, so to save the new Detection Zone the Project File must now be saved from the File Menu.

To learn more about creating Detection Zones, step through Tutorial A, Doing a Simple Note Detection. And also read Project, Stereo-Mix Channel, Time-Zone Selection, Wave File.

### **Deleting a Detection Zone**

The way to delete a Detection Zone to create a new Detection Zone OVER part of an existing Detection Zone. Then the previous Detection Zones that were in contact with the new Detection Zone will be deleted from the current Project, and only the new Detection Zone will remain. NEVER delete a Detection Zone unless you *also want to delete* the Notes that it may have created.

## Automatic Note Detection

The end result of PitchScope is to create a *list of Notes* (i.e. Notelist) that are detected from a musical instrument's solo. After the user has created a transcription Project, and has created a Detection Zone for an instrumental solo, then it is time to apply the note detector.

### **Detecting Notes**

Within a Detection Zone the user is free to do any number of note detections, and any series of notes may be deleted and redetected if desired. Notes can be detected on either the Note Detector Window or the Pitch Viewer Window. The Note Detector Window is preferred because the user can test many different settings with the *Detect* button of the Detect Notes dialog box, as he or she fine tunes the dialog's controls for final detection. Notes can ONLY be detected WITHIN Detection Zones. Do not try to detect notes outside of a Detection Zone.

To detect notes within a Detection Zone, the Selection Tool is horizontally mouse-dragged to create a Time-Zone Selection Box, or the user can use the *Select Entire Detection Zone* command from the Edit menu. The Time-Zone Selection Box displays as a rectangular image in reversed gray colors. The two square handles of the Time-Zone Selection Box can be used to fine tune the start and end of the Time-Zone Selection by horizontal mouse-dragging. When the user is satisfied with the location of the Time Zone Selection Box, the notes are detected by choosing the "Detect Notes" menu command upon the Detection Menu.

After the Detect Notes menu command is executed, the Detect Notes dialog box is launched and displays two slider controls that affect the detection scan:

- 1) *Detection Detail Slider* control
- 2) *Weak-Note Cutoff Slider* control

Adjusting these 2 controls can affect how many subtle 'detail notes' are found in the solo, and set a cutoff point for weak notes (dark gray) that might be noise-notes. The user can hit the *Detect* button as many times as they like to see the effects of different slider control settings -- thus fine tuning the dialog's controls for the best final note detection. Each time that you hit the Detect button, the existing notes in the Time-Zone Selection area are deleted, and replaced by a new set of notes determined by the new settings on the two slider controls. Step through *Tutorial D: Previewing a Note Detection*, to see how to toggle these controls while depressing the Detect button.

Sliding the *Detection Detail Slider* control to a maximum value will cause the note detector to respond to the faintest of pitches, so much so that a very high setting will pick up 'noise' or irrelevant notes from other instruments. And when the slider is set to a low value, some relevant notes might be missed, but noise is at a minimum. Users will want to find the best setting that allows subtle notes to be detected, and yet has a minimum number of *noise-notes*. Similarly, sliding the *Weak-Note Cutoff Slider* control to a high value will cause the note detector to erase many notes with low detection values, indicated by their dark gray color. As the *Weak-Note Cutoff Slider* is reduced to a lower value, more dark gray notes will appear. You should experiment with these sliders till the all the important notes are found, and noise-notes are at a minimum.

The *Detect Notes* dialog box also has a checkbox labeled *Boost Volume*. If the notes all seem to be a dark gray, you could set that checkbox in order to increase their Midi volume, and then the detected notes will display lighter shades of gray. Users will want to find the best setting that allows notes to be bright enough, and still displays some gray colors for the Notes. If all you see are white colored notes, then the Boost Volume checkbox should be unchecked. And if all the Notes have a dark or medium gray color, then the checkbox should be checked.

Once a Notelist has been detected, its notes will be graphically displayed in both the Note Detector and the Pitch Viewer windows.

### **The Notelist**

The detected Notes of an instrumental solo are grouped together into a Notelist, which can be saved to hard drive as a Notelist File. PitchScope uses Microsoft Windows' internal midi SoftWare Synthesizer to generate the notes that you hear when the Notelist plays. As the Notelist is being played, the display becomes graphically animated, and a green rectangle will float upon the current playing note. And animated notes can also be tracked with a 'bouncing red ball' by setting the Popup Menu's *Toggle Frame Advance* menu command. Playing notes also receive special animation behaviors on the Revolver Animation Window and the Mountain Animation Window.

The Notelist and/or the original Wave Recording can be played back at various *slowed-down speeds* via the Toolbox's Play Speed Buttons. The various *slowed-down play speeds* make it easier for users to play along with the Notelist, and to gradually learn how to finger the notes on their musical instruments.

Notes within the Notelist can be edited with standard Copy, Cut, Paste, Delete menu commands. The Notelist can also be saved and reloaded from the user's hard drive for later edits or practice sessions.

See Notelist, Note, and SW Synthesizer in this guide's Glossary of Terms, and also step through Tutorial A: *Doing a Simple Note Detection*. Also step through Tutorial D: *Previewing a Note Detection*.

## Ways of Listening to Wave Recordings and Notelists

In order to help the user *edit* and *practice* with Notelists, PitchScope creates various *ways to listen* to a Notelist and/or the Wave Recording. Since the note detector is not absolute and occasionally makes errors, you will need to make special audio focus when evaluating whether or not a note needs a correction, like an Octave adjustment. To help you better judge the nature of possible detection errors, the following *listening modes* can help you better focus on a Note's property that might need adjustment. Some listening modes pertain to listening to the Notelist as a whole, and some listening modes pertain to listening to just individual notes.

The Notelist and the Wave Recording use *two different devices* to play aloud. The two devices are:

- 1) Wave Player (plays the .WAV file that you loaded into the Project)
- 2) Midi SW Synthesizer (plays the individual notes in the Notelist)

Also see document's *Glossary Of Terms'* definition for *Midi* and *SW Synthesizer*.

### **Listening to the Notelist As A Whole**

There are three main *ways to listen* (called Audition Modes) to the *entire* Notelist and/or the Wave Recording. The three Audition Modes are:

*Midi and Wave*  
*Just Midi*  
*Just Wave*

The *Just Wave* mode will only let you hear only the Wave Recording of the song, without hearing the Notelist. This *Just Midi* mode will only let you hear the midi play of the Notelist, but without hearing the Wave recording. And the *Midi and Wave* mode will let you simultaneously hear the Wave Recording along with the Notelist being played by the SW Synthesizer. These modes can be switched from the Audition Menu.

Another way to get better focus while playing the Notelist, is to press the *Play Window Button* instead of the Play Forward Button on the Toolbox. When you press the Play Window Button, the playing of the Notelist *automatically stops* when the last visible note in the window is played. Since only the notes in the window are played, the display does NOT scroll forward, but stays focused on the current visual segment of the Notelist. The Play Window Button is a convenient way to repetitively hear only a small section of the Notelist and/or Wave Recording, without having the window's image advance to a new position in the song.

And yet another way to hear isolated phrases is to use the Loop Play ('LP') button on the toolbox. After a *Time-Zone Selection* is made with the mouse, just press the 'LP' button on the Toolbox, and the selected time segment will loop over and over until the Pause button is pressed.

### **Listening at Various Speeds**

The five *Play Speed Buttons* are located on the bottom of the Toolbox, and affect the play of the Notelist and/or Wave Recording after the *Play Forward Button* on the Toolbox is hit. In order to make the solo easier to study, their purpose is to slow down the play speed of the Wave Recording, without altering the original pitch. The buttons are Windows radio buttons and are numerically labeled (1,2,3,5,8) with the amount that they can slow down the play of the music. For instance, hitting the radio button labeled "2" will cause the notes to play twice as long, hitting the radio button labeled "3" will cause the notes to play three times as long, etc. Being able to slow down the play speed of the Wave Recording and/or Notelist can help the user check the accuracy of the note detection, and can also help the user gradually learn how to finger the notes on their musical instrument as they play along.

### **Listening To Different Stereo-Mix Channels**

As mentioned in the prior *Creating Detection Zones* section, the user has the choice of creating Detection Zones and detecting notes for a Notelist in *any of three* different Stereo-Mix Channels for *any given Notelist*. But, while a Notelist and its file may have notes from *any of the three* Stereo-Mix Channels (left, right, center), the visual and audio interface will only show and play the notes of only one Stereo-Mix Channel at a time. So if you decide to create Detection Zones inside *multiple* Stereo-Mix Channels, you must remember to set the correct *current Stereo-Mix Channel setting* from the View Menu so that you see and hear your particular note detection of a Detection Zone. The 3 Stereo-Mix Channel settings on the *View Menu* are:

- 1) *Display Left Stereo* - plays and displays just the left stereo channel
- 2) *Display Right Stereo* - plays and displays just the right stereo channel
- 3) *Display Center* - plays and displays both the left and right channels combined together.

Also read the *View Menu* section, and *Stereo-Mix Channel* in the *Glossary of Terms*.

### **Listening To Individual Notes**

For focused listening to *individual* Notes, PitchScope also gives you some additional utilities. The first is the mouse's *Play Note Tool*. When you mouse-click on an individual Note with the Play Note Tool, you will hear the pitch of that particular note from the SW Synthesizer. If you hold down the *CTRL* key of the keyboard while mouse-clicking, you will hear what the Wave Recording would play for the time interval of that note. By clicking with and without the *CTRL* key, you can verify if the detector has picked the correct ScalePitch and Octave for the note, or has made a mistake that needs editing. Read about the Play Note Tool in the Glossary, and try it out in Tutorial A, Step 9: *Using Some of PitchScope's Mouse Tools*.

In addition to the Play Note Tool, are the three *Step-Play Note Buttons* upon the Toolbox (*Play Previous Note Button*, *Play Current Note Button*, *Play Next Note Button*). The 3 Step-Play Note Buttons can also be used to audibly test and evaluate an individual note. Here's how they work:

After first selecting a Note and then mouse-clicking the Toolbox's *Play Current Note Button*, two successive tones will be heard: 1st) the Wave Recording's sound for the time span of the note, and then 2nd) the actual note being played through the midi SW Synthesizer. The audible comparison of the two successive tones can help the user judge if the note is correct, or needs any additional editing. By hitting the *Play Next Note Button*, you can advance the test to the next note, and so on. Read about *the Step-Play Note Buttons* in the Glossary, and see how they work in *Tutorial A, Step 10: Using The Three Step-Play Note Buttons*.

Also see *Audition Mode*, *Play Note Tool*, *Midi/Wave Balance Slider* in this document's *Glossary of Terms*. Also read the *Cleaning Up Notelists* section, and step through *Tutorial A: Doing a Simple Note Detection*.

## Cleaning Up Notelists

While PitchScope can make accurate note detections in many circumstances, its note detector is not absolute and occasionally makes minor errors, and might even miscalculate some notes. Since the detector is not entirely accurate, PitchScope also comes with a Graphic Editor that allows the user to correct the initial Notelists that the pitch detector creates. The Note Detector Window is the preferred window with which to edit a note.

A Note in PitchScope can has 3 properties:

- 1) *Duration* (the beginning and end points of a note in time. See *Note's Start Handle* and *Note's End Handle* in Glossary)
- 2) *Octave* (within PitchScope, a note can be in one of 4 octaves. See *Note's Octave Handle* in Glossary)
- 3) *ScalePitch* (a note can have one of 12 ScalePitch values [E,F,F#,G,G#,A,A#,B,C,C#,D,D#]. Also see *ScalePitch Channel* in Glossary).

Using the mouse's Selection Tool, individual Notes may be selected and have their various properties adjusted by mouse-dragging the Note's Handles that appear in the Note Detector Window.

PitchScope comes with standard edit menu commands for notes, such as Cut, Copy, Paste, Undo, and Delete. Read *Edit Menu* under this guide's Menu Commands section, and also step through *Tutorial C: Editing Some Notes*. The user can also manually add notes to a Notelist with the use of the Create Note Tool -- but this technique is not for beginners. See *Tutorial E: Using the Create Note Tool*.

### **Spotting Note Detection Errors**

The first step in correcting the initial note scan created from the *Detect Notes* menu command, is to listen to the Notelist play along with the original Wave Recording. This is done by setting the Audition Mode to *Midi and Wave* and pressing the *Play Forward Button* or the *Play Window Button* upon the Toolbox. The Play Window Button is useful when you only want to focus on a short segment of the Notelist without having the display scroll forward to a new location.

You also might want to listen to the Notelist play at a *slower speeds* by choosing one of the *Play Speed Buttons* upon the Toolbox. Listening with the Audition Mode set to *Just Midi* is also useful in displaying errors. When you find a Note that sounds suspicious, you will want to tighten your focus to a single note with the Play Note Tool or the Play Current Note button. Also read *Ways of Listening to Wave Recordings and Notelists* and step through *Using Sound Tests to Find A Bad Note* in Tutorial C.

### **Causes of Note Detection Errors**

Erroneous notes can occur for a number of reasons. Sometimes if the note detector's *Detection Detail Slider* is set too high, the detector will process 'noise' as notes and possibly pick up some notes from other musical instruments. As you will learn in *Tutorial A Step 6*, note detection with maximum sensitivity (*Detection Detail Slider* to far right) can cause the note detector to create some noise-notes (dark gray notes that are really errors). To clean up some of the 'noise', you will want to listen to the dark gray notes with the Play Note Tool (*Tutorial A, Step 9*) or the *Play Current Note Button* to determine which notes are complete errors, or which notes have problems that can be fixed with an edit. Reread *Ways of Listening to Wave Recordings and Notelists* to get an idea which listening methods best help in the detection of 'noise-notes'.

The most common error that the note detector might make is to pick the wrong Octave, while picking the correct ScalePitch and Duration for the note. For this reason, a selected note's *Octave Handle* makes it very easy to correct the note's octave value while maintaining the original *ScalePitch* value (E, F, F#,G,G#,A,A#,B,C,C#,D,D#).

Excessive 'noise-notes' can also be created if the User has incorrectly picked the wrong Stereo-Mix Channel when creating their Detection Zone. Read *Stereo-Mix Channels* in the *Creating Detection Zones* section of this document.

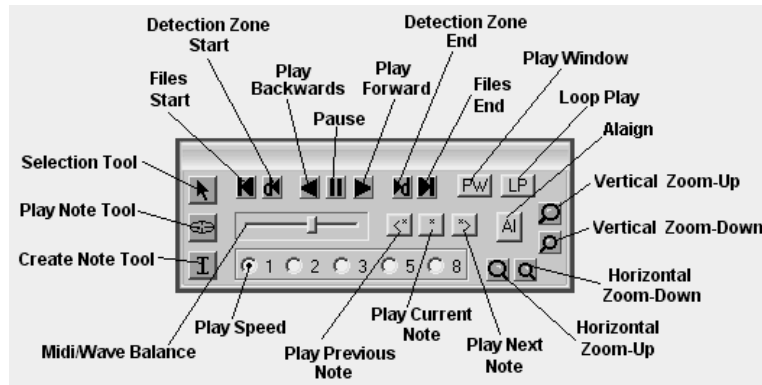
Also read: *Tutorial C: Editing Some Notes*, *Ways of Listening to Wave Recordings and Notelists*, and *Tutorial D: Previewing a Note Detection, Step 3*.

# Window Diagrams

Definitions of buttons and other controls are listed in *alphabetical order*. Technical terms particular to PitchScope are placed with *first letters in capitals* (example: **Detection Zone**), and can be looked up in the *Glossary Of Terms* section at the end of this document.

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## Toolbox Window



The Toolbox Window is the small, non-sizing, window that is seen when the application first starts. It is made up of many buttons and controls to help you navigate through Wave and Notelist operations. The names and functions of the Toolbox's buttons are summarized below.

**Align Button (AI)** - Use this button when you have both a Note Detector and a Pitch Viewer window open above and below each other, and want to vertically find and compare the different visual presentations of the same note or notes. Pressing this button will cause the same notes to become *vertically aligned*, so that it is easier to find the same note in the different windows. All windows that are not the *active* window, will have their horizontal alignment and zoom changed to match the alignment and horizontal zoom of the active window. So if you are looking at the Note Detector window and are trying to figure out if a note is valid or not, you can press the Align Button and the Pitch Viewer window below will have its notes vertically aligned so that it is easier to examine the note's pitch activity upon the Pitch Viewer. It is also a good idea to turn on the Notes' *text names* when doing this type of examination (see *Toggle Note Text* on the Popup Menu).

**Create Note Tool** - PitchScope has three different tools that are associated with the mouse. The Create Note Tool changes the shape of the mouse's cursor to that of an i-beam. The Create Note Tool is to only to be used on the Pitch Viewer Windows. Use the Create Note Tool to manually detect a note that the automatic *note detector* might have *missed*.

First, identify the area of the 'undetected note' by looking for its white cluster of pixels in a particular *ScalePitch Channel* on the Pitch Viewer Window. Mouse-click in the white cluster and a new note will be created with a blue outline. You can then go back to the Note Detector Window and use the Selection Tool to possibly adjust the note's *Octave* and *Duration* with the Handles that appear after note selection. To get some experience using the Create Note Tool, step through *Tutorial E: Using the Create Note Tool*.

**Detection Zone End Button** - Mouse-clicking on this button to shift the active window's image and current play point to the *end* of the current *Detection Zone* in view.

**Detection Zone Start Button** - Mouse-clicking on this button to shift the active window's image and current play point to the *start* of the current *Detection Zone* in view.

**File's End Button** - Mouse-clicking on this button to shift the active window's image and current play point to the *end* of the *Wave Recording* of the song.

**File's Start Button** - Mouse-clicking on this button to shift the active window's image and current play point to the *start* of the *Wave Recording* of the song.

**Horizontal Zoom-Up Button** - Mouse-clicking on this button will cause the currently active window to horizontally *magnify* the section of the Wave and Notelist that is currently visible.

**Horizontal Zoom-Down Button** - Mouse-clicking this button will cause the currently active window to horizontally *compress* and show a larger section of the Wave and Notelist that is currently visible.

**Loop Play Button (LP)** - When there is a Time-Zone Selection Box upon the window, mouse-clicking on this button will cause *the selected time segment* to repetitively play over and over. Hit the Pause Button when you want the music to stop. Also see *Time-Zone Selection Box* in this document's *Glossary of Terms*.

**Midi/Wave Balance Slider** - This control is to be used when the current Audition Mode is set to *Midi and Wave* (see *Audition Mode* in Glossary of Terms). When in the *Midi and Wave* mode, you will want to be able to *equally hear* both the Midi play of the Notelist *and* the original Wave Recording. You can use the Midi/Wave Balance Slider control to increase or decrease the loudness of the midi SW Synthesizer (which plays the Notelist) *relative* to the Wave Recording's loudness. Moving the slider to the right will reduce the volume of the Wave recording so that the Midi play of the Notelist will sound louder. Moving the slider control to the left will increase the Wave Recording's volume and decrease the volume of the midi SW Synthesizer that plays the Notelist.

If moving the Midi/Wave Balance slider can not balance the two music, you may have to open Windows Speaker(Volume) Control dialogbox and adjust the values for "SW Synth" and/or "Wave". Make sure that the "Mute" buttons are NOT checked for either "SW Synth" or "Wave". The Windows Speaker(Volume) Control dialogbox is opened by double mouse-clicking on the Speaker(Volume) Icon in the Windows Taskbar at the far bottom of the screen (for Vista also click on "Mixer" ). Also see *Audition Mode, SW Synthesizer, Midi and Wave Recording* in this document's *Glossary of Terms*.

**Pause Button** - Anytime you are playing the Wave Recording and/or the Notelist, you can stop the music at the current point in time by hitting this button.

**Play Backwards Button** - Hit this button if you want to slowly scroll the window's current view back in time. If you want to make a much larger change in time, use the window's Horizontal Scroll Knob.

**Play Forward Button** - Hit this button to play the Wave and/or Notelist in the *active* window. You can stop the music from playing by hitting the Pause Button on the Toolbox.

**Play Note Tool** - When the Play Note Tool has been selected, the mouse cursor changes to the shape of an oval with crosshairs, and when mouse-clicked inside a note, only that note will play. You can select the Play Note Tool from the Tools Menu, or you can hit the Play Note Tool button on the Toolbox. This tool can be used to check for errors from the note detector, or to slowly *study* the notes in the Notelist. When you hold down the "Ctrl Key" on the keyboard while mouse-clicking, you will instead hear the Wave's Recording for the note's time span. By toggling the keyboard's Ctrl Key on and off while mouse-clicking, you can audibly test whether or not the note detector has picked the correct Octave and ScalePitch for the note, or whether the note is from *another* musical instrument. If you hold down the keyboard's "Shift Key" while mouse-clicking in the Note Detector Window, you will instead hear the Wave's Recording with an unusual *filter*. For some ears, the Shift Key's *filtered* Wave sound might be easier to work with than the Ctrl Key's *unfiltered* Wave sound. To get some experience using the Play Note Tool, step through Tutorial C: *Editing Some Notes*.

**Play Current Note Button** - The Play Current Note Button is one of three Toolbox buttons called the *Step-Play Note Buttons* (see *Glossary of Terms'* definition for *Step-Play Note Buttons*). Use this button to test whether or not the note detector has picked the correct Octave and ScalePitch for a note. First select a note with the Selection Tool to establish it as the 'current note'. Then, when you hit this button, the current note will play two different tones: 1st) the Wave's sound for the time span of the note, and then 2nd) the actual note being played through the midi SW Synthesizer. When the two tones sound the most alike, you have correctly set the values for the note. By also mouse-clicking on the Play Previous Note Button and the Play Next Note Button, you can incrementally navigate forward and backwards through the entire Notelist as you check for errors from the note detector. Also see *Step-Play Note Buttons, Play Next Note Button, and Play Previous Note Button*. Also read Tutorial C: *Editing Some Notes*.

**Play Next Note Button** - The Play Next Note Button is one of three Toolbox buttons called the *Step-Play Note Buttons* (see *Glossary of Terms'* definition for *Step-Play Note Buttons*). Use this button to test whether the note detector has picked the correct Octave and ScalePitch for a note. First, select a note with the Selection Tool to establish it as the 'current note'. Then, when you hit this button, the current note will shift to the next note and you will hear two tones: 1st) the Wave's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. If you want to hear those two tones again, hit the Play Current Note Button. When the two tones sound the most alike, you have set the correct values for the note. You can then repeatedly *step* to the *next* note and hear its two tones by hitting this button again and again, as you progressively check the entire Notelist for *possible* errors from the note detector. Also see *Step-Play Note Buttons, Play Current Note Button and Play Previous Note Button*. Also read Tutorial C: *Editing Some Notes*.

**Play Previous Note Button** - The Play Previous Note Button is one of three Toolbox buttons called *Step-Play Note Buttons* (see *Glossary of Terms'* definition for *Step-Play Note Buttons*). Use this button to test whether the note detector has picked the correct Octave and ScalePitch for a note. First, select a note with the Selection Tool to establish it as the 'current note'. Then, when you hit this button, the current note will shift to the *previous* note and you will hear two tones: 1st) the Wave recording's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. If you want to hear those two tones again, hit the Play Current Note Button. When the two tones sound the most alike, you have set the correct values for the note. By using the Play Previous Note Button and the Play Next Note button you can incrementally navigate forward and backwards throughout the Notelist as you check for possible errors from the note detector. Also see *Step-Play Note Buttons, Play Current Note Button and Play Next Note Button*. Also read Tutorial C: *Editing Some Notes*.

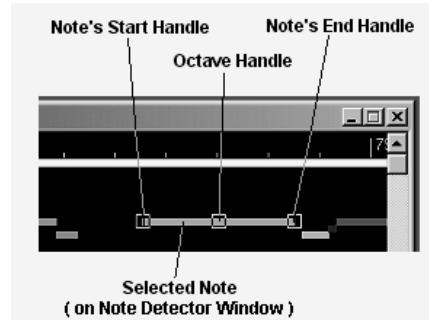
**Play Speed Buttons** - The five Play Speed Buttons are located on the bottom of the Toolbox. In order to make a solo easier to study, they can *slow down* the play-speed of the Wave Recording and/or Notelist, without altering the original pitch. The buttons are Windows radio buttons and are numerically labeled (1,2,3,5,8) with the amount that they can *slow down* the play of the music. For instance, hitting the radio button labeled "2" will cause the notes to play twice as long, hitting the radio button labeled "3" will cause the notes to play three times as long, etc. Being able to *slow down* the play speed of the Wave Recording and/or Notelist can help the user check the accuracy of the note detection, and can also help the user gradually learn how to finger the notes on their instrument as they play along.

**Play Window Button (PW)** - Mouse-click on this button to *only play* the notes of the Notelist and the portion of the Wave Recording, that is *visible* in the window. The current *start note* for play will remain the same. The music will *automatically stop* playing when the last note in the window has played. And you can also stop the music at any time by hitting the Pause Button on the Toolbox. The Play Window Button is a convenient way to repetitively hear only a small section of the Notelist and/or Wave Recording without having the window's image advance to a new position in the song.

**Selection Tool Button** - When the Selection Tool has been chosen, the mouse cursor changes to the shape of an arrow. In order to edit or modify something, like a Note, you must first select it with this tool. You can choose the Selection Tool from the Tools menu, or you can press this Selection Tool button on the Toolbox.

The Selection Tool has many purposes:

- 1) Select an individual note for editing
- 2) Select multiple notes for editing
- 3) Create a Time-Zone Selection
- 4) Mouse-dragging a selected note's Handles to edit the note
- 5) Mouse-dragging a Time-Zone Selection Box's handles in order to change the size of the Time-Zone Selection Box

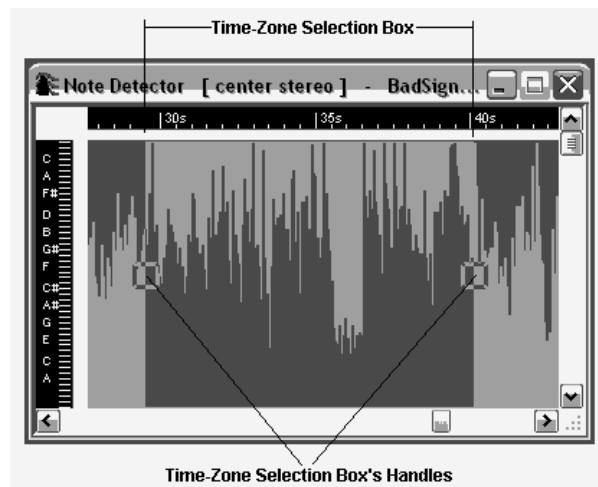


Mouse-clicking with the Selection Tool inside a note with the mouse's left button will display either one, two, or three Handles depending on which window type was used. You can then mouse-drag any of the note's Handles to change the note's various properties. Mouse-dragging on the note's center handle will change its Octave, dragging the note's left handle will change the note's start in time, and dragging the note's right handle will adjust the note's endpoint in time. A selected note can also respond to any of the commands of the Edit menu, such as Cut, Copy, Paste, or Delete.

If you want to erase the current selection, just mouse-click inside a blank area of the window.

If you hold down the Ctrl Key on the keyboard while mouse-clicking inside of notes, you can select multiple notes for editing. If you hold down the Shift Key while horizontally mouse-dragging, you will select all of the notes inside the time range of the drag and release.

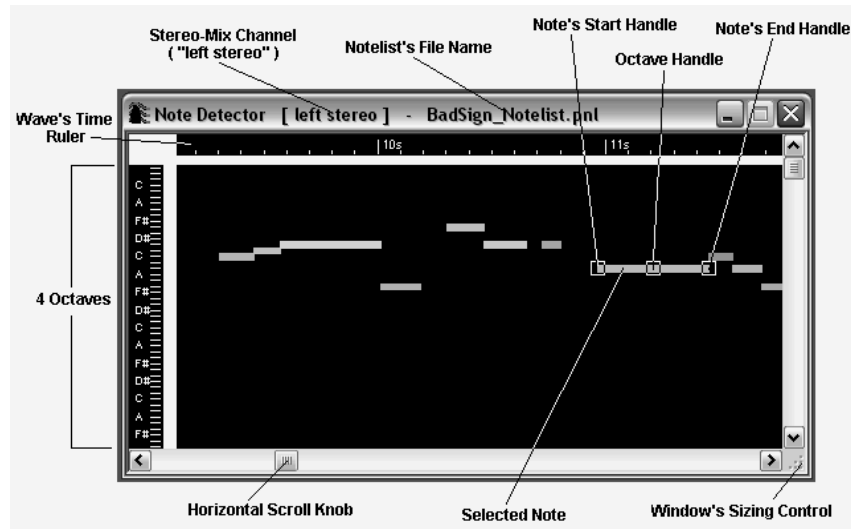
You can also create a Time-Zone Selection with the Selection Tool by horizontally mouse-dragging and then releasing the mouse's button. The Time-Zone Selection will display a box of inverted gray colors and have a Handle on either end. Those handles may also be mouse-dragged to refine the beginning and end of the Time-Zone Selection Box. Time-Zone Selections are used in creating Detection Zones and in doing note detection. To get some experience using the Selection Tool, step Tutorial C: *Editing Some Notes*.



**Vertical Zoom-Up Button** - This button is located on the right edge of the Tool Box Window. Mouse-clicking this button will cause the currently *active* window to vertically *magnify* the section of the Wave and Notelist that is currently visible. When the window is vertically zoomed-up, the Vertical Scroll Knob will then activate and allow to the image to be vertically scrolled. If the window is NOT vertically magnified, the vertical scroll bar and knob are *disabled*.

**Vertical Zoom-Down Button** - This button is located on the right edge of the Tool Box Window. Mouse-clicking this button will cause the currently *active* window to vertically *compress* and show a larger vertical section of the Wave and Notelist. When the window is vertically zoomed-down, the Vertical Scroll Knob will then activate and allow to the image to be vertically scrolled. If the window is NOT vertically magnified, the vertical scroll bar and knob are *disabled*. To bring the window to its *lowest vertical magnification*, keep hitting this button until the image refuses to compress any more. There is no harm in hitting this button to many times when trying to reach the lowest level vertical magnification.

# Note Detector Window



The Note Detector Window has three main purposes: First, to enable the user to create Detection Zones and to detect notes, to allow the user to edit occasional miscalculations of the note detector (see *Cleaning Up Notelists* section), and finally to give the user animated visual feedback when learning a solo, as they play along with their musical instrument.

Just after creating a new Project you will see the digital WAV recording displayed in the Note Detector Window as a series of gray vertical bars that represent the volume of the recording at various points in time.

While PitchScope can make accurate note detections in many circumstances, its note detector is not absolute and occasionally makes errors. Sometimes a miscalculation is minor can be fixed by editing the Note. Before a note can be edited, it must first be *selected* with the Selection Tool. A selected note will display Handles that can be mouse-dragged to change one of the note's properties (see above diagram).

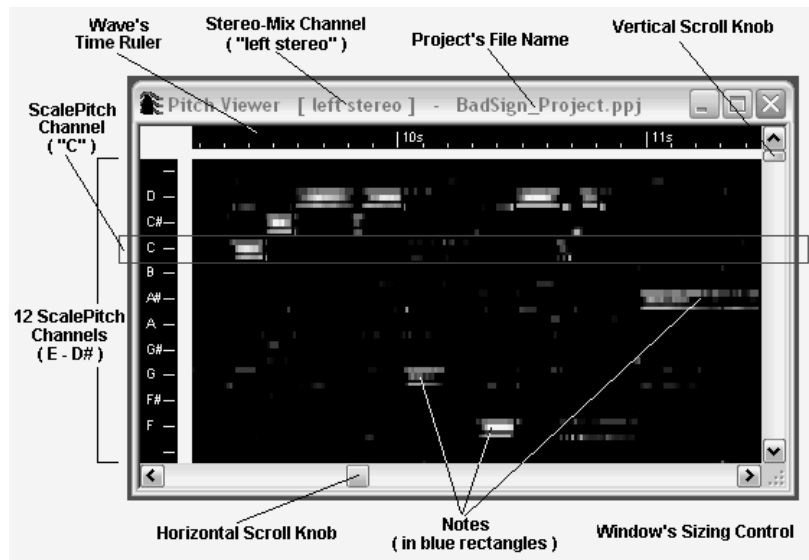
The *graphic animations* of the Note Detector Window also become useful as a visual learning-aid as the user practices along with the playing Notelist, while he or she gradually learns the solo. Step through this document's Tutorial A: *Doing a Simple Note Detection* in order to learn how to use this window. Also read Tutorial C: *Editing Some Notes*.

**Note's Start Handle** - A Note can be selected by mouse-clicking with the left button inside a note's rectangle with the Selection Tool. The selected note will then display one, two, or three Handles (see above diagram). The handle at the far *left* is the Note's Start Handle, and can be mouse-dragged to change the time value for the *start* of the note. Most of the time the note detector will do a good job of setting this value, but at times you may want to make a minor adjustment. The Note's Start and End Handles will *only* appear if the note is *wide enough* to fit all of the three handles. If, after selecting the note you only see one handle, go to the Toolbox and hit the Horizontal Zoom-Up Button as many times as necessary until the note is finally *wide enough* to fit the three handles after selection.

**Note's End Handle** - A Note can be selected by mouse-clicking with the left button inside a note's rectangle with the Selection Tool. The selected note will then display one, two, or three Handles (see above diagram). The handle at the far *right* is the Note's End Handle, and can be mouse-dragged to change the time value for the *end* of the note. The Note's Start and End Handles will *only* appear if the note is *wide enough* to fit all of the three handles. If, after selecting the note you only see one handle, go to the Toolbox and hit the Horizontal Zoom-Up Button as many times as necessary until the note is finally *wide enough* to fit the three handles after selection. Note: One way to merge two neighboring notes of the same Fundamental Pitch is to first delete the second note, and then drag to the right the first Note's End Handle to the position of the deleted note's endpoint.

**Note's Octave Handle** - The Octave Handle *only appears* on Note Detector Windows, and not on Pitch Viewer Windows. The handle in the *center* of the note is the Octave Handle. If you mouse-drag the Octave Handle in a vertical motion, you will change the note's octave value while keeping the same ScalePitch value for that note. The most common error of the note detector is to get the Octave wrong, while setting the ScalePitch (E, F, F#,G,G#,A,A#,B,C,C#,D,D#) correctly. So to make your cleanup of a note detection scan easier, the Octave value can be easily changed with this handle *without altering* the existing ScalePitch value. As you try different octave positions, hit the Toolbox's *Play Current Note Button* and you will hear two successive tones: 1st) the Wave's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. After testing different octave positions, you will be able to judge the correct octave position when the two tones sound the most alike. Double-clicking on a note will launch the *Note Properties Dialog*. Upon it you will see the different strengths for each octave candidate. You can also use these octave candidate scores to aid you make a correction. Also see *Octave* in the *Glossary of Terms* section of this document. Also read Tutorial C: *Editing Some Notes*, step 4: *Correcting A Note's Octave*.

# Pitch Viewer Window



After you have executed the "Create Detection Zone" menu command, the Pitch Viewer window will automatically appear. Upon it you will see the differing pitch activity drawn as a white and gray pixels upon the black background of the Detection Zone (see diagram above). The whiter the pixels, the stronger the pitch activity in that area of the view. The Pitch Viewer window helps the user make decisions when editing notes that the note detector initially creates.

Step through this document's Tutorial A: *Doing a Simple Note Detection* in order to learn how to use this window. If the Pitch Viewer Window is not already displayed, you can open one from the View Menu by selecting "Pitch Viewer".

**Horizontal Scroll Knob** - A standard Microsoft Windows control. Mouse-dragging horizontally on the knob will scroll the *viewable time segment* of the Wave recording, forward or backwards in time.

**ScalePitch Channel** - On the Pitch Viewer Window you can see 12 horizontal ScalePitch Channels (see diagram above). A ScalePitch Channel has several horizontal rows of pixels that represent the pitch activity for the given channel's ScalePitch value, regardless of its octave (example: The F# Channel would show all pitch activity for *any* notes that are F#, and in *any* given octave). See *ScalePitch* in the *Glossary of Terms* section of this document.

**Wave's Time Ruler** - On the top of a Pitch Viewer Window or a Note Detector Window is a *Wave's Time Ruler*. It looks like a horizontal ruler with markings for the time positions into the Wave File for that particular image location. The notation for the time markings are given in minutes, seconds, and milliseconds (example: "2mn 43s 500ms" is 2 minutes, 43 seconds, 500 milliseconds). Scrolling the window left or right with the window's Horizontal Scroll Knob will change the *time segment* of the Wave File that is currently in view, and correspondingly change the numeric time values of the Wave's Time Ruler.

**Vertical Scroll Knob** - A standard Microsoft Windows control. Mouse-dragging vertically on the knob will scroll the viewable frequency ranges of the notes' up or down.

*Note:* The vertical scroll knob will only work if you have *zoomed-up* the window in the vertical direction. If the window is at *zero vertical magnification* (stretch mode), then the vertical scroll knob is disabled. When a window initially opens, it is at *zero vertical magnification* (stretch mode).

# Tutorials

Technical terms particular to PitchScope are placed with *first letters in capitals* (example: **Detection Zone**), and can be looked up in the *Glossary Of Terms* section at the end of this document. References to controls and buttons on the Toolbox are also set with first letters in capitals, but are defined in the *Window Diagrams* section, *Toolbox Window* sub-section of this document.

But before you proceed with the tutorials, you might want to first review the *Window Diagrams* section and familiarize yourself with the Toolbox and other PitchScope windows. During the tutorials you will find these diagrams very useful in identifying the Toolbox buttons and other window mechanisms. You might also want to quickly glance, and later study, the *Glossary Of Terms* section in this document to get a rough overview of the application. The tutorials are ordered so that the easiest and most important lessons are covered first, and the more difficult and less used techniques are discussed last. Before attempting the tutorials, make sure that you have properly installed PitchScope to your computer.

## **Tutorial A: Doing a Simple Note Detection**

### **1. Launch PitchScope**

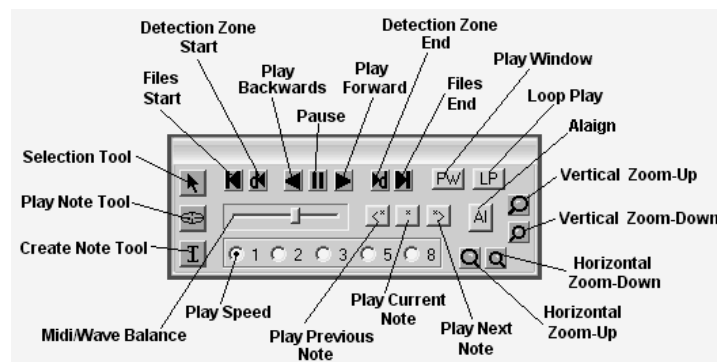
Start the PitchScope application by pressing the Windows "Start" button, go to "Programs", and select "PitchScope". Or launch PitchScope by mouse double-clicking on PitchScope's Desktop Icon. (If you can still not start the application, use the Microsoft Windows Search Function (from *Start Button*) to find the file named "Pscope.exe". When you find the file, double mouse-click on the file name to launch). With the application started and no files loaded, you should only see the small Toolbox Window which has no title bar.

### **2. Find a Wave File for Detection**

Launch a *My Computer* window by double mouse-clicking on the "My Computer" icon of your desktop, or select "Computer" from the Start Button's menu. Use a "My Computer" window to locate the folder named "Examples" inside the "Program Files" folder's PitchScope folder (Program Files\PitchScope\Examples\). Inside of the *Examples* folder you should find a file called "Ps\_Solo\_1.wav". If you can not find the *Examples* folder, use the Windows *Search* function to find the file called "Ps\_Solo\_1.wav". The Windows *Search* function is launched by hitting the "Start" button, selecting "Search", and then "For Files and Folders..."

### **3. Create a New Project**

In PitchScope's File Menu, select "New Project". Within the "Create New Project" dialog box, mouse-click on the upper *Browse* button (*Pick Wave or MP3 Music File*). Then use the *Open Wave or MP3* file dialog box to navigate and select "Ps\_Solo\_1.wav" in the *Examples* folder, and then hit the "Open" button. In the "Project's Name" text box fill in a name for the project file, namely "Ps\_Project\_1". Then mouse-click on the lower *Browse* button (*Pick Project File's Location*), and use the *Select Folder* file dialog box to navigate to the folder named "Examples". With the name of the project file (Ps\_Project\_1) in the *File Name* text box, hit the *Open* button to assign the path for the new Project's file. Carefully inspect the choices you made in the *Create New Project* dialog box for *Music File's Path* and *Project Name*, and *Project File's Path*. If you are satisfied, hit the "Create" button. But if any of the information looks wrong, merely hit the "Cancel" button and repeat this step from the beginning. After hitting the "Create" button, you should see a confirmation dialog, then hit "OK", and the Note Detector Window should open with a graph of the Wave file's amplitudes as vertical bars.



### **4. Navigating from the Toolbox Window**

Now that the Wave File(.wav) has been loaded and a new Project File has been created, you can play the Wave Recording forward, backwards, and at various slower speeds. We will now use the Toolbox to play the Wave. To locate any of the named Toolbox buttons, look at the diagram above. To play the Wave, go to the Toolbox Window and mouse-click the Play Forward Button. If you want to stop the music from playing, hit the Pause Button. To jump to the end of the Wave Recording, hit the File's End Button. To go back to the start of the Wave Recording, hit the File's Start Button. At any time while the music is playing you can hit any one of the Play Speed Buttons (circular Radio Buttons with the numerals: "1,2,3,5,8") to slow down the song. Hitting the Play Speed Button called "2" will cause the music to play at 1/2 the normal speed while keeping the notes at the same pitch. Similarly, hitting the Play Speed Button called "3" will cause the music to play at 1/3 the normal speed, hitting the Play Speed Button called "5" will cause the music to play at 1/5 the normal speed... etc. Take a few minutes to play the Wave Recording while experimenting with these Toolbox buttons.

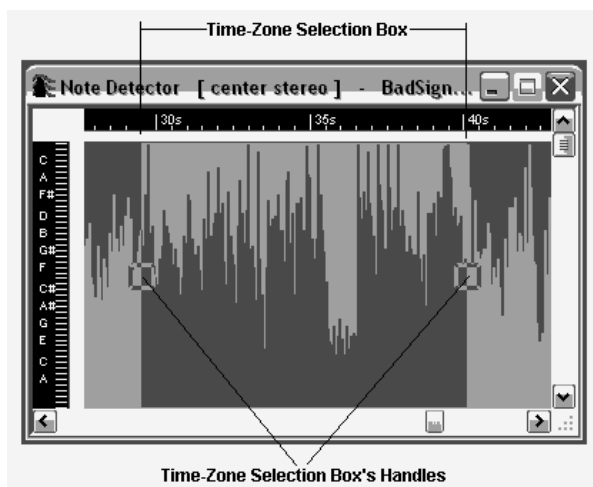
When playing and detecting music, you must choose which of 3 *Stereo-Mix Channels* to detect notes from. The three Stereo-Mix Channels are:

- 1) *Left Stereo-Mix* channel (hear only left stereo),
- 2) *Right Stereo-Mix* channel (hear only right stereo)
- 3) *Center Stereo-Mix* channel (hear both left and right stereo channels combined).

You will have the best results at note detection by selecting the Stereo-Mix Channel that plays the instrumental solo the *loudest*, and with the least interference from *other* tonal instruments. To change the current Stereo-Mix channel setting, go to the View Menu and select either *Display Center*, *Display Left Stereo*, or *Display Right Stereo*. For most recordings a musical instrument solo will be mixed in the 'center' of left and right stereo speakers, so selecting *Display Center* will typically work best. For this tutorial, make sure that *Display Center* is selected and checked on its menu item.

Also on the Toolbox window are four buttons that magnify the image in the currently *active* window. The two Horizontal Zoom Buttons can *horizontally* either magnify or shrink the *time interval* of the Wave File that is displayed in a window. Take a few minutes to experiment with the two Horizontal Zoom buttons. The two Vertical Zoom Buttons are rarely used and can sometimes confuse the new user. For now, just leave the two Vertical Zoom buttons alone.

You might also want to take a few more minutes to familiarize yourself with the various Toolbox buttons by playing the Wave and observing the various effects of the different buttons. Also read the definitions for the different Toolbox buttons in this document's *Window Diagrams* section, *Toolbox Window* sub-section.



## 5. Create a New Detection Zone

On the View Menu make sure that *Display Center* is selected and shows a checkmark by "Display Center". Then hit the Toolbox's *File's Start Button* to make sure that the window shows the very beginning of the Wave Recording. Now we must *horizontally* shrink the Wave so that it is *entirely visible* within the Note Detector Window's horizontal direction. To do this, hit the Toolbox's Horizontal Zoom-Down Button (*small magnifying glass on lower right*) a few times until the end of the Wave is where there are no more vertical bars on the right and only light gray is seen.

Go to the Tools Menu and make sure that the Selection Tool is chosen (should see a checkmark by the word "Select"). With the Selection Tool, push the left mouse button down at the left of the window, drag the mouse (button still down) till the mouse's arrow cursor is near the far right of the vertical bars, and then release the mouse button. The Time-Zone Select Box should now be visible. The Time-Zone Select Box will show an image in *reversed* gray colors and has two handles (small squares) that allow fine tuning the start and end of the Time-Zone selection by mouse-dragging. If you are not happy with the position of the Time-Zone Select Box, you can mouse-click once inside the window, it will go away, and then you can try again. When you are satisfied with the position of the Time-Zone Select Box, go to the Detection Menu and select "Create DetectionZone". The calculations for the new Detection Zone may take a while, and a Progress Bar will show you how quickly they are proceeding. At the end of calculations you will see a confirmation box, hit its "OK" button, and notice that the new Detection Zone box has a black background. Keep the horizontal magnification of the window at its current setting. Now save the new Detection Zone to the Project File by going to the File Menu and selecting "Save Project".

*Note:* As pitch detection can sometimes be slow and consume much memory, never make a Detection Zone for the entire length of a song. Only create Detection Zones where you really need them, like in a musical instrumental solo.

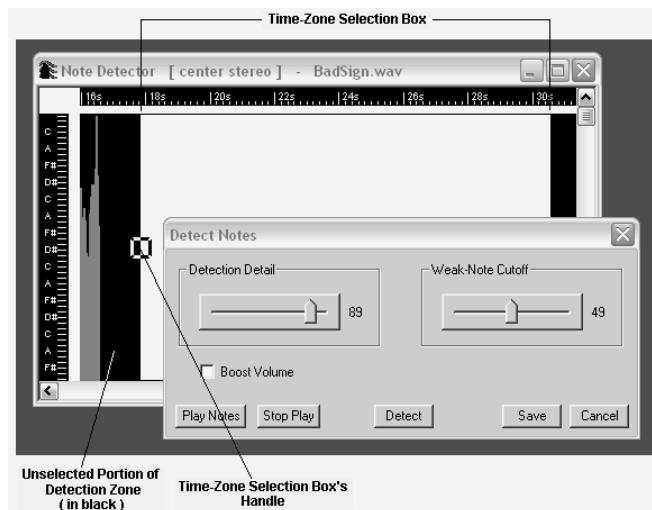
## 6. Detect Some Notes

You can detect notes on either the Note Detector Window or the Pitch Viewer Window. The Note Detector Window is preferred because the user can test many different settings with the *Detect* button on the *Detect Notes* dialog box, as he or she *fine tunes* the dialog's controls for final detection. Now *activate* the Note Detector Window by mouse-clicking inside the window. If a Note Detector Window is not displayed, you can launch a new one from the View Menu by selecting "Note Detector."

Next you must make a selection inside the Detection Zone to determine where the notes are to come from. If you want to select the *entire* Detection Zone, use the "Select Entire Detection Zone" command on the Edit Menu. If you only want to select a portion of the Detection Zone, you must mouse-drag with the Selection Tool as follows: with the Selection Tool, push the left mouse button down at the left start of the Detection Zone, drag the mouse to the right edge of the Detection Zone, and then release the mouse button. Again you should see the Time-Zone Selection Box as an image in *reversed* gray colors. The two small square handles of the Selection Box can be used to fine tune the start and end of the Time-Zone selection by mouse-dragging. It is not necessary to precisely set the boundaries of the Time-Zone Select Box to exactly the same boundaries as the Detection Zone. In fact, they can

even go outside of the Detection Zone's boundaries. If you have used the "Select Entire Detection Zone" command, then there will be no handles on the Time-Zone Selection Box to adjust.

Now, with the Time-Zone Select Box visible, go to the Detection Menu and select "Detect Notes". This will launch the *Detect Notes* dialog box. For this tutorial, just leave the existing settings on the dialog's *Detection Detail* slider control and *Weak-Note Cutoff* slider control (*Detection Detail* at "89", and *Weak-Note Cutoff* at "49"). Now just mouse-click on the "Detect" button. When the detection of notes is complete you should see the notes draw as *gray solid rectangles* if the Note Detector Window is used, and the notes will be drawn in hollow blue rectangles if performed on the Pitch Viewer Window.



Notice that the Detect Notes dialog box also has a checkbox labeled *Boost Volume*. If the notes all seem to be a dark gray, you could set that checkbox to increase their Midi volume, and then have the notes display lighter shades of gray. Users will want to find the best setting that allows notes to be bright enough, and yet still displays some varying gray in the colors of the Notes. If all you see are white colored notes, then the setting for the Boost Volume checkbox should become unchecked. And if all the Notes have a dark or medium gray color, then the Boost Volume checkbox should become checked.

You can *repetitively* press the Detect button while testing different settings on the two slider controls. Once the Detect Notes dialog box is launched, PitchScope remembers the Time Zone Selection after successive Detect Button presses -- you do not have to use the mouse to later make Time-Zone Selections. And each time that you hit the Detect button, the existing notes in the time selection area are deleted, and replaced by a new set of notes determined by the new settings on the two slider controls. If you want to hear what your new notes sound like just hit the "Play Notes" button, and then hit the "Stop Play" button to stop the music. When you are satisfied with the note detection scan, press the "Save" button to close the dialog box. And if you are unhappy with the scan press the "Cancel" button, and then the notes that were in the Notelist before the launch of the dialog will return. **Always close the Detect Notes dialog box immediately after you are done with the detection scan.**

It is now time to *expand* the horizontal image on the Pitch Viewer Window in order to see the detail of the Notes. First *activate* a Pitch Viewer Window by mouse-clicking inside the window. If one is not visible, go to the View Menu and launch one by selecting "Pitch Viewer". Then go to the Toolbox and hit the Horizontal Zoom-Up Button a couple of times till you can see the *insides* of the notes. Scroll the window to the right with the Horizontal Scroll Knob, and notice how the Detection Zone on a Pitch Viewer Window will display the *pitch activity* inside the notes with clusters of light gray and white pixels.

Now *re-activate* the Note Detector Window. While the Pitch Viewer Window will only vertically display the notes in the twelve *ScalePitch* values (E,F,F#,G,G#,A,A#,B,C,C#,D,D#), the Note Detector Window will vertically display notes by their *Fundamental Pitch* values (with octave values) graphically in a Piano Roll format. To have the notes in a window display their *letter names*, push down the right mouse button inside the window and a *popup menu* will appear. Select "Toggle Note Text" to either show or hide the notes' letter names (also see document's *Menu Commands* section, *Popup Menu* sub-section).

While both the Note Detector Window and the Pitch Viewer Window can be vertically zoomed-up (magnified) to reveal more vertical detail, vertical magnification can sometimes confuse the new user. So for that reason, leave the Vertical Zoom-Up buttons alone and at their lowest magnification. When you launch a new window, it is automatically set to its lowest vertical magnification.

For more information, also see *Detection Detail Slider* and *Weak-Note Cutoff Slider* in this document's *Glossary of Terms*. And later you can step through Tutorial D, *Previewing a Note Detection*, to learn how to adjust the *Detection Detail* and the *Weak-Note Cutoff* slider controls for more accurate note detection.

## 7. Save the New Notelist

Now that you have detected a new Notelist, you will want to save it to your hard drive so that you may later hear or modify it. Go to the File Menu and select "Save Notelist". This will launch the *Save As* file dialog box. You can use its standard Microsoft Windows commands to navigate to a special folder, or to create a new folder if you like. For now, just navigate to the *Examples* folder, and write "Notelist\_1" in the *File Name* text box. Hit the "Save" button, and the new Notelist file will be saved to that folder.

## 8. Playing the Wave and Notelist In Different Audition Modes

Now that you have created a new Notelist, you will want to hear it play -- sometimes along with the Wave Recording, and sometimes by itself. The Notelist and the Wave Recording use *two different devices* to play. The two devices are:

- 1) the Wave Player (plays the .WAV file that you loaded)

- 2) the Midi SoftWare Synthesizer (plays the individual notes in the Notelist)

There are three ways to listen (called Audition Modes) to the Notelist and/or the Wave Recording. The three Audition Modes are:

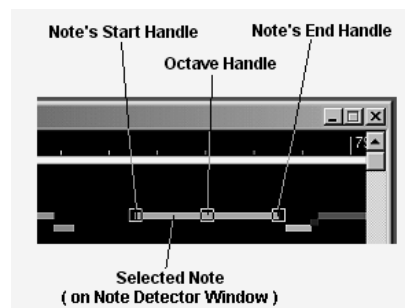
- 1) Midi and Wave
- 2) Just Midi
- 3) Just Wave

The *Just Wave* mode will only let you hear the Wave Recording of the song, without hearing the Notelist being played. Now go to the Audition Menu and select "Just Wave." Go to the Toolbox and first hit the File's Start Button, and then the Play Forward Button. Though you can see the Notelist's current note being animated with a green rectangle, you can NOT hear the Notelist being played.

Now hit the Pause Button to stop playing the music, and go to the Audition Menu and select "Just Midi." Again go to the Toolbox and hit the File's Start Button, and then hit the Play Forward Button. This time you can hear the Notelist being played by the midi SW Synthesizer, but you can NOT hear the original Wave Recording being played.

And now hit the Pause Button to stop play, and go to the Audition Menu and select "Midi and Wave." Now go to the Toolbox and hit the File's Start Button, and then hit the Play Forward Button. You should now be *simultaneously* hearing *both* the Notelist and the Wave Recording. When in the *Midi and Wave* audition mode, you can use the Toolbox's *Midi/Wave Balance Slider* control to increase or decrease the loudness of the Notelist' sound *relative* to the Wave Recording's sound. Moving the slider to the right will reduce the volume of the Wave Recording, so that the Notelist will appear louder by comparison. Moving the slider to the left will increase the volume of the Wave Recording and drown out the Notelist. Take a few minutes to experiment with the *Midi/Wave Balance Slider* control while in the *Midi and Wave* audition mode. Ideally you should balance the two sound sources so that you can distinctly hear each one of them. *Always stop play with the Pause Button before executing a menu command.* Also when starting a new Project, it is probably best to leave the *Midi/Wave Balance Slider* control in a the 'middle position', and later fine tune its setting after you have created a Notelist. Also see *Midi/Wave Balance Slider*, *SW Synthesizer*, *Midi*, and *Audition Mode* in this document's *Glossary of Terms*.

When simultaneously listening to the Notelist and the WAV recording (from the *Midi and WAV* audition mode), it is necessary to have the two musical sources be synchronized in time. Because different microprocessors and sound hardware sometimes execute midi play commands with different response times, PitchScope must sometimes have its Timing-Advance Factor altered to fine tune the synchronization of play. If the play of the midi notes sounds a little out of beat with the play of the source WAV file, you can then you can correct the problem by adjusting the Timing-Advance Factor on the Options dialog. You can open the Options dialog from the Tools Menu by selecting "Options..." To learn how to set the Timing-Advance Factor, read about it in the *Options Dialog* part of the *Tools Menu* section in this document.



## 9. Using Some of PitchScope's Mouse Tools

On the Tools menu, you will see choices for the three mouse tools: 1) *Selection* (tool), 2) *Play Note* (tool), and the 3) *Create Note* (tool). The different tools can also be selected on the Toolbox. The three large buttons at the far left of the Toolbox represent the three different tools. As shown earlier in this tutorial, the Selection Tool can be used to make a Time-Zone Selection to create a Detection Zone, or to create a Time-Zone Selection for multiple note *selection*. The Selection Tool can also be used to individually select notes for editing (cut, copy, paste, and delete). If the note detector is too *sensitive* (see Detection Detail Slider), it will pick some irrelevant pitches from other instruments. To delete a note, first mouse-click with the Selection Tool on a note and notice that when a note is selected, some Handles will appear on the note. Use the *Edit* menu's Cut command to remove the note after it has been selected. If you change your mind about the edit, merely select *Undo* from the *Edit* menu. To select multiple notes, hold down the keyboard's *CTRL* key while mouse-clicking with the left button.

Now let's try the Play Note Tool. Go to the *Tools* menu and select "Play Note". Notice how the mouse's cursor changes shape to an oval with two cross hairs (the same icon as on the Toolbox's far left button which can also select the Play Note Tool). When you mouse-click on an individual note with this tool, you will hear the pitch of that particular note being played through the SW Synthesizer. If you hold down the keyboard's *CTRL* key while mouse-clicking, you will hear what the Wave Recording would play for the *time interval* of that note. By clicking with and without the *CTRL* key while listening, you can verify if the detector has picked the right pitch and octave for a valid note, or has maybe generated an irrelevant note from another instrument. Use the Play Note Tool in this manner to search for note detector errors to be later edited or deleted. Also see *Selection Tool* and *Play Note Tool* in the "Tools Menu" sub-section of the *Menu Commands* section of this document, and *Selection Tool* and *Play Note Tool* in the *Glossary of Terms* section of this document.

## 10. Using the Three Step-Play Buttons

As mentioned, you might have to spend a little time 'cleaning up' a newly detected Notelist, and delete some of the *irrelevant notes* (noise) from the note detection. A useful mechanism for note cleanup are the three Step-Play Note Buttons. The three Step-Play Note Buttons (*Play Previous Note Button*, *Play Current Note Button*, *Play Next Note Button*) are located on the Toolbox (see document's *Window Diagrams* section, *Toolbox Window* sub-section). Use these buttons to audibly test whether or not the note detector has picked the correct Octave and/or ScalePitch for a note.

Here is how the three buttons work. First select a note with the Selection Tool to establish it as the *current note*. Then hit the Play Current Note Button, and the current note will play two successive tones: 1st) the Wave's Recording's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. If you want to hear those two tones again, just hit the Play Current Note Button a second time. You can then move to the *next* note for the same tone test by hitting the Play Next Note Button. By repetitively hitting the Play Next Note Button, you can incrementally step through all the notes in the Notelist while checking and correcting errors. If you want to navigate to an earlier note, just hit the Play Previous Note Button. Also see definitions for *Play Previous Note Button*, *Play Current Note Button*, and *Play Next Note Button* in this document's *Window Diagrams* section, *Toolbox Window* sub-section. Take a few minutes to try out and become familiar with these three buttons -- they can be *very useful* for notelist corrections.

## 11. And Lastly

This concludes the *Tutorial A*. Remember that to save your changes, you might have to save one or both of PitchScope's two file types:

a) The Project File (.ppj) saves the Detection Zones that you might create or change. A Project File is always linked to the Wave File of its creation. Never modify a Wave file (.wav) after you have created a Project File for it. The Project File is the 'parent' file of which many Notelist Files may be later created.

b) The Notelist File (.pnl) saves the notes that you detect or create. A Notelist file always refers back to the Project File that was used for its creation. While a Project File may have many Notelist files that refer to it, a Notelist File can have only one Project file as its 'parent'. Never try to rename a Project File or it will confuse its 'child' Notelist Files. In order to edit a Notelist file you should make sure that its Project File is also loaded.

## **Tutorial B: Extract a Song from an Audio CD, And Convert a MP3 File to Wave Format**

As previously mentioned, you will need music files in either the Wave(.wav) or MP3(.mp3) format in order to detect notes with PitchScope. Though Wave and MP3 music files can be found on the Internet or in your friend's collections, you will probably want to copy some music files from your Audio CDs. If you have good Wave Editor software, that may be able to extract('rip') or copy the .WAV files from your audio CD. *CD Ripping Software* is often available for free on the Internet, or can be inexpensively purchased.

If possible, copy or 'rip' your song files to an *uncompressed Stereo Wave(.wav) file format at 44.1 kHz with 16 bit samples*, because this is the *final* format that you will need to do note detection in a PitchScope Project. If you cannot get the music files in that format, you still may be able to use other Wave(.wav) formats and the MP3 format, but PitchScope will have to convert them into a Stereo Wave(.wav) file at 44.1 kHz with 16 bit samples. If a file conversion is to be performed there may be a small loss in sound quality, but pitch detection can still proceed. If a file conversion has been performed, only the final *converted version(.wav)* of the file is then needed.

If you have Windows XP or a later version of Windows, then you automatically have a version of Microsoft's *Windows Media Player* which can also be used to copy music files from your Audio CDs to the MP3 format. This tutorial will step you through to act of copying music files from CDs with Windows Media Player. **If you have any trouble understanding this tutorial, remember that you can always read Windows Media Player's own help topics for answers.** To see Media Player's help topics, go to its "Help" menu and select "Help Topics" from the sub-menu.

### 1. Launch Windows Media Player

Go to the Windows "Start" button at the bottom left of the display, first select "Programs", and then select "Windows Media Player" from the menu.

### 2. Insert an Audio CD Into the Computer

Audio CDs are the kind of music CDs that you might play in your stereo. Load an Audio CD into the computer's CD-ROM drive or DVD drive. If after you insert the CD you get a message box called "Audio CD" and asks if you want to "Play Audio CD...", just hit the Cancel button to close the message box.

### 3. Set the File Preferences for Windows Media Player

Go to Windows Media Player's Tools Menu and select "Options..." This will launch the Options dialog. Click on the "Copy Music" tab. From the "Copy to music location" box, write down the setting for its path (example: C:\WinMediaMusic). This will be the folder where the copied music files will be placed. Then go to the "Copy settings" box, and in the "File format" drop-down box select "MPEG Layer-3" (i.e. MP3 format). Do NOT select "Windows Media Audio", because PitchScope can NOT convert from that file format. *If you can* make a "Best Quality" setting on the slider control choose it, but at present Windows Media Player does not allow a "Best Quality" setting on the slider for "MPEG Layer-3". Later versions of Media Player (in Vista) will let you extract directly to the Wave (.wav) format. If this is possible, select a Wave format for an *uncompressed stereo .WAV file at 44100 Hz with 16 bit samples*. Hit the "OK" button to save your settings and close the Options dialog box.

### 4. Execute the Copy Command

Go to Windows Media Player's "File" Menu and first select "Copy", and then select "Copy From Audio CD" from the sub-menu. A dark screen will come up and list all the Tracks (songs) on the Audio CD. Uncheck all the Tracks that you do NOT want to copy to your hard drive, so that only the ones that you want have a checkmark next to them.

Next you will want to rename the 'Titles' of each track. To change a Track's Title, first mouse-click in the row to select that song and row. After the row is selected, click once in the row's Title field (example: "Track 01"). When you see a white rectangle in the Title field, then type in a unique name for the song (example: psSong1). Repeat this for each track that you have a checkmarked.

After you have given all the tracks that you want to extract a unique file name, look in the upper right of the screen for a button that says "Copy Music". Mouse-click that "Copy Music" button. If you get a dialog that asks if you want to *change* your *target file type* from MPEG Layer-3(MP3), select "No" and to keep the MP3 setting that you just made in Step 3 (however if you can extract in a WAV format, use that). And if you get another dialog box that asks if you want 'copy protection', select for "NO Copy Protection". While the Media Player is copying the music, you will see its progress being written in the "Copy Status" field for each Track as it does its job.

When each of the checkmarked rows shows "Copied To Library" in the *Copy Status* field, you are done copying songs. But before you exit Windows Media Player, look into the drop-down text box at the upper right hand corner of the screen. Write down the Folder Name that it displays (example: "Unknown Album 2/16/07"). Your newly created MP3 music files will be located in that folder, which is itself located in the "Copy to music location" folder that you just wrote down in Step 3. Also write down the new names that you gave the songs (ex: psSong1).

## 5. Find and Copy the new Music Files

Double mouse-click on the "My Computer" icon on your desktop, or select "Computer" upon the menu from the *Start Button*. This launches a window from which you can navigate upon your hard drive. In the *My Computer* window, mouse click on the "Folders" button, and then double-click on "Local Disc(C:)" in the file tree. This shows the folders on your hard drive in a 'tree hierarchy', and should make it easy to create new folders and to navigate to files. If you have any trouble using this window to navigate to your files, remember that you can always go to Microsoft's "Help" menu for more information.

Now create a *new folder* for a PitchScope Project, and name it "psFolder1". To create a new folder from this window, go to the "File" Menu and select "New", and then "Folder" from the sub-menu. Where you see the highlighted text saying "New Folder", type in "psFolder1".

Next navigate down the path that you wrote down in Step 3 (might be C:\WinMediaMusic), and then navigate to the sub-folder that you wrote down in Step 4 (example: "Unknown Album 2/16/07"). You might have to first open the "Unknown Artist" folder before you can find this sub-folder. Then, within that folder, you should see the song file that you just extracted (example: "01 psSong1.mp3"). Notice that Windows Media Player will prepend the CD's *track number* to your new song's *name* (example: Track 1 will prepend "01", Track 2 will prepend "02", etc).

Remember that if you have trouble finding your .MP3 song in the file tree window, you could also use the Window's "Search" function to find the file. To use Window's Search Function, mouse-click on the "Start" button at the bottom left of the screen and select "For Files or Folders..." Then in the "Search Results" window, click "All files and Folders" on the left, and then write the name of your song file in the "All or part of the file name" text input box (ex: "psSong1"). Then hit the "Search" button, and wait for the results. After you have found your newly extracted .MP3 song file, copy it to your newly created folder named "psFolder1".

## 6. Create a New Project and Do A File Conversion

Now we will create a new PitchScope transcription Project, and also demonstrate how PitchScope can convert psSong1.mp3 into a .WAV file that we can use for note detection. First launch PitchScope (see Tutorial A).

From PitchScope's File Menu, select "New Project". Upon the "Create New Project" dialog box, mouse-click on the upper *Browse* button (*Pick Wave or MP3 Music File*). Then use the *Open Wave or MP3 File* dialog box to navigate to the *psFolder1* folder, select "psSong1.mp3" to the *File Name* text box, and then hit the "Open" button.

A message box will open that says: "*This file is not a stereo .WAV file at 44100 Hz with 16 bit samples. A new file will now be created to that format.*" Hit the OK button and a Progress Bar will show the ongoing status of the calculations. If the conversion goes correctly, you should see another message box that says: "*A compatible .WAV file[ psSong1.wav ] has been successfully created, and may be used for the new project.*" Hit the OK button and you will return to the partially completed "New Project" dialog box.

In the dialog's "Project's Name" text box, fill in the name for the Project file, namely "psProject1". Then mouse-click on the lower Browse button (*Pick Project File's Location*), and use the *Select Folder* file dialog box to navigate to the new folder named "psFolder1". With the name of the Project File (psProject1) in the *File Name* text box, hit the *Open* button to assign the path for the new Project File. Notice that you do not have to include the file's extension (".ppj") in the *File Name* text box. Then hit the "Create" button to create the new Project and its associated Project File (psProject1.ppj).

If you examine the contents of psFolder1, you will see that along with the Project File (psProject1.ppj) you will also see a new music file named psSong1.WAV (not to be confused with psSong1.MP3). At this point the .MP3 file is no longer needed, and you only need to include *psSong1.wav* with the *psProject1.ppj* to run the Project. Do NOT edit or change the name of the .WAV file, and NEVER re-name a Project File (psProject1.ppj).

## 7. File Conversion Through the "Load Wave/MP3" Menu Command

Suppose you wanted to *just load* a music file into PitchScope so you could initially hear it, and then decide if you would like to later use it for a transcription Project. For that purpose you could use the "Load Wave/MP3" menu command on PitchScope's "File" Menu.

So, if you then executed the "Load Wave/MP3" menu command, you would see the *Open* file dialog box. You would then navigate to a new music file, say "psSong2.mp3", and select that name to the *File Name* text box. If it was a MP3 file, or a Wave(.wav) file other than at stereo 44.1 kHz with 16 bit samples, after hitting the *Open* button you would again see the same message box of Step 6 that says: "*This file is not a stereo .WAV file at 44100 Hz with 16 bit samples. A new file will now be created to that format.*"

After hitting the "OK" button, a new Wave file named "psSong2.wav" will be created in the same folder with psSong2.mp3, and then loaded into PitchScope. Later, if you decide that you would like to make a transcription Project for that song, make sure that you use the file named *psSong2.WAV* (NOT *psSong2.MP3*) in the *Create New Project* dialog box.

## **Tutorial C: Editing Some Notes**

While PitchScope can make accurate note detections under many circumstances, PitchScope's note detector is not absolute and occasionally makes minor errors, and might miscalculate some notes. Since the detector is not entirely accurate, PitchScope also comes with a Graphic Editor that allows the user to correct the initial notelists that the pitch detector creates. You will want to do ALL of your note edits on the Note Detector Window where a note's *shade of gray* can give you an idea of the *certainty* for the detection *accuracy* for that note. Dark gray notes suggest that the note detection *might NOT* have much certainty, and very light gray notes suggest that a note is likely to be an accurate detection. To better view the *detection values* for an individual note, mouse double-click upon a note, and the *Note Properties* dialogbox will appear. It will contain the note's detection score, and the scores for the four different octave candidates. Also, when you get a chance, read the *Cleaning Up Notelists* section of this document.

This tutorial will introduce you to some of the edit tools and techniques that you can use to clean up some of your initial note detection scans from a Detection Zone. When a note edit is performed with a note's Handles, sometimes all of the windows are NOT automatically redrawn. If you have edited a note, in say the Note Detector Window, and would like to see its new representation in the Pitch Viewer Window, you will have to *activate* the Pitch Viewer Window by clicking inside the window with the mouse. Once the new window is *activated*, it will redraw itself and show any recent note editing changes.

### **1. Create a New Project and Notelist**

For this tutorial you will need a test Project (created from a Wave file) and a Notelist that has been detected from one of its Detection Zones. If you can not remember how to create a Project, a Detection Zone, or a Notelist, go to *Tutorial A* and do this now. After you have created a Notelist, activate or launch a Note Detector Window. You will need to work on a Note Detector Window for the rest of this tutorial.

### **2. Using Sound Tests to Find A Bad Note**

Erroneous notes (noise-notes) can occur for a number of reasons. Note detection with a low value on the *Weak-Note Cutoff Slider* can create many noise-notes, and a very high setting on the *Detection Detail Slider* can cause the note detector to create some noise-notes, but to a lesser degree than the *Weak-Note Cutoff Slider*. Noise-notes are typically dark gray in color upon the Note Detector window, and sometimes might come from other musical instruments than the solo instrument. To clean up some of the noise-notes, you will want to listen to the dark gray notes with the Play Note Tool (*Tutorial A*, Step 9) and determine which notes are complete errors, or have problems that can be fixed.

You can also listen to an isolated note with the *Play Current Note Button* on the Toolbox (see *Step-Play Note Buttons* in the Glossary of Terms). To use the *Play Current Note Button*, first select the note with the Selection Tool to establish it as the 'current note'. Then, when you hit the *Play Current Note Button*, the note will play two different tones: 1st) the Wave Recording's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. If the two tones sound 'similar', then you have a valid note. But if the two tones sound very different and the note is dark gray on the Note Detector Window, then you might have a noise-note which is really not part of the solo. Also see *Play Next Note Button* and *Play Current Note Button* in the Glossary of Terms, and take some time to familiarize yourself with the three *Step-Play Note Buttons* (see *Tutorial A*, Step 10).

### **3. Deleting An Irrelevant Note**

Use the *Play Next Note Button* and *Play Current Note Button* to find a noise-note in your Notelist. To delete the note you must first select the note with the Selection Tool, and then execute the "Cut" command on the Edit Menu. If you change your mind and want the note back in the Notelist, execute the "Undo" command on the Edit Menu. Executing the "Delete" command from the Edit will remove the note but not allow the Undo menu command to later restore it.

Now select and *Cut* a note. Then try the *Undo* command, and observe how the note comes back. You can also use the keyboard to cut notes by pressing the *Delete* key. Now finally remove the noise-note and look for another. Practice using both the *Play Note Tool* and the *Play Current Note Button* upon the Toolbox to find bad notes. Which is easier for you? Judging a bad note is a little more of an art than a science. If you have trouble at first do not get discouraged -- with time and a little practice you will get much better at picking out a noise-note.

### **4. Correcting A Note's Octave**

As previously mentioned, while the note detector can at times be very accurate, it can occasionally make some errors. The most common error that the note detector might make is picking the *wrong octave* while getting the correct ScalePitch (E, F, F#, G, G#, A, A#, B, C, C#, D, D#) for the note. For this reason, PitchScope makes it very easy to correct a note's octave value while keeping the original ScalePitch value.

Activate the Note Detector Window by mouse-clicking inside it. If you do not see a Note Detector Window on the display, you can launch one by going to the View Menu and selecting "Note Detector". Now go to the Tools menu and pick the Selection Tool. Now mouse-click on a note and notice its Handles (small squares). The Handle in the middle of the note is used to change the note's octave. Mouse-dragging on the Octave Handle in an upward or downward direction to change the octave of the note.

To help you resolve a possibly bad octave assignment, PitchScope gives you numerous tools: various audio tools to help you hear if the octave is bad, and a *Note Properties dialog box* that is launched when you double-click with the mouse upon a note. The dialog box contains the scores of the four possible octave candidates for that particular ScalePitch value. Each of the four octave

candidates' *Primary Scores* tell you how well they scored with the octave detector. Usually the correct octave has the highest Primary Score. However, if some of the Primary Scores are close (and show a low percentage for *Best Primary Score Certainty*), then the octave detector may have made a mistake in choosing the correct octave. In considering whether or not to change an octave value, you can also look at the octave candidates' *Closeness Scores*. Typically neighboring notes tend to cluster together in pitch, and do not jump wildly from octave to octave. If the two highest Primary Scores are close in value and the note does not sound right, then you might want to try the octave candidate with the highest Closeness Score.

To hear the note play in its new octave followed by the Wave Recording for the note's duration, mouse-click on the *Play Current Note Button* upon the Toolbox. The three Step-Play Note Buttons are horizontally grouped and are in the middle of the Toolbox. The *Play Current Note Button* is the center button in the group of three. Now mouse-click on the Play Current Note Button and *compare* the note's sound in its new octave to the Wave Recording's tone. By testing and listening to the four octave possibilities with the Play Current Note Button, you can correct a bad octave assignment.

Much of the time it is easier to tell if a note has the correct octave by listening to the note play along with some of its surrounding neighbor notes. A useful method to focus on a note that needs an octave correction, is to use the Toolbox's *Loop Play Button*, which is labeled with the text "LP" (Loop Play). To use the Loop Play button, first create a Time-Zone Selection Box around the group of notes you are examining. Then press the Loop Play Button, and the same group of notes will play over and over again, until you press the Pause Button on the Toolbox. While the music is playing you can even mouse-drag on the Octave Handles to hear what a note sounds like in a different octave. And while the music is playing you can also move the Midi/Wave Balance Slider left and right, while in the Midi and WAV audition mode, to hear the same group of notes with or without the WAV or Midi-note sounds.

Though a bad octave assignment is rare, it is *much more unlikely* that a bad ScalePitch assignment would occur by the note detector. Take a few minutes to select notes, make adjustments with the Note's Octave Handle and listen to your changes. Can you tell when the note is in its correct octave? Also try setting the Audition Mode to *Just Midi* and see if that makes it easier to spot a note that has a bad octave assignment. Correcting octaves can sometimes be a little difficult at first, but with some practice it will become much easier with time.

## 5. Correcting A Note's Duration

Sometimes the detector will assign the correct pitch for a note, but its length in time (duration) is slightly incorrect. To correct the duration of a note, first open the Note Detector Window by going to the View Menu and selecting "Note Detector". Scroll the window to the left or right till the note is in view. Select the note with the Selection Tool. You should then see three Handles (small squares) on the note. If you only see one Handle in the middle, it means that the Note Detector Window must be horizontally zoomed-up (magnified) so the note has enough horizontal length in order to have room to draw three Handles. To zoom-up the window in the horizontal direction, go to the Toolbox and mouse-click on the Horizontal Zoom-Up Button, which is the button with a *large* magnifying glass located at the farthest left of the ToolBox. After zooming-up the window, re-select the note to see if the three Handles now have enough room to be drawn. If you still can not see three Handles, repeat zooming-up and re-selecting until the three handles have enough room to be drawn.

Now that the note displays its three Handles, mouse-drag on the right handle to stretch the notes duration (i.e. make the note play for a longer time). If you want the note to start playing a little earlier or later, mouse-drag on the *left* Handle. To hear what the note sounds like with its neighboring notes, you could hit the *Play Window Button* on the Toolbox. Take a few minutes to select notes and make adjustments with the Note's Start Handle and Note's End Handle.

## 6. Merging Two Notes of Same Pitch

If you have two neighboring notes of the same pitch and octave that you want to merge into one note, you can delete the *second* note and then mouse-drag the first note's *right* Handle to the point where the *second* note had previously ended. See if you can find two notes of the same *Fundamental Pitch* (same pitch and octave), and then merge them in to one note.

# **Tutorial D: Previewing a Note Detection**

You can detect notes on either the *Note Detector Window* or the *Pitch Viewer Window*. However, the Note Detector Window is preferred because the user can get better visual feedback when testing different control settings along with the Detect button of the *Detect Notes* dialog box. By repetitively hitting the Detect button, the user can visually see the effects of different slider control settings, and then fine tune the dialog's controls for the best final note detection. This tutorial will elaborate on *Step 6 of Tutorial A (Doing A Simple Note Detection)*, and show you how to use the controls on the Detect Notes dialog box to get better note detections.

## 1. Create a New Project

For this tutorial you will need to create a test Project (created from a Wave file) for a musical instrument solo. If you can not remember how to create a Project or a Detection Zone, go to *Tutorial A* and do this now.

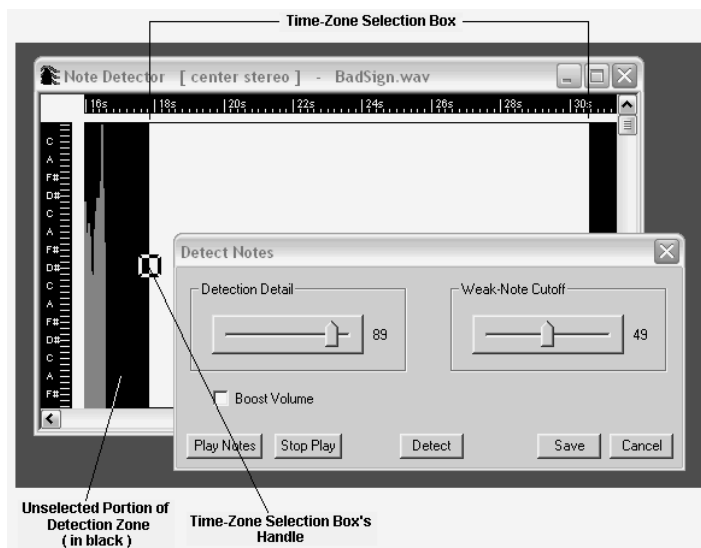
## 2. Setting Up the Two Windows for Preview Mode

Now open up a *Note Detector Window*. Leave the horizontal magnification (zoom) alone so that you can later see the detail of the individual notes. From the Edit Menu choose the *Select Entire Detection Zone* command so that the entire detection zone is selected, even though it may not be fully in view. You will then see a Time-Zone Selection Box as an image in reversed gray colors.

## 3. Make Multiple Previews of Note Detection Scans

We will now proceed to do a note detection with the Note Detector Window. If you have forgotten how to detect notes, take a moment to review Step 6 of *Tutorial A*. Now, with the Time-Zone Selection Box visible from Step 2, go to the Detection Menu and select "Detect Notes". This will launch the *Detect Notes* dialog box.

For this tutorial we will be experimenting with the *Detection Detail Slider* and the *Weak-Note Cutoff Slider* after multiple presses of the *Detect* button. When using the Detect Notes dialog box, the user can repetitively hit the Detect button while testing different settings on the two slider controls. Once the Detect Notes dialog box is launched, PitchScope *remembers* the Time-Zone Selection after successive Detect button presses -- the user does *not* have to again use the mouse or menu to later make additional Time-Zone Selection Boxes. Each time that you hit the Detect button, the existing notes in the time selection area are deleted, and *replaced* by a new set of notes that are determined by the new settings on the two slider controls.



Sliding the *Detection Detail Slider* control to a maximum value will cause the note detector to respond to the faintest of pitches, so much so that a very high setting will pick up *noise-notes* (i.e. irrelevant notes) from other instruments. And when the slider is set to a low value, some relevant notes might be missed, but the amount of noise-notes is at a minimum.

Sliding the *Weak-Note Cutoff Slider* control to a high value will eliminate notes with a *low detection score* (as shown by their *dark gray* color). The Weak-Note Cutoff Slider control is useful in preventing too many incorrect noise-notes to be created during a detection scan. A high setting will eliminate too many valid notes, and a low setting will not eliminate enough weak erroneous notes. Users will want to find the best setting that allows valid subtle notes to be detected, and yet has a minimum amount of noise-notes.

First write down the initial values for both the Detection Detail and the Weak-Note Cutoff sliders. They should be "89" for the Detection Detail slider, and "49" for the Weak-Note Cutoff slider. Now hit the Detect button for the first time. If all the notes are a faint dark gray color, you may want to check the *Boost Volume* checkbox and again hit the Detect button. If you want to hear what the notes sound like between different presses of the Detect button, just press the *Play Notes* button, and then stop the note play with the *Stop Play* button.

Now examine the gray notes in the Note Detector Window. Do you see a lot of noise-notes -- lots of little dark notes that do not seem to be part of the melody? If so, then you might want to increase the Weak-Note Cutoff slider to get rid of some of the noise-notes. And if you do NOT see enough relevant and complete notes from the detection scan, you may need to increase the setting on the Detection Detail slider. Remember that, though you may have to do some manual cleanup (deleting noise-notes), it is much better to have too many noise-notes, than to miss some relevant notes. If you miss notes, you will have to later manually add them with Create Note Tool, which can be very *much slower* than deleting noise-notes (see *Tutorial E: Using the Create Note Tool*). **It is recommended that you first adjust the Detection Detail Slider with some previews from the Detect button, and then later fine tune your detection scan with the Weak-Note Cutoff Slider.** Hit the Detect button a second first time after adjusting the slider controls. Does the new detection scan look better or worse? Keep hitting the Detect button while experimenting with the slider control settings till you are satisfied. Then hit the "Save" button to save your new notes to the Notelist while closing the Detect Notes dialog box .

#### 4. Evaluating the Note Detection Scan

Now zoom-up (*Horizontal Zoom-Up Button*) and scroll the window to get a better look at the new notes. You might also want to open a *Pitch Viewer Window* to get a look at the notes' *pitch properties* in that graphic format. Notice how the Pitch Viewer Window displays the pitch activity inside the notes with clusters of light-gray pixels.

Now play the new notes with the different *Audition Modes*. Did you get all the notes you need, or miss some important notes? If you are not happy with the detection scan, use either the mouse or the menu's *Select Entire Detection Zone* command to create a new Time-Zone Selection Box, and again hit the Detect Notes menu command. You can then try again with the Detect Notes dialog box to get a better detection scan.

When you eventually get a set of notes that you like, hit the Save button and then proceed to 'cleanup' the note scan as described *Tutorial C: Editing Some Notes*. As said earlier, doing note detection is still more of an art than a science. If at first you have some difficulty, do not get discouraged. After practicing on different musical instrument solos, you will eventually find it much easier to perform note detection and manual cleanup. When you are done with your note scan, **always** make sure to **close the Detect Notes dialog box** with either the Save or Cancel button.

## **Tutorial E: Using the Create Note Tool**

The third mouse tool is the Create Note Tool. You can use the Create Note Tool when the note detector has occasionally failed to *find* a note that you can hear in the Wave Recording. By using the Create Note Tool you can *manually* add new notes to a set of notes that were previously created from the "Detect Notes" menu command. Also see *Create Note Tool* in the *Menu Commands* section of this document.

### **1. Create a New Project and Notelist**

For this tutorial you will need to create a test Project and a Notelist that has been detected from a Detection Zone. If you can not remember how to create a Project, Detection Zone, or Notelist, go to *Tutorial A* and do this now.

### **2. Create A New Note**

Go to the Tools menu and select "Create Note". Notice how the mouse's cursor changes shape to that of an i-beam (the same icon as on the Toolbox's far left button which also selects the Create Note Tool). Activate the Pitch Viewer Window by mouse clicking inside the window. Now scroll to an area where you think that you missed a note that you can still hear. In that time interval, look for the *strongest cluster* of light-gray and white pixels in one of the 12 horizontal ScalePitch Channels. Mouse-click on that cluster of light-gray pixels with the Create Note Tool. If you picked correctly and there is *some* pitch activity in that spot, a new note will be created and drawn with a blue rectangle.

### **3. Listen to the New Note**

Now go back and choose the SelectionTool. Click on the new note with the Selection Tool to establish it as the *current note*. Then mouse-click on the Toolbox's *Play Current Note Button*, and you will hear two tones: 1st) the Wave Recording's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. If and when the two tones sound the most alike, you have correctly adjusted the note's values (Duration, ScalePitch, Octave).

### **4. Adjusting the New Note**

A note has three properties that you can adjust in PitchScope:

- 1) *Duration* (the beginning and end of the note in time)
- 2) *Octave* (in PitchScope a note can have one of 4 octaves)
- 3) *ScalePitch* (E,F,F#,G,G#,A,A#,B,C,C#,D,D# ...the 12 horizontal channels on the Pitch Viewer Window)

In order for your new note to be correct, you must properly adjust each of these values. First try to determine if the *ScalePitch* value is correct when you play the note with either the *Play Current Note Button* or the *Play Note Tool*. If the note sounds very wrong, you may have picked the wrong *ScalePitch Channel*. In that case you would have to delete the note and create another note in one of the other *ScalePitch Channels*, until you choose the correct channel.

When you are satisfied with the *ScalePitch* setting, then it is time to set the note's *Octave* setting. Open up a Note Detector Window and scroll to find your new note. You may need to look at the values in the Wave's Time Ruler in order to locate the note in the Note Detector Window. Select the note and notice that its *Octave Handle* is in the middle. By mouse-dragging the *Octave Handle* in a vertical direction, you can choose the correct octave. PitchScope has 4 different octaves that you can choose from. Remember to evaluate the different possible octaves by playing the new note with either the *Play Current Note Button*, the *Play Note Tool*, or *Play Window Button* (all on Toolbox). Also see *Tutorial C, Editing Some Notes, Step 4* for a more thorough discussion on adjusting Octaves.

And finally, you can adjust the note's *Duration* (when the note starts playing, when it stops playing) by horizontally mouse-dragging the two outer Handles of the selected note. Again you need to listen to your changes in one of the various ways to make sure of your choice. If you can not properly adjust your note, you may have to delete the new Note and start all over again.

### **5. Concurrency Issues**

As stated earlier, PitchScope can only play one note at a time. For that reason, NEVER create a new note so that its *time interval* overlaps the time interval of another note. You must adjust the different notes' durations so that they NEVER overlap or coincide in time.

### **6. And Lastly**

The Create Note Tool is perhaps the most difficult part of the PitchScope interface. If you find yourself constantly going to the Create Note Tool to add missing notes, consider trying to use *higher* settings on the *Detection Detail* slider control, and *lower* settings on the *Weak-Note Cutoff* slider of the Detect Notes dialog box (see *Tutorial D, Step 3*). With a *higher* setting on the *Detection Detail* slider, and perhaps a *lower* setting on the *Weak-Note Cutoff Slider*, you will probably detect the missing notes with the note detector, and not have to manually add them with the Create Note Tool. With these settings you may get more noise-notes, but it is much *easier* to *delete* noise-notes than it is to *create* new notes with the Create Note Tool.

# Menu Commands

Before you go ahead and read the features of the menus, and commands of PitchScope, it might be best to step through this document's various *Tutorials* in order to get a basic feel for the application. Technical terms particular to PitchScope are placed with *first letters in capitals* (example: **Detection Zone**), and can be looked up in the *Glossary Of Terms* section at the end of this document.

## Main-Window Menus

### **File Menu:**

**New Project** - Choose this to start a new musical Transcription Project from a Wave(.wav) or MP3 song file. Fill out the three fields on the "Create New Project" dialog box and hit the Create button. Ideally the digital song file that you will choose will be in an *uncompressed Stereo Wave at 44.1 kHz with 16 bit samples* format. But if you can not find your song in that format, PitchScope also has a built-in *MP3 File converter* and a *Wave File(.wav) converter* that can convert other formats to an uncompressed Stereo Wave(.wav) at 44.1 kHz format. When you attempt to load a MP3 file, or a Wave file of a different format, PitchScope will automatically ask you if you want the conversion to create a second file in uncompressed Stereo Wave(.wav) at 44.1 kHz format. Select "Yes", and the converter should, in most cases, be able to create the *second* song file in uncompressed Stereo Wave at 44.1 kHz format. If it fails to do the conversion (very rare), you could find or buy a digital music file Conversion Utility to make the conversion to an uncompressed Stereo Wave(.wav) at 44.1 kHz with 16 bit samples format. If a file conversion has been performed, only the *converted version* of the file is then needed. Read Tutorial A: *Doing a Simple Note Detection*. Also read *Basic Topics* (section *Working With Sound Files*), and Tutorial B: *Extract a Song from an Audio CD, and Convert a MP3 File to Wave Format*.

**New Notelist** - Choose this if you want to create *another* new Notelist from a Project. The existing Notelist will be deleted from memory and a new Notelist will be created that has no notes. You can then use the pitch detector to detect some notes from one of the *current* Project's Detection Zones. See Tutorial A, steps 5 and 6 from this document.

**Load Project** - Choose this to load a pre-existing *Project File* and its Wave File(.wav) into PitchScope. You could then create a new Notelist, or load an existing Notelist that was originally created from that Project File.

**Load Notelist** - Choose this to load a pre-existing Notelist File into PitchScope. When this command is executed, PitchScope will attempt to find the Project File that was used to create this Notelist File -- if it finds the Project File, it will ask you if you want to *also* load the Project File. Most times you will want the Notelist's Project File to be loaded, so that you can also see the *pitch activity* upon the Pitch Viewer Window.

**Load Wave/MP3** - This will allow you to load a digital music file, in either Wave(.wav) or .MP3 format, into PitchScope without having to first create a new Project. Do this when you want to first examine a music file to make sure it will be acceptable for PitchScope to work with. Technically, an uncompressed Stereo Wave(.wav) file at 44.1 kHz with 16 bit samples is the only format that PitchScope can work with. When you extract Wave Files from Audio CDs, or otherwise acquire music files, always try to save them in *uncompressed Stereo Wave(.wav) file at 44.1 kHz with 16 bit samples* format. However if you can not do this, PitchScope also has a built-in *MP3 File converter* and a *Wave File converter* that can convert other formats to the desired uncompressed Stereo Wave(.wav) at 44.1 kHz format. When you attempt to load a MP3 file, or a Wave(.wav) file of a different format, the converter will automatically ask you if you want the file converter to create a second file in uncompressed Stereo Wave(.wav) at 44.1 kHz format. Select "Yes", and the converter should in most cases, be able to create the *second* music file in stereo Wave(.wav) at 44.1 kHz format. If a file conversion has been performed, only the later *converted version* of the file is needed to later create a new Project. Also read in document *Basic Topics* (section *Working With Sound Files*), and Tutorial B: *Extract a Song from an Audio CD, and Convert a MP3 File to Wave Format*.

**Save Project** - Choose this to save *any modifications* that you may have made to the current Project, to its Project File. Typical modifications might be the addition, deletion, or modification of Detection Zones, or any changes made through the Project Options menu command.

**Save Notelist** - Choose this to save your *currently loaded* Notelist to the last Notelist File that was loaded. If you made any edits to the Notelist, you will probably want to save your changes with this command.

**Save Notelist As** - Choose this to save your Notelist to a new Notelist File on your hard drive. If you want to save your changes to a second, new Notelist, just type in a new filename for the new notelist in the "Save As" dialog's file name-field.

**Project Options** - This will launch the "Project Options" dialog box. The dialog box will show which *Stereo-Mix Channel* you have decided to detect from, and the file paths of the Project File and its source Wave(.wav) file.

**Print** - Choose this to print out the notes in the Notelist to your printer. The graphic format that displays the notes is similar to what you see in the Note Detector window. After selecting this menu command you will see a dialog box that will ask if you would like to print *only* the notes in the currently visible Detection Zone, or print *all* the notes in the Notelist. Only the notes in the visible Stereo-Mix Channel will be printed.

**Exit** - This will shut down PitchScope. Make sure to first save any changes to either the currently loaded Project File and/or Notelist File.

## **Edit Menu:**

**Undo** - Select this after you have made an edit to the currently loaded Notelist. Typical Notelist edits might be the Copy, Cut, or Paste of notes, changes to a note's octave, or changes to a note's duration (length in time). This command does NOT work with the Delete menu command.

**Cut** - After first selecting a note or notes with the Selection Tool, use this command to remove the note or notes from the Notelist. You can also use the keyboard to cut notes by pressing the *Delete* button. The notes will then be copied to PitchScope's Clipboard.

**Copy** - Use this command to copy a Note or notes to PitchScope's clipboard.

**Paste** - Use this command to paste a Note or notes from PitchScope's clipboard to the currently loaded Notelist.

**Delete** - After first selecting a Note or notes with the Selection Tool, use this command to delete the note or notes from the Notelist. The Undo menu command will NOT work with this command. If you anticipate the need for an Undo, use the Cut command instead.

**Select Entire Detection Zone** - Use this command before you detect notes for an entire Detection Zone. This is an easier way to select a Detection Zone than creating a Time-Zone Selection Box with handles, and can allow selection when not all of the Detection Zone can fit in the window.

**Select All Notes In DZone** - This command will select all the notes in the Detection Zone that is *currently visible* in the window. If more than one Detection Zone is visible in the window, you must horizontally scroll and/or Zoom-Up the window so that a portion of *only one* Detection Zone is visible. It is acceptable if *only part* of the Detection Zone is visible in the window.

## **View Menu:**

**Display Center** - Choose this when you want PitchScope to display notes and Detection Zones from the *combined* sound of *both* left and right stereo channels of the original Wave Recording. At any time you can choose one of three Stereo-Mix Channels (center, left, right) to work with. Suppose you were to create a Detection Zone and Notelist in the left channel, and you then used this menu command to switch to the center channel -- you would then NOT be able to see or hear the notes that you created in the left channel. Only the notes and Detection Zones that you created in the *center* channel would be visible with this menu command checkmarked. However, a Notelist and Notelist File may contain notes from all three channels if you wish. For most digital song files this Display Center setting will give the best results, as most instrumental solos are typically mixed with equal volume into both left and right stereo channels. Also see Glossary of Terms section for *Stereo-Mix Channel*.

**Display Left Stereo** - Choose this when you want PitchScope to display notes and Detection Zones from only the *left* stereo channel of the original Wave recording. This would be appropriate if the instrumental solo was mixed so that the instrument's volume was mostly in the left channel, with little volume in the right channel. Also see Glossary of Terms section for *Stereo-Mix Channel*.

**Display Right Stereo** - Choose this when you want PitchScope to display notes and Detection Zones from only the *right* stereo channel of the original Wave recording. This would be appropriate if the instrumental solo was mixed so that the instrument's volume was mostly in the right channel, with little volume in the left channel. Also see Glossary of Terms section for *Stereo-Mix Channel*.

**Note Detector** - This launches the Note Detector Window. Go to the *Window Diagrams* section of this document to see a picture of this window. This window is primarily used to view and play the loaded Wave File, and to create Detection Zones of the instrumental solo portion of the Wave recording. In the Note Detector Window, unlike the Pitch Viewer Window, notes are displayed *with their octave values* and appear as they would in a Piano Roll Format. The higher pitched notes are at the top, and the lower ones are at the bottom. It is here that you will make edits to notes that may need some minor corrections. Unlike the Pitch Viewer Window, when a note is selected here with the Selection Tool, it has *three* handles (small squares) on its beginning, end, and in the center. As with the Pitch Viewer Window, the left and right handles can be horizontally dragged to change where a note starts or ends. But the center handle, when mouse-dragged vertically will change the note's Octave. And as the Pitch Viewer Window, right mouse-clicking on this window will launch Popup Menu from which you can select "Toggle Note Text" to either show or hide each note's letter name. To learn more about pitch detection on the Note Detector Window, step through Tutorial A: *Doing a Simple Note Detection*, and to learn more about editing notes on the Note Detector, step through Tutorial C: *Editing Some Notes*.

**Pitch Viewer** - This launches the Pitch Viewer Window. Go to the *Window Diagrams* section of this document to see a picture of this window. The Pitch Viewer Window shows *pitch activity* in the 12 horizontal ScalePitch Channels corresponding to the 12 ScalePitches of the musical scale (E,F,F#,G,G#,A,A#,B,C,C#,D,D#). Here the notes are displayed *without* their octave information. The white and light gray *clusters of pixels* indicate a possible note in a given ScalePitch Channel. Right mouse-clicking on this window will launch a popup menu from which you can select "Toggle Note Text" to either show or hide each note's letter name. When a note is selected with the Selection Tool, it shows two Handles (small squares) on its beginning and end. Mouse-dragging horizontally on a Handle can change where a note starts and/or ends.

**Revolver Animation** - This launches the Revolver Animation Window. This animation window do not allow editing, but attempts to better display the current playing note by *only rendering* that current note while it plays. It is called the 'Revolver' because the 12 ScalePitch values are displayed in a circular format.

**Mountain Animation** - This launches the Mountain Animation Window. Like the Revolver Window, this animation window does not allow editing, but attempts to better display the current playing note with an animated graph of moving 'mountains' that are rotated sideways.

**Close All** - This will close all of PitchScope's windows except for the Toolbox.

## Tools Menu:

**Select (tool)** - This will change the current mouse tool to the Selection Tool, and then the mouse's cursor will take on the shape of an arrow. To see a summary of the Selection Tool's uses, read the Selection Tool's definition in the *Window Diagrams* section, *Toolbox Window* sub-section. And to learn more about the *uses* of the Selection Tool, step through Tutorial A: *Doing a Simple Note Detection*, and Tutorial C: *Editing Some Notes*.

**Play Note (tool)** - Select this and the current mouse tool will change to the Play Note Tool. This will change the mouse's cursor to the shape of an oval with two cross hairs. To see a summary of the Play Note Tool's uses, read the Play Note Tool's definition in the *Window Diagrams* section, *Toolbox Window* sub-section. And to get some experience using the Play Note Tool, step Tutorial A: *Doing a Simple Note Detection*, Step 9.

**Create Note (tool)** - Select this and the current mouse tool will change to the Create Note Tool, and the mouse's cursor will change to the shape of an i-beam. Use the Create Note Tool to *manually* create a note that the note detector might have missed. To see a summary of the Create Note Tool's uses, read the Create Note Tool's definition in the *Window Diagrams* section, *Toolbox Window* sub-section. And to get some experience using the Create Note Tool, step through Tutorial E: *Using the Create Note Tool*.

**Options** - This launches the Application *Options* dialog box. Upon the Midi Playback groupbox you can change the current Midi *musical instrument* that you hear playing the notes in the notelist. Picking a different Midi instrument will change the sound of the SW Synthesizer's play of the Notelist to perhaps that of a clarinet, a saxophone, Hammond organ, or various other musical instruments. Many times a Midi instrument is referred to as a *Midi Instrument Patch Number*. To change the current Midi instrument, just input a new patch number between 0 and 95 into the textbox, or scroll to a new number with the arrow controls. Also see *Midi*, *SW Synthesizer*, and *Midi Instrument Patch Number* in this document's Glossary of Terms.

When simultaneously listening to the Notelist and the WAV recording (from the *Midi and WAV* audition mode), it is necessary to have the two musical sources be *synchronized* in time. Because different microprocessors and sound hardware sometimes execute midi play commands with different response times, PitchScope must sometimes have its *Timing-Advance Factor* altered to fine tune the synchronization of play. If the play of the midi notes sounds a little out of beat with the play of the source WAV file, you can then you can correct the problem by adjusting the Timing-Advance Factor upon the *Options* dialog. When changing the Timing-Advance Factor with the arrow controls, notice how the Possible Processor Speed values change for the different Timing-Advance values. Keep in mind that the Possible Processor Speed values for speed and operating system are only rough approximations -- you will have to ultimately *test* the synchronization by listening to each of the different settings. It may be that you ultimately need a setting that is different than your actual processor speed and/or operating system.

Here is how to set the Timing-Advance Factor: first use the arrow controls to scroll through the different values, and stop at the number whose Possible Processor Speed best describes your computer. Now, with the audition mode set to *Midi and WAV*, load and listen to a Notelist that you have detected from a WAV. Try to notice if the Notelist sound a little out of beat with the WAV recording. Now change the Timing-Advance Factor to a number that is *one higher* that the current setting. Again listen to the Notelist and WAV play. Does it sound more or less in sync? Now try a Timing-Advance Factor that is *one less than your first value*, and listen to the Notelist again. Does this sound better? By testing different values for the Timing-Advance you will eventually zero in on the correct setting.

*Note:* PitchScope can not remember between sessions what values you entered for the Timing-Advance Factor or the Midi Instrument Patch Number. If the Timing-Advance Factor for your computer is different than the *default* setting, you will have to manually enter it at the start of each session. However, the *Timing-Advance Factor* and *Midi Instrument Patch Number* are automatically saved to both Notelist files and the Project files, so that any time that you load a Notelist or Project file, your custom settings will also be loaded and set.

## Audition Menu:

**Midi and Wave** - This is the first of three *ways to listen* (i.e. Audition Modes) to the Wave Recording and/or the Notelist. After choosing this command, the Midi and Wave mode will simultaneously play both the Notelist (by internal Midi device) along with the source Wave Recording (.wav). When in the Midi and Wave mode, you will want to be able to *equally hear* both the Midi play of the Notelist *and* the original Wave recording. To do this you can use the horizontal Midi/Wave Balance Slider control on the ToolBox

to increase or decrease the dominance of the Wave Recording *relative to* the volume of the Notelist. Moving the slider to the right will reduce the volume of the Wave, so that the Midi play of the Notelist will appear louder by comparison. Also see *Midi/Wave Balance Slider*, *Audition Mode*, *SW Synthesizer*, and *Notelist* in this document's Glossary of Terms.

**Just Midi** - This is the second of three ways to listen to the Wave Recording and/or the Notelist. The Just Midi mode will only let you hear the playing notes from the Notelist through the midi SoftWare Synthesizer. Also see *SW Synthesizer*, *Midi*, and *Audition Mode* in this document's Glossary of Terms.

**Just Wave** - This is the third of three ways to listen to the Wave Recording and/or the Notelist. The Just Wave mode will only let you hear the source Wave Recording(.wav) of the song. The three Audition Modes are useful when correcting the occasionally errors from that occur from the note detector. Also see *Audition Mode* and *Midi/Wave Balance Slider* in this document's Glossary of Terms.

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**Source WAV File** - Selecting this, instead of Notelist-Only Separation or Background-Only Separation, will cause the *playing* WAV file to be that of the original source WAV file that was used to detect notes. This is the default setting for any new Projects or just loaded WAV files.

**Notelist-Only Separation** - Selecting this, instead of Source WAV File or Background-Only Separation, will cause the *playing* WAV to be from a Separation WAV file that has only the *WAV's sounds* of the notes contained in the Notelist from the original source WAV file. See the *Create Notelist-Only Separation* menu command of the ReSynthesis Menu for a description of how the separation wave file is created and used.

**Background-Only Separation** - Selecting this, instead of Source WAV File or Notelist-Only Separation, will cause the *playing* WAV to be from a Separation WAV file that has all the *WAV's sounds* of original source WAV file except for the sounds of the notes contained in the Notelist. The notes are stripped away from a copy of the source WAV file in much the same way that a karaoke recording has the singer's voice erased from the original recording. See the *Create Background-Only Separation* menu command of the ReSynthesis Menu for a description of how the separation wave file is created and used.

## **Detection Menu:**

**Create DetectionZone** - This will create a new Detection Zone from which the note detector will later be able to detect notes for a Notelist. Before hitting this menu command, you must first pick the best Stereo-Mix Channel to focus your detection upon. Then the Selection Tool is used to create a Time-Zone Selection over the entire length of the instrumental solo. As pitch detection can sometimes be slow and consume much memory, NEVER make a Detection Zone for the *entire length of a song*. Only create Detection Zones where you really need them, like in musical instrument solos. Read a summary of Detection Zone creation in *Creating Detection Zones* of the *Detection Topics* section of this guide, and make sure to step through Tutorial A: *Doing a Simple Note Detection* before attempting this command.

**Detect Notes** - After a Detection Zone has been created, you can then use this command have the note detector find the notes within the instrument's solo. You may detect notes on either Note Detector Window or Pitch Viewer Window. However, the Note Detector Window is preferred because the user can preview the effects of many different settings with the Detect button from the Detect Notes dialog box, and then visually fine tune the dialog's slider controls for final detection. In order to use this menu command, you must first use Selection Tool to create a Time-Zone Selection Box over an existing Detection Zone. The Time-Zone Select Box shows the image in reversed gray colors and has two Handles with which to fine tune the borders of the Time-Zone Selection Box. With the Time-Zone Select Box displayed, hit this command and the Detect Notes dialog box will be launched.

Upon the Detect Notes dialog box, sliding the *Detection Detail Slider* control to a maximum value will cause the note detector to respond to the faintest of pitches, so much so that a very high setting will pick up 'noise-notes' (irrelevant notes) from other instruments. And when the slider is set to a very low value, some relevant notes might be missed but the amount of noise-notes is at a minimum. Users will want to find the best setting that allows subtle notes to be detected, and yet has a minimum amount of noise-notes. Irrelevant noise-notes can easily be deleted with Edit Menu commands like Cut and Delete.

Similarly, sliding the *Weak-Note Cutoff Slider* control to a high value will eliminate notes with a *low detection value* (shown by their dark gray color). The Weak-Note Cutoff Slider control is the most useful in preventing incorrect noise-notes during a detection scan. A high setting will eliminate too many valid notes, and a low setting will not eliminate enough weak erroneous notes. Users will want to find the best setting that allows valid subtle notes to be detected, and yet has a minimum amount of noise-notes. Remember that after the note detection scan you will have to manually delete any noise-notes that remain.

When using the *Detect Notes* dialog box with the Note Detector Window, the user can repetitively press the Detect button while testing different settings on the sliders, and observe the nature of the different note detection scans. Do not worry if the Time-Zone Select Box disappears after the first Detect button hit, the computer will remember the original Time-Zone Selection values for later Detect button hits. If you want to experiment with the two slider controls, you can repetitively change the slider settings and hit the Detect button to see what the detection note scans will look like on the Note Detector Window. When the Detect Notes dialog box is launched, the sliders are preset to a reasonable values. When you are finally happy with a note detection scan, hit the Save button and the notes will be saved to the currently loaded Notelist.

**It is recommended that you first adjust the *Detection Detail Slider* with some previews from the Detect button, and then later fine tune your detection scan with the *Weak-Note Cutoff Slider*.**

Go to *Automatic Note Detection* in the *Detection Topics* section to read a summary of the note detection process and step through Tutorial A: *Doing a Simple Note Detection*. And also step through Tutorial D: *Previewing a Note Detection* to get a better feel for using the Detection Detail Slider and Weak-Note Cutoff Slider controls.

## ReSynthesis Menu:

The ReSynthesis Menu commands allow you to create new, modified WAV files (called Separations), derived from the source WAV file that you used to make your Notelist. The Separations modify a copy of the original WAV file by using the notes in the Notelist to either *isolate* or *subtract* the sounds of the notes from the original WAV file. If you want to copy and save the new Separation File, you can find it in the same folder as the original source WAV file. You must have a Notelist loaded for these commands to be able to work. The Separation WAV is a normal WAV file that is independent of PitchScope, and can be played on any WAV player or burned to Audio CD. Creating the Separation Files does NOT change the original source WAV file, which should *never* be changed by you. Separation WAV files can be played instead of the original source WAV file by going to the Audition Menu and choosing either *Notelist-Only Separation* or *Background-Only Separation*. Detection Zones should never be created from Separation Files.

**Create Notelist-Only Separation** – This command creates a new WAV Separation File by copying only the time-segments and tones of the original source WAV where there exists a note from the Notelist. The result is a new WAV file that only contains the sounds of the solo notes of the Notelist. This new WAV file will have the same name as the original source WAV file, but with "\_lead" added to the file name (ex: MySong.wav will create the new file, MySong\_lead.wav).

You can test your edits to the Notelist with this command -- after creating the Separation WAV, go to the Audition Menu and select "Notelist-Only Separation". Now when you hit the play button you will hear the Notes-Only WAV instead of the original source WAV file. If you have missed some notes or have incorrect notes, it should become obvious where the problems are when you listen to the Separation WAV. Then go back to the Note Detector Window and edit the incorrect notes, and possibly make existing notes longer in length. After the edits, execute this command again to create another revised Separation WAV, and see if it sounds more better.

**Create Background-Only Separation** – This command creates a new WAV Separation File by copying *everything* but the time-segments and tones of the original source WAV where there exists a note from the Notelist. The result is a new WAV file that plays the accompaniment of the song, but without the sounds of the solo notes of the Notelist. This is similar to the way karaoke files are made that strip out the singer's voice. As in karaoke, you can practice the solo's notes along with this WAV, without hearing the original recording's notes of the solo. Playing along with the Background-Only Separation can be an excellent way to train yourself to play the solo as you would in a band. To hear the new Background-Only Separation after doing this command, go to the Audition Menu and select "Background-Only Separation". Now when you hit the play button you will hear the Background-Only WAV file instead of the original source WAV file. The new Background-Only Separation WAV file will have the same name as the original source WAV file, but with "\_bground" added to the file name (ex: MySong.wav will create the new file, MySong\_bground.wav). Listening to the Background-Only Separation can also be a good way to test the accuracy of the Notelist. If, while listening to the Background-Only Separation in WAV-only audition mode, you can still hear some notes of the solo, then you must go back and add those missing notes to the Notelist, so that they may be *later* stripped out with a new separation file.

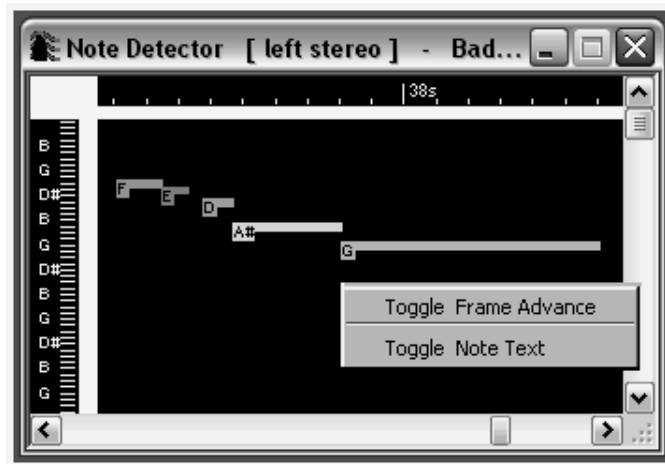
## Help Menu:

**Help Topics** - This launches a dialog box that leads to PitchScope's Help Files. Inside the Help Files are window diagrams, descriptions of menu and button commands, a Glossary of Terms, and assorted tutorials.

*Note:* If the Help Files do NOT appear after selecting this command and you are running Microsoft Vista, you will have to download a patch from Microsoft to fix this problem. Learn how to get the Microsoft patch file by reading the *Know Issues* topic on the *Installation* page of this document (pp. 3)

**About PitchScope** - This launches the *About PitchScope* dialog box which displays the copyright information for this application, and Creative Detectors contact information.

## The Popup Menu



***The Popup Menu after selecting "Toggle Note Text"***  
[ the notes now show their *letter names* (F, E, D, A#, G) ]

The Popup Menu is launched by clicking with the *right* mouse button *inside an empty area* of either the Pitch Viewer Window or the Note Detector Window. Once the Popup Menu is visible (see diagram below), click with the mouse's *left* button on the desired menu command (example: "Toggle Note Text").

**Toggle Frame Advance** - When you hit the Toolbox's Play Forward Button on a new window, both the Pitch Viewer and Note Detector windows' image will *only move forward* when the last note in the window has played. This is called the "*Hopping Frame Advance*" mode. Now if you select this menu command, the window's image will slowly move forward during the entire play, and a *bouncing red ball* will converge on each currently playing note. This slowly moving image mode is called the "*Smooth Frame Advance*" mode. The Smooth Frame Advance mode uses a lot of microprocessor resources, and should only be used of computers with fast microprocessors. If your microprocessor is too slow to support this mode, the play will be choppy and the sound will be bad. For this reason it is always much easier on the microprocessor if you only use the Smooth Frame Advance mode on the Note Detector Window, instead of the *more demanding* Pitch Viewer Window. If you *again select* this menu command from the *Smooth Frame Advance* mode, it will toggle the setting back to the *Hopping Frame Advance* mode.

**Toggle Note Text** - Normally a window does not show the notes' *letter names* (C,C#,D,D#... B). If you select this menu command it will display the letter names for each note (see diagram below). And if you again select this menu command, it will toggle the setting back to not showing the notes' letter names.

# Glossary of Terms

Definitions are listed in *alphabetical order*.

**Audition Mode** - PitchScope has various ways that the user can listen to the original Wave Recording and/or the Notelist. The Notelist and the Wave Recording use *two different devices* to play. The two devices are: 1) the Wave Player (plays the .WAV File that you loaded), and 2) the midi SW Synthesizer (plays the individual notes in the Notelist). The three Audition Modes, which can be changed from the Audition Menu, are 1) *Midi and Wave*, 2) *Just Midi* and 3) *Just Wave*.

The *Just Wave* mode will only let you hear the source Wave Recording of the song during the play command.

The *Just Midi* mode will only let you hear the notes of the Notelist playing through the midi SW Synthesizer.

The *Midi and Wave* mode will simultaneously play both the Notelist along with the Wave Recording. With this mode you can use the Midi/Wave Balance Slider control on the ToolBox to increase or decrease the dominance of the Wave Recording *relative* to the volume of the Notelist. Moving the slider to the left will reduce the volume of the Wave, so that the Midi play of the Notelist will appear louder by comparison.

To change the *current* audition mode, go to the Audition Menu and select one of the three modes. These modes are useful when correcting the occasionally errors that might occur from note detection. Also see *SW Synthesizer*, *Midi*, and *Midi/Wave Balance Slider* in this glossary.

**Background-Only Separation** - Besides being able to listen to the source WAV file that the Notelist was detected from, you can also create two types of Separation WAV files that can be listened via settings on the Audition Menu. The Background-Only Separation WAV file is made from the ReSynthesis menu, and is a modified WAV file that has all the sounds of original source WAV file except for the sounds of the notes in the Notelist. The notes are stripped away from a copy of the source WAV file in much the same way that a karaoke recording has the singer's voice erased from the original recording. Also see *Create Background-Only Separation* menu command and the Audition Menu's *Background-Only Separation* menu command.

**CD Ripping Software** - The songs that are on your Audio CDs are stored in a Wave File format. With CD Ripping Software, or perhaps some Wave Editor software, you will be able to *copy* the Wave song files from your Audio CDs to your hard drive. Once the Wave song files are on your hard drive, you can use them as a source for your PitchScope transcription Projects. The preferred Wave format for PitchScope, which also happens to be same as the native Wave format on an Audio CD, is an *uncompressed Stereo Wave(.wav) at 44.1 kHz with 16 bit samples*. If you always 'rip' or copy the song files from the CD in that format, then you will have the best sound quality and PitchScope can skip the step of *conversion* from another file format. See *Wave File* in this glossary. Also see *Working With Sound Files* of the *Basic Topics* section in this document. And also read Tutorial B: *Extract a Song from an Audio CD, and Convert a MP3 File to Wave Format*.

**Create Note Tool** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Create Note Tool Button*.

**Detection Detail Slider** - This slider control is located on the Detect Notes dialog box, which is seen after the user executes the *Detect Notes* menu command on the Detection Menu. Sliding this control to a maximum value will cause the note detector to respond to the faintest of pitches, so much so that a very high setting will pick up 'noise' or irrelevant notes from other instruments. And when the slider is set to a low value, some relevant notes might be missed but noise is at a minimum. Users will want to find the best setting that allows *subtle* notes to be detected, but yet has a minimum amount of noise-notes. When using the Detect Notes dialog box with the Note Detector Window, the user can repetitively hit the Detect button while testing different settings on the slider, and observe the effects of the different detection slider settings. When the Detect Notes dialog box is launched, the slider is already set to a reasonable value. Step through Tutorial A: *Doing a Simple Note Detection*, and Tutorial D: *Previewing a Note Detection*.

**Detection Zone** - When transcribing an instrument's solo, the user must first create a Detection Zone upon the Note Detector Window while a Project is loaded. The Detection Zone is created by mouse-dragging the mouse horizontally with the Selection Tool to create a Time-Zone Selection Box. With the Time-Zone Selection Box displayed, the user then selects "Create Detection Zone" from the Detection menu. Creating the Detection Zone is the first step in detecting notes from the Wave Recording and its associated Project File. After a Detection Zone is created, the user can then execute the "Detect Notes" menu command from the Detection menu to create the new Notelist. The Detection Zone information is stored in the Project File. To learn more about Detection Zones, read *Creating Detection Zones* in the *Detection Topics* section of this document. And to get some experience creating Detection Zones, step through Tutorial A: *Doing a Simple Note Detection*.

**Detect Zone End Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Detect Zone End Button*.

**Detect Zone Start Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Detect Zone Start Button*.

**File's End Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *File's End Button*.

**File's Start Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *File's Start Button*.

**Fundamental Pitch** - The Fundamental Pitch is the pitch *type* that we typically associate to a note on the musical staff. The Fundamental Pitch has an Octave value for the note. Also see *ScalePitch* and *Octave* in this glossary.

**Handle** - A Note can be selected with the Selection Tool by mouse-clicking inside the note's rectangle. When selected, a note is displays one, two, or three handles which appear as small hollow squares. Handles may be dragged with the mouse while the left mouse button is depressed. By dragging the handles you can edit a note's properties. The Time-Zone Selection Box also displays handles that can be mouse-dragged to make the Time-Zone Selection Box bigger or smaller. Also see *Selection Tool* in this glossary, and step through Tutorial C: *Editing Some Notes*.

**Horizontal Scroll Knob** - A standard Windows control that is located at the very bottom of a window. Mouse-dragging horizontally on the knob will scroll the *viewable section* of the Wave Recording and Notelist, forward or backwards in time. The specific *time location* of the Wave's image is written on the Wave's Time Ruler. See this document's *Window Diagrams* section, the *Note Detector Window* diagram. Also look up *Wave's Time Ruler* in this glossary.

**Horizontal Zoom-Up Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Horizontal Zoom-Up Button*.

**Horizontal Zoom-Down Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Horizontal Zoom-Down Button*.

**Midi** - Midi stands for "**M**usical **I**nstrument **D**igital **I**nterface", and is a set of commands for storing and transmitting information about music to computers and electronic devices. MIDI output devices (MIDI musical *instruments*) interpret this information and use it to *synthesize* musical notes. PitchScope uses Microsoft Windows' internal midi SW Synthesizer (**S**oft**W**are **S**ynthesizer) to generate the notes that you hear from the Notelist. Also see *SW Synthesizer* and *Midi Instrument Patch Number* in this glossary.

**Midi Instrument Patch Number** - The Midi output device, or in PitchScope's case Window's internal midi SoftWare Synthesizer, allows the user to change the midi musical *instrument* that currently plays the notes in the Notelist. 'Patch' is a nickname for a midi musical instrument setting. A table of numbers (0-95) references the various musical instrument sounds that you can choose to play the Notelist. To change the current Midi instrument, open the application *Options* dialogbox with the "Options" menu command on the Tools Menu. For example, entering "41" into the *Options* dialogbox's textbox for "Midi Instrument Patch Number" will give you the sound of a *viola* (our favorite for electric guitar solos). Entering "64" will make a soprano sax sound, entering "16" will give a Hammond organ sound, etc. Also see *SW Synthesizer* and *Midi* in this glossary.

**Midi Timing-Advance Factor** - When simultaneously listening to the Notelist and the WAV recording (from the *Midi and WAV* audition mode), it is necessary to have the two musical sources be *synchronized* in time. Because different microprocessors and sound hardware sometimes execute midi play commands with different response times, PitchScope must sometimes have its *Timing-Advance Factor* altered to fine tune the synchronization of play. If the play of the midi notes sounds a little out of beat with the play of the source WAV file, you can then you can correct the problem by adjusting the Timing-Advance Factor on the *Options* dialog. You can open the *Options* dialog from the Tools menu by selecting "Options..." To learn how to set the Timing-Advance Factor, read about it in the *Options Dialog* portion of the *Menu Commands, Tools Menu* sub-section of this document.

**Midi/Wave Balance Slider** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Midi/Wave Balance Slider*.

**Mountain Animation Window** - This is one of several animation windows whose sole purpose to vividly display the current playing note, so that the user can practice along with the Wave Recording and/or Notelist. It is nicknamed the 'Mountain' window because the animation looks like moving 'mountains' rotated sideways.

**Mouse-Click** - Within PitchScope's documentation, this refers to the act of clicking inside a window with the mouse's *left* button. If the right button is to be used, it will be *explicitly* mentioned.

**Mouse-Dragging** - Within PitchScope's documentation, this refers to the act of pressing down with the mouse's *left* button, and dragging the mouse while still holding down the button, and finally releasing the button at a specified location.

**MP3 File** - This is a type of digital music file that is frequently used on the Internet. Because it is compressed, its fidelity will not be as good as an uncompressed Stereo Wave File(.wav) format at 44.1 kHz with 16 bit samples. Though PitchScope can work with MP3 files as a source, it is much better to use an *Uncompressed Stereo Wave(.wav) format at 44.1 kHz with 16 bit samples*, if possible. Also read the *Working With Sound Files* section of this document.

**Noise-Note** - An automatic note detection scan, performed from the Detect Notes menu command, attempts to find and identify all the notes in a musical instrument solo as it builds a new Notelist. However a note detection scan is not perfect, and if the *Weak-Note Cutoff Slider* control is set too low, the note detector will pick up erroneous notes from other instruments -- these incorrect notes are called 'Noise-Notes', and must be manually deleted by the user in creating an accurate Notelist of the musical instrument solo. Noise-notes typically have a *low Detection Value* (i.e. weak-note) which is represented by the dark gray color of the note on the Note Detector window. A good note detection scan depends on the user correctly setting both the *Detection Detail Slider* and the *Weak-Note Cutoff Slider* controls upon the Detect Notes dialog box. Remember, that just because a note has a dark gray color does not necessarily mean that it is a noise-note. Some valid notes of the solo that are hard to detect will have a dark gray color. See the tutorials for a better discussion on the proper use of the *Detection Detail Slider* and *Weak-Note Cutoff Slider* controls.

**Note** - Notes are the separate parts of a Notelist that PitchScope creates with its note detector. Within PitchScope's graphic interface, a note is typically represented by a rectangle. On the *Pitch Viewer Window* a note is shown with hollow blue rectangles, and on the *Note Detector Window* the notes are drawn as solid gray rectangles. A very light gray color means that the note had a strong *detection value*, and is probably a valid note within the instrument's solo. A note with a very dark color means that its *detection value* was weak, and the note *might* be an error by the note detector. Also see *Notelist* in this glossary.

**Note Detector Window** - Go to this document's *Window Diagrams* section, *Note Detector Window* sub-section, to see a picture of the Note Detector Window. If a Note Detector Window is not already displayed, you can open one from the View Menu by selecting "Note Detector." When you start a new transcription Project, you will first work with the Note Detector Window. After

creating the new Project by selecting a source Wave(.wav) or MP3 file, you will see the digital Wave Recording displayed in the Note Detector Window as a series of vertical bars that represent the volume of the recording at various points in time. You would then create a Detection Zone of the musical instrument's solo. The next step is to do a note detection within the Detection Zone to create a new Notelist. After doing a note detection scan, you will likely need to 'clean up' a few errors that might have occurred from the note detector. Sometimes a note might just need a minor adjustment, and sometimes the note might be entirely wrong and need to be deleted. The graphic animations of the Note Detector Window also become useful as a visual learning-aid, when users practice along with the playing Notelist. Read the *Cleaning Up Notelists* section, and step through *Tutorial C: Editing Some Notes*.

**Note's End Handle** - A note can be selected by mouse-clicking inside the Note's rectangle with the Selection Tool. The selected note will then display one, two, or three Handles, which look like small hollow squares.

A Note's Start and End Handles will *only appear* in a window if the note is *wide enough* to fit the rendering of *multiple* handles. If, while mouse-clicking inside the note with the Selection Tool you only see one handle, go to the Toolbox and press the *Horizontal Zoom-Up* button as many times as necessary so that the note is finally wide enough to fit the renderings of multiple handles.

The handle at the far *right* is the Note's End Handle, and can be mouse click-and-dragged to change the time value for the end of the note. See *Note* and *Selection Tool* in this glossary. Also see this document's *Window Diagrams* section, the *Note Detector Window* diagram.

**Note's Octave Handle** - The Note's Octave Handle will *only appear* on Note Detector Windows. The Octave Handle is the handle in the center, and if you only see one handle it *is* the Octave Handle. If you mouse-drag the Octave Handle in a vertical motion, you will change the note's Octave value while keeping the same ScalePitch value. The most common error for the note detector is to get the Octave wrong while setting the ScalePitch correctly. So to make your cleanup of a note detection easier, the octave value can be easily changed by this handle *without altering* the note's ScalePitch value. As you try different octave values, hit the Toolbox's Play Current Note Button and you will hear two successive tones: 1st) the Wave Recording's sound for the time span of the note, and then 2nd) the actual note played through the midi SW Synthesizer. After testing all four octave positions, you will know when you have picked the correct note when the two tones from the Play Current Note Button sound the most alike. Also, if you mouse double-click upon the Note, the *Note Properties* dialog box will be launched. Upon it you will see the various ratings for the 4 different octave possibilities -- you should use them when editing an octave assignment. See *Octave* and *ScalePitch* in this glossary, and read *Cleaning Up Notelists* in the *Detection Topics* section. Also see this document's *Window Diagrams* section, *Note Detector Window* sub-section. And also read *Tutorial C: Editing Some Notes*, step 4: *Correcting A Note's Octave*.

**Note Properties Dialog Box** - The Note Properties dialog box is launched when you double-click with the mouse on an individual note. It contains various *measurements* of the note: the note's *ScalePitch* Value, the note's Detection Score, and the scores of the four possible *octave candidates* for that particular ScalePitch value. The note's Detection Score is in percent and represents the note detector's *certainty* that this is indeed a valid note and not a *Noise-Note*. When the percentage is low, consider the possibility that the note detector might have incorrectly created a noise-note that must be manually deleted. Each of the four octave candidates' *Primary Scores* tell you how well they scored with the octave detector. Usually the correct octave has the highest Primary Score. However, if some of the Primary Scores are close (and show a low percentage for *Best Primary Score Certainty*), then the octave detector may have made a mistake in choosing the correct octave. In considering whether or not to change an octave value, you can also look at the octave candidates' *Closeness Scores*. Typically neighboring notes tend to cluster together in pitch, and do not jump wildly from octave to octave. Therefore, when you have doubts whether or not the Primary Score chose the correct octave, you can also resort to the Closeness Score -- usually the correct octave candidate will also have the highest Closeness Score. The note's current octave value can be changed by mouse-clicking on the radio buttons in the *Octave Selection* group box. Also see *Tutorial C: Editing Some Notes*, *Correcting A Note's Octave*.

**Note's Start Handle** - A note can be selected by mouse-clicking inside the Note's rectangle with the Selection Tool. The selected note will then display one, two, or three Handles, which look like small hollow squares.

A Note's Start and End Handles will *only appear* in a window if the note is *wide enough* to fit the rendering of *multiple* handles. If, while mouse-clicking inside the note with the Selection Tool you only see one handle, go to the Toolbox and press the *Horizontal Zoom-Up* button as many times as necessary so that the note is finally wide enough to fit the rendering of multiple handles.

The handle at the far *left* is the Note's Start Handle, and can be mouse-dragged to change the time value for the *start* of the note. Most of the time the note detector will do a good job of setting this value, but at times you may want to make minor correction. See *Note* and *Selection Tool* in this glossary. Also see this document's *Window Diagrams* section, the *Note Detector Window* diagram.

**Notelist** - The main purpose of PitchScope is to detect and save the individual Notes of a Wave Recording's musical instrument solo. The individual Notes of an analyzed solo are grouped into a Notelist and can be saved to hard drive as a Notelist File. PitchScope uses Microsoft Windows' internal midi SW Synthesizer to generate the sounds that you hear when the Notelist plays. While a Notelist may have notes from *any* of the three Stereo-Mix Channels (left, right, center), the visual interface will only *show and play* the notes of *one* Stereo-Mix Channel *at a time*. The current Stereo-Mix Channel setting can be chosen from the View Menu (*Display Center, Display Left, Display Right*). PitchScope's various Audition Modes can allow the Notelist to be played by itself, or along with the source Wave Recording. And other PitchScope mechanisms allow individual Notes of the Notelist to be heard and audibly tested. Also read the *Ways of Listening to Wave Recordings and Notelists* section. And also see *Notelist File, Note, SW Synthesizer, Stereo-Mix Channel, Wave Recording* and *Audition Mode* in this glossary.

**Notelist File** - The current Notelist may be saved to hard disk as a PitchScope Notelist File, and will have the ".pnl" file extension (**Pitch NoteList**). Saved Notelist Files may be re-loaded to PitchScope for user practice sessions, as the user plays along with a Notelist. A Notelist and the Project File that was used to create it, are forever 'linked' together. While an individual Project may spawn many different Notelists, each Notelist will always *refer back* to the Project File that it came from. While it is best that the user *also loads* the Project File that a Notelist was derived from, it is not necessary. The Notelist File only needs to be able to find the Wave File (.wav) that was its source. This way you can share Notelist Files with your friends who have purchased PitchScope, as long as you also give them the source Wave File as well. If a Notelist cannot find the source Wave File, the Notelist will only be able to play the through the midi SW Synthesizer, and the Wave Recording will not be heard. Also see *Project File* and *Wave File* in this glossary.

**Notelist-Only Separation** - Besides being able to listen to the source WAV file that the Notelist was detected from, you can also create two types of Separation WAV files that can be listened via a setting on the Audition Menu. The Notelist-Only Separation WAV file is made from the ReSynthesis menu, and is a modified WAV file that has only the sounds and tones of the notes in the Notelist. Also see *Create Notelist-Only Separation* menu command and the Audition Menu's *Notelist-Only Separation* menu command.

**Octave** - An octave is a musical interval comprised of 12 *half-steps*. A half-step is the musical interval between two *neighboring* keys on a piano. So, on a piano we identify the various octaves by a repeating *visual pattern* of 12 half-steps, which are 5 black keys and 7 white keys (5+7= 12 half-steps). Two notes that have the same ScalePitch but are in neighboring octaves will almost sound alike, and will sound completely *harmonious* together. For example, two different notes that are both D#, but are in two neighboring octaves will almost sound alike. PitchScope detects notes within a four octave range. Also see *ScalePitch*, *Fundamental Pitch*, and *Note's Octave Handle* in this glossary.

**Pause Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Pause Button*.

**Pitch** - Every note has a given *frequency* that determines whether it sounds high, low, or somewhere in between. On a piano, the way you would play a note with a *different* pitch is to strike a *different* piano key. PitchScope detects the different pitches that occur during an instrument's solo in order to create the Notes for the Notelist. PitchScope refers to 2 different types of Pitches: 1) Fundamental Pitch and 2) ScalePitch. Also see *Fundamental Pitch*, *ScalePitch*, and *Note* in this glossary.

**Pitch Viewer Window** - Go to this document's *Window Diagrams* section, *Pitch Viewer Window* sub-section, to see a picture of the Pitch Viewer Window. If a Pitch Viewer Window is not already displayed, you can open one from the View Menu by selecting "Pitch Viewer". After a Detection Zone has been created, you can see the *pitch activity* for each ScalePitch Channel drawn as clusters of white and light gray pixels upon the black Detection Zone. The Pitch Viewer Window supplies additional data to aid you during your cleanup evaluations after an initial note detection scan has been completed. Also read *ScalePitch* and *ScalePitch Channel* in this glossary. Step through Tutorial A: *Doing a Simple Note Detection*.

**Play Backwards Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Backwards Button*.

**Play Forward Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Forward Button*.

**Play Note Tool** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Tool Button*.

**Play Current Note Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Current Note Button*.

**Play Next Note Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Next Note Button*.

**Play Previous Note Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Previous Note Button*.

**Play Speed Buttons** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Speed Buttons*.

**Play Window Button (PW)** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Play Window Button*.

**Polyphonic Recording** - A polyphonic recording is one where there is more than one instrument playing at a time, as in a band. *Pitch detection* is simple if only one musical instrument is playing, but with a polyphonic recording of multiple instruments it becomes very, very difficult. PitchScope does pitch detection and note analysis on polyphonic recordings by only trying to detect the most dominant note of an instrumental solo at any given moment in time. For this reason, PitchScope's Notelists can NOT play more than one note at a time.

**Project** - In PitchScope, pitch detection and musical *transcription* always start by first creating a Project. A transcription Project is forever linked to the source Wave(.wav) file that it was made from. Never try to rename a Project File, and never modify the source Wave(.wav) File after a Project has been created. The Project also stores the Detection Zones that you will create. Within a Project you may create and save any number of Notelists, but each Notelist can only refer back to its parent Project. If you want to see the Project's folder path for the source Wave File and its own path, go to the File Menu and select "Project Options...". Also see *Project File* in this glossary, and Tutorial A: *Doing a Simple Note Detection*.

**Project File** - The transcription Projects that you create in PitchScope can also be saved to hard disk. You can then reload a Project in order to create new Detection Zones, or to refine one of the Project's Notelists. A Project file will have the extension ".ppj" ( *Pitch ProJect* ). Never rename a Project file, and never delete its source Wave File (.wav). If you want to see the Project's folder paths for its source Wave File and its own path, go to the File Menu and select "Project Options...". Also see *Project* in this glossary.

**Revolver Animation Window** - This is one of many animation windows whose sole purpose to vividly display the *current* playing note, so that the user can practice along with the Wave Recording and/or Notelist at a slower speeds. It is nicknamed the 'Revolver' window because the 12 ScalePitches are displayed in a circular format.

**ScalePitch** - Within PitchScope, pitch is presented in two different ways: 1) Fundamental Pitch, and 2) ScalePitch. In the Note Detector Window you see a Notelist's notes displayed by their Fundamental Pitch, that is in a range of many *Octaves*. Fundamental

Pitch contains an octave value, and is what you see when you look at notes in sheet music. However, ScalePitch only has 12 values (E, F, F#,G,G#,A,A#,B,C,C#,D,D#) because there is NO octave assignment. {Do, Re, Mi, Fa, So, La, Ti, Do} is another way to express ScalePitch because it also contains no octave assignment. When you look at the 12 horizontal ScalePitch Channels of the Pitch Viewer Window, you can see the same notes of the Notelist as in the Note Detector Window, but displayed *without* their *octave values*. Also see *Fundamental Pitch, Octave, and ScalePitch Channel* in this glossary.

**ScalePitch Channel** - Go to this document's *Window Diagrams* section, *Pitch Viewer Window* sub-section, and look up *ScalePitch Channel*.

**Selection Tool** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Selection Tool Button*.

**Step-Play Note Buttons** - The three Step-Play Note Buttons (*Play Previous Note Button, Play Current Note Button, Play Next Note Button*) are located on the Toolbox (see document's *Window Diagrams* section, *Toolbox Window* sub-section). Use these buttons when you want to audibly test whether or not the note detector has picked the correct pitch and octave for a note. Here is how the buttons work. First, select a note with the Selection Tool to establish it as the 'current note'. Then, hit the Play Current Note Button, and PitchScope will play two successive tones: 1st) the Wave's recording's sound for the time span of the note, and then 2nd) the actual Note played through the midi SW Synthesizer. If you want to again hear those two tones, just hit the Play Current Note Button again. When the two tones sound the most alike, you have correctly set the *values* (Octave, ScalePitch, Duration) for the note. You can then move to the *next* note and perform the same tone test by hitting the Play Next Note Button. By repetitively hitting the Play Next Note Button you can incrementally step through all the new notes in a detected Notelist while checking for and correcting errors. If you want to navigate to an *earlier* note, just hit the Play Previous Note Button. See *Play Previous Note Button, Play Current Note Button, and Play Next Note Button* in this glossary. Also read the *Cleaning Up Notelists* section, and also step through Tutorial C: *Editing Some Notes*

**Stereo-Mix Channel** - The *current* Stereo-Mix Channel setting has three possible choices: *left, right, and center*. This setting is chosen from the View Menu: 1) Display Center (channel), 2) Display Left Stereo (channel), and Display Right Stereo (channel). Because PitchScope detects notes from a *stereo* Wave Recording, it can choose to focus and detect from: 1) just the left stereo channel (Display Left Stereo), 2) just the right stereo channel (Display Right Stereo), or 3) both the left and right channels combined together (Display Center). For most musical instrument solos, Display Center will be the best setting for detection because most solos are typically *mixed 'to the center' (between left and right)*. However on some recordings, the instrument's solo may be very dominant in just the left or right stereo channel. In that case, you might want to experiment by creating your Detection Zones with either the *Display Left Stereo* or the *Display Right Stereo* setting, wherever the instrumental solo sounds the loudest. It is acceptable to have multiple Detection Zones in *different* Stereo-Mix Channels within the *same* Notelist and Project. The only catch is that when you play the Notelist, you will only see and *hear* the notes of the *current* Stereo-Mix Channel setting. The *current* Stereo-Mix Channel setting is written in the title bar of a window (see document's *Window Diagrams* section, the *Note Detector Window* diagram). Also read *Creating Detection Zones* in the *Detection Topics* section to get a better idea how Stereo-Mix Channels affect note detection. And also read *Display Center, Display Left Stereo, Display Right Stereo* in the *Menu Commands* section of this document.

**SW Synthesizer** - The midi 'SW(*SoftWare*) Synthesizer' comes with the Windows operating system and is what and is what creates the sounds for the notes of a playing Notelist. By double mouse-clicking on the Speaker (Volume) Control Icon in the Windows Taskbar (far bottom right of screen), you will launch the Volume Control(Mixer) dialog box (for Vista, also click on "Mixer"). In order to hear the SW Synthesizer play the Notelist, the "Mute" checkbox for "SW Synth" must be *unchecked* and its volume slider should probably be on maximum. And similarly, in order to hear the source Wave Recording play, the "Mute" checkbox for "Wave" must also be *unchecked* and its volume slider should probably be on maximum. Also see *Midi, Notelist, and Midi/Wave Balance Slider* in this glossary.

**Toolbox Window** - The Toolbox Window is the small, non-sizing, window that is seen when the application first starts. It is made up of many buttons and controls to help you navigate through Wave Recording and Notelist operations. Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, to see a picture of the Toolbox and its labeled buttons. The functions of the of the Toolbox's individual buttons are summarized in this glossary by the *button names* in the diagram.

**Transcription** - When musicians listen to a musical recording and then *write down* its notes for sheet music, it is said that "they made a *transcription* of the song". While PitchScope can not write down notes in the notation style of sheet music, it can *transcribe* the notes into a Notelist and then display the Notelist in Piano Roll Format upon the Note Detector Window. Within this document, a 'Project' is sometimes referred to as a '*Transcription Project*'. Also see *Project* in this glossary.

**Transcription Project** - Within PitchScope, a Transcription Project is the same thing as a 'Project'. Also see *Project* and *Transcription* in this glossary.

**Time-Zone Selection** - In order to create a Detection Zone or to detect some notes or to detect some notes within a Detection Zone, you must first create a Time-Zone Selection. This is created with the Selection Tool by pushing down the mouse's left button in the left part of the window, dragging the mouse (button still down) to the right, and then releasing the mouse button. After releasing the mouse button, the Time-Zone Selection Box should now be visible. The Time-Zone Selection Box will show an image in *reversed* gray colors and have two Handles (small hollow squares) at its borders. The Handles can also be horizontally mouse-dragged to fine tune the borders of the Time-Zone Selection Box. If you are not happy with the position of the Time-Zone Selection Box, you can *erase* the Time-Zone Selection Box by mouse-clicking inside an empty area of the window, and then be free to create a new Time Zone Selection. See *Selection Tool, Detection Zone, and Handle* in this glossary. Also step through Tutorial A: *Doing a Simple Note Detection*.

**Time-Zone Selection Box** - The Time-Zone Selection Box is the *graphical* representation of a Time-Zone Selection. See *Time-Zone Selection* in this glossary.

**Vertical Scroll Knob** - A standard Windows control that is located at the very right of a window. If the window has been vertically zoomed-up (magnified), mouse-dragging vertically on the knob will scroll the window's image up or down. If the window has NOT been vertically zoomed-up (i.e. at its lowest vertical magnification), dragging this knob will have no effect. To bring a window to its *lowest vertical magnification*, repetitively hit the Vertical Zoom-Down Button until the window's image no longer shrinks in the vertical direction. When a new window is just opened, it is already at its lowest vertical magnification. See this document's *Window Diagrams* section, the *Note Detector Window* diagram.

**Vertical Zoom-Up Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Vertical Zoom-Up Button*.

**Vertical Zoom-Down Button** - Go to this document's *Window Diagrams* section, *Toolbox Window* sub-section, and look up *Vertical Zoom-Down Button*.

**Wave File** - This is the type of digital music file that is used on Audio CDs, and is also the preferred file format for PitchScope. ".WAV" is the file extension for a Wave file. If possible, copy or 'rip' your song files to an *uncompressed Stereo Wave(.wav) file format at 44.1 kHz with 16 bit samples*. If you cannot extract your song files into that format, PitchScope can also use *other* Wave formats as well as the MP3 format, but PitchScope will have to first *convert* those formats and there may be a loss in sound quality. If a file conversion has been performed, only the *.WAV converted version* of the file is later needed. When you create a Project for transcription, PitchScope will prompt you for a Wave or MP3 File as its source. In order to hear the Wave Recording play once it is loaded to PitchScope, the "Mute" checkbox for "Wave" must be unchecked and its volume slider should probably be on full volume upon the Windows Speaker (Volume) Control dialogbox. Also, the Toolbox's Midi/Wave Balance Slider should be set in the middle position. The Windows Speaker (Volume) Control dialogbox is opened by double mouse-clicking on the Speaker (Volume) Icon in the Windows Taskbar at the far bottom right of the screen (for Vista, also click on "Mixer"). See *Midi/Wave Balance Slider* and *CD Ripping Software* in this glossary. Also see *Working With Sound Files* of the *Basic Topics* section in this document. And also read Tutorial B: *Extract a Song from an Audio CD, and Convert a MP3 File to Wave Format*.

**Wave Recording** - Virtually the same thing as a Wave File. Sometimes in this document we refer to a Wave File that has been *loaded into PitchScope* as a Wave Recording.

**.WAV File** - The same thing as a Wave File. ".wav" is just the file extension for a Wave File. See *Wave File* in this glossary.

**Wave's Time Ruler** - On the top of the Pitch Viewer Window and the Note Detector Window is the Wave's Time Ruler (see document's *Window Diagrams* section, the *Note Detector Window* diagram). It looks like a horizontal ruler with markings for the *time position* into the Wave file for that particular Wave image. The notation for the time markings are given in minutes, seconds, and milliseconds (example: "2mn 43s 500ms" is 2 minutes, 43 seconds, 500 milliseconds). Scrolling the window left or right with the Windows Horizontal Scroll Knob will change the *time frame* of the Wave file segment that is currently in view, and correspondingly change the numeric values on the Wave's Time Ruler. The Wave's Time Ruler will become useful when you attempt to find the beginning and end time boundaries of the musical instrument solo.

**Weak-Note Cutoff Slider** - This is one of two slider controls on the Detect Notes dialog box, which appears after selecting the *Detect Notes* menu command. The Weak-Note Cutoff slider can be used to eliminate notes with a low detection value (Noise-Notes), as shown by their dark gray color in the Note Detector Window. This control is the most useful in eliminating noise-notes during a detection scan. A high setting will eliminate too many valid notes, and a low setting will not eliminate enough weak erroneous notes. Users will want to experiment during a note detection scan to find the best setting that includes the valid notes, and only allows a small amount of noise-notes. After a note detection scan, users can manually delete the noise-notes with the Selection Tool and Edit menu commands.



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