In This Chapter

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Time Operations, Tempo Operations, and Key Signatures

Introduction

One of the first things you ought to consider whenever you are working on music in Pro Tools is the tempo. If you are about to record a new piece of music, you will usually want to have the musicians play along to a click to help keep their timing accurate. This will also help to ensure that the music you record lines up with the bar lines in your Pro Tools session, so that you can edit using the grid and other editing features. If the musicians don't want to record to a click, there are ways to match the audio you record to the bars and beats in Pro Tools afterwards, but this will inevitably take more time to sort out.

You may also need to create tempo maps so that musicians can play faster or slower in different sections of the music along with meter changes, whenever these are needed. Even short pop songs sometimes have odd numbers of bars or beats, or changing meters, and these are very common in music-to-picture. The meter, or time signature, defines the number of beats in a bar and the way they can be subdivided, so you need to be familiar with all these things to get the best results.

It can also be very helpful to establish the correct key signature for your music, especially if you intend to use the Score Editor or key transposition features. And if you want to quickly check whether a guitar or keyboard or bass part or whatever will work better in another key, the Elastic Audio Pitch Transposition feature is the perfect tool.

Elastic Audio also lets you treat audio much like MIDI—quantizing and moving notes around more or less at will—using time compression and expansion algorithms in this case. You can use Elastic Audio to quickly beat match an entire song to the session tempo and Bar|Beat grid. Or you can quantize audio to a groove template so that other audio regions take on the same feel. For instance, you might take the feel from one drum loop that you like and apply that to another. And if you are a fan of Beatles-style recording effects, you can use the Varispeed algorithm to create tape-like effects with speed changes that cause pitch changes.

Beat Detective provides various kinds of analysis of tempo and "groove" for your audio and MIDI recordings. For example, you can use Beat Detective to establish a "groove" template that deviates from the standard grid so that you can match new recordings to the "groove" of a particular drum-machine, sequencer, or percussion loop. Beat Detective also lets you analyze the beats in any audio region, and then allows you to separate these so they can be moved around or edited for a variety of purposes. So you can conform beats to the grid in Pro Tools or make the session tempo follow the tempo that your drummer has established.

> ## Tip
>
> If you are learning Pro Tools for the first time, you should make the effort to get used to the terminology that Avid uses to describe the features of the system so that this all becomes very familiar to you as soon as possible. Then you will find everything less confusing; and when you need to look something up in the manual or remind yourself about how something works, you will be much faster.

Timebase and Conductor Rulers

In Pro Tools, you edit and arrange your music along the tracks in the Edit window by placing and moving the audio and MIDI regions along the timeline that runs from left to right along the window.

Regions and events can be anchored to specific points or locations along this timeline. You can view these locations as time in seconds and minutes; as SMPTE time code locations; as bar, beat, and tick locations; or in other formats, using the Timebase rulers that can be displayed along the top of the Edit window above the Conductor rulers.

The Timebase rulers can measure time in two different ways: sample-based time (absolute time) as shown in the Minutes:Seconds ruler and tick-based time (relative time) as shown in the Bars:Beats ruler. The relative time that the Bars:Beats ruler represents will change depending on the tempo and meter settings. Absolute time, as displayed in the Minutes:Seconds ruler, can never change, which of course is why it is called absolute time.

Any or all of the Timebase rulers can be displayed at the top of the Edit window in Bars:Beats; in Minutes:Seconds; as Time Code, which displays the Time Scale in SMPTE frames; or as Time Code 2, which lets you refer video frame rates that are different from the session Time Code rate or as Feet + Frames, which is used for film work. You can also display the Time Scale in samples, which can be very useful for precise editing tasks.

The most useful Timebase rulers for music production are Bars:Beats and Minutes:Seconds; so you should deselect the ones that you are not using to remove the potential for confusion and to conserve screen space.

> **Tip**
> The Timebase rulers may be used to define *Edit selections* for track material and *timeline selections* for record and play ranges. For example, using the Selector tool, you can drag along any Timebase ruler to select material across all the tracks in the Edit window. To include the Conductor tracks in the selection, just press Option (Mac) or Alt (Windows) while you drag. Often, you will want to link the Edit and timeline selections, but sometimes you will want to make different Edit and timeline selections. You can make or break the link between these using the Link timeline and Edit Selection button located just below the tools in the Edit window.

The Conductor rulers include the Tempo, Meter, Key Signature, Chords, and Markers rulers. Tempo and Meter events entered into these rulers will affect the timing of any tick-based tracks and also provide the tempo and meter map for the Bar:Beat grid and Click. Pro Tools allows you to edit Tempo events either in the Tempo ruler or by using the Tempo Editor as shown below.
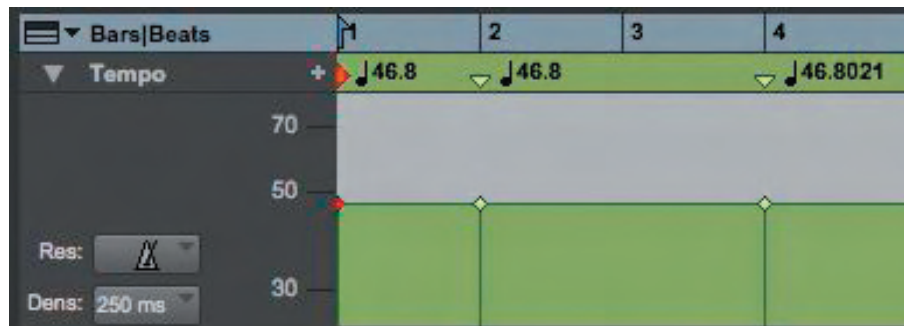

Figure 3.1
Tempo Editor.

You can enter key signatures and make key changes using the Key Signature ruler. This is useful when transposing MIDI notes, for example. When you choose "Transpose in Key" in the Event Operations Transpose window and enter a particular number of scale steps, Pro Tools works out what the root note of the key should be based on the key signature that applies at this point along the timeline and then transposes any selected MIDI notes by the number of steps that you specify. You can also change the key of audio regions.

The Chords ruler lets you display Chord symbols for musicians to follow and the Markers ruler lets you display markers to indicate which section of the music is which.


Figure 3.3
Chords and
Markers.

Markers are actually Memory locations that can be used for other purposes, but their most basic function, that of marking out the sections of your music, is probably their most important function. It is a good idea to define markers for any musical session in Pro Tools as early as possible.

Choosing the Marker Reference

When you create or edit Marker (or Selection) Memory Locations in the New or Edit Memory Location dialogs, you can choose whether they should have an Absolute (sample-based) or Bar:Beat (tick-based) reference using the Reference pop-up.


Figure 3.4
Choosing the
Marker Reference.
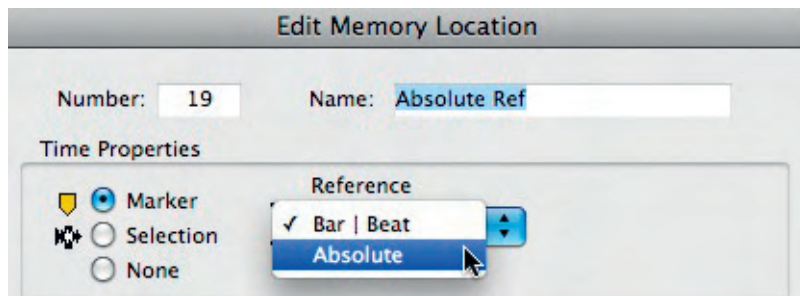
If you choose Bar|Beat, the Memory Location will be tick-based and its bar|beat location *will not* change if the tempo is changed. However, its sample location *will* change.

If you choose Absolute, the Memory Location will be sample-based and its bar|beat location *will* change if the tempo is changed. But its sample location *will not* change.

Bar|Beat Reference Markers appear as yellow chevrons in the Markers ruler and Absolute Reference Markers appear as yellow diamonds, so that you can distinguish between the two types of markers.
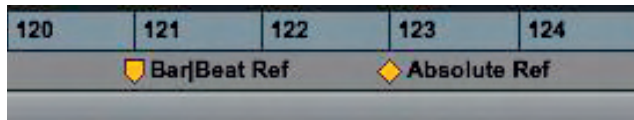
Setting the Time Scales

The Main Time Scale that you should choose for the session will normally be Bars:Beats for music production. This will be displayed as the Main Counter in the Transport window and at the top of the Edit window. This counter will also be used for the Start, End, and Length values next to the Main Counter; for the Grid and Nudge values in the Edit window; and for any Pre- and Post-roll amounts that you set.

You can also choose which Sub Counter Time Scale to display below each Main Counter. The obvious choice for music production would be Minutes:Seconds so that you always get some feedback about how long regions or complete sessions last.

> **Note**
>
> When the Main Time Scale is set to Bars:Beats and you are using tempo changes, you should set the Linearity Display Mode to Linear Tick Display. This will keep the Bars:Beats ruler fixed at the selected zoom level, and sample-based rulers such as Minutes:Seconds will scale to fit any tempo changes while bar lengths remain constant.

Meter, Tempo, and Click

If you intend to do anything but the most basic recording and playback of musical audio material, you will need to make sure that the bar and beat positions in the audio line up with the bar and beat positions in Pro Tools. It is absolutely essential that the bars correspond correctly if you want to be able to navigate to bar positions and use Grid mode and other features to edit your audio with ease. If you are recording musicians, you can generate a click for the musicians to play along. If they do this well, then the music they play will be in time with the click and will line up with the bar lines in Pro Tools.

Audio that is recorded without listening to a click can still be aligned to bar and beat boundaries in Pro Tools either by using Beat Detective or by using the Identify Beat command, but this can take some time. You can also record MIDI with or without a click and either manually add Bar|Beat Markers or generate a tempo and meter map using Beat Detective.

Creating a Click Track

In older versions of Pro Tools, the way to create a click track was to create a mono Auxiliary Input and insert the Avid Click plug-in or a virtual instrument plug-in or an external MIDI device to play the click. You can still do any of these things if you like, but in more recent versions, you can use the Create Click Track command, which you will find in the Track menu. When you choose this command, Pro Tools create a new Auxiliary Input track named "Click" with the Click plug-in already inserted and with the click track's Track Height conveniently set to Mini in the Edit window. To hear the click, you also need to highlight the Metronome icon in the Transport window by clicking this, or by pressing the "7" key on your numeric keypad, or by selecting "Click" in the Options menu.

Figure 3.6
The Click Plug-in.

> ### Tip
>
> To avoid cluttering up your Mix and Edit windows in Pro Tools, you can hide the click track using the "hide" feature in the Tracks List. If you solo-safe your click track (using a Command-Click [Mac] or Control-Click [Windows] on the track's solo button), you can hide your click track in the tracks list and use the "7" key on your numeric key pad to turn the click on and off at any time. Because the track is "solo safed," you will always hear the click when other tracks in your session are soloed.

You can use the Click/Countoff Options dialog, available from the Setup menu, to choose when the click should be active and to set the MIDI notes, velocities, and durations that should play if you are using a virtual instrument or an external MIDI device to produce the click sound. The MIDI parameters in the Click/Countoff Options dialog do not affect the Click plug-in—this is controlled

internally by the Pro Tools software. You can also set the number of count-in bars that you prefer and whether you want to hear these sounds every time you playback or only when recording.

> **Note**
>
> If you are using the internal Click plug-in, leave the Output popup set to "None." If you are using an external device or a software synthesizer to produce your click sound, you can choose this device or synthesizer using the Output popup.
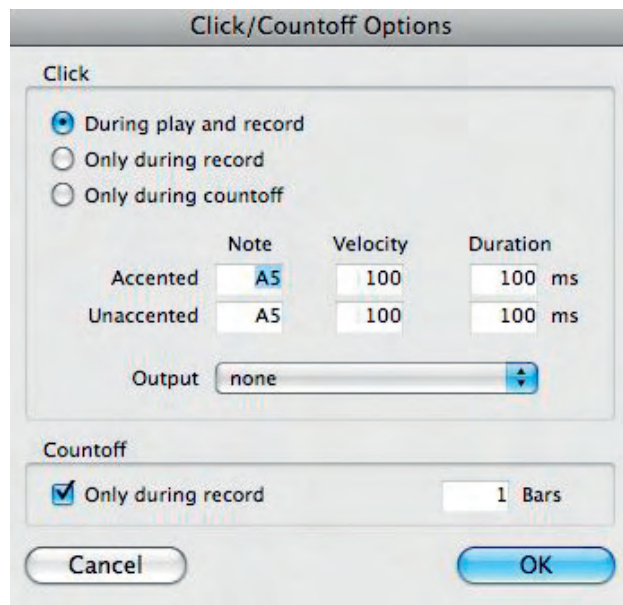

Figure 3.7
Click/Countoff
Options dialog.

Time Signatures and Clicks

When you are setting up a click for musicians to play along to, you may need to change the time signature if the music is not in the default 4/4 meter. This will be very obvious if the music is in time signatures 3/4 or 5/4 which are used in popular music. But it may not be quite as obvious if the music is in 6/8 or 12/8.

And if the music is in 6/8, for instance, you may find it better to use a dotted quarter note value for the click. This way, you would get two clicks in each bar. Otherwise, if you use an eighth-note click, this would give you six clicks in each bar, which can sometimes be distracting for the musicians.

To set the meter, double-click on the Current Meter display in the MIDI Controls to open the Change Meter dialog.
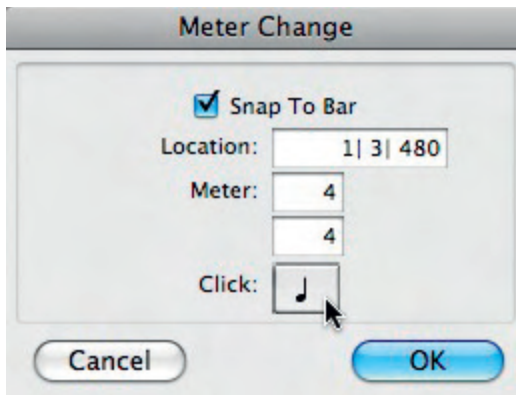
Figure 3.8
Double-click the
Current Meter
display in the MIDI
Controls to open
the Change Meter
dialog.

In this dialog window, make sure that you are at the correct location in your session by typing in the correct bar and beat, and tick values if these are not already correct. If the music uses the same time signature throughout, then you should enter this meter value at the start of your song or music composition. Obviously, if the meter changes anywhere in the song, you will also need to enter meter changes at these locations.
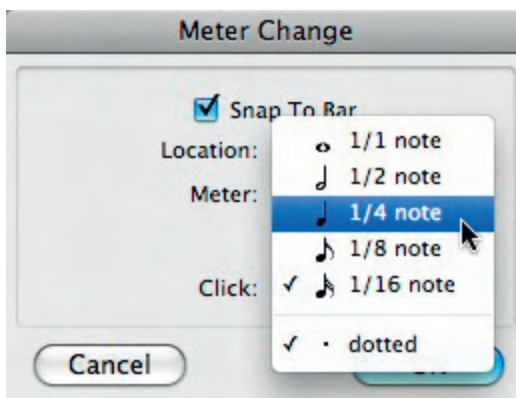
Figure 3.9
Changing the
Click resolution.

The Meter Change dialog window has a popup selector that lets you change the click "resolution."

Figure 3.10
Choosing dotted
1/4 note click
resolution.

Here you can choose the note subdivision that makes most sense to use. For example, you might choose a dotted 1/4 note resolution when you are in 6/8 meter so that you get just two clicks per bar.
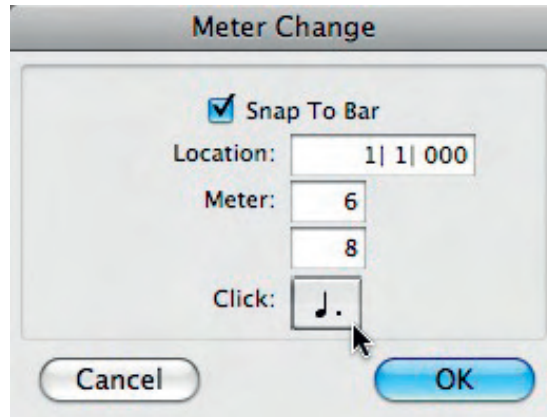
Figure 3.11
Meter set to 6/8
from bar 1, beat 1,
with the click
resolution set to
a dotted quarter
note.

Tempo

Tempo is one of the most fundamental aspects of music. After all, if there is no tempo, the music goes nowhere! And if the tempo becomes erratic, the music is not "working" properly. Also, when you are making a recording, getting the tempo to feel "right" can make all the difference between a successful recording and the one that does not inspire people to listen to it. Of course this can be a subjective matter that not everyone will agree about, but most musicians will perform much better on a particular piece of music if the tempo makes them feel "comfortable." And this good feeling will usually communicate itself to the listeners. So it is very important to pay attention to tempo!

Figure 3.12
Setting the tempo
using the MIDI
tempo controls.

Setting Tempo Manually

You can set a tempo for your session manually using the MIDI tempo controls in the expanded Transport window. When the Conductor icon is not selected, you can either type the tempo or drag the mouse pointer in the tempo field to change the tempo.

Tapping the Tempo

If you are trying to match the tempo of the session to the tempo of a recording of some music and you have no idea what this should be, just click on the numeric tempo field to highlight it, as in the screenshot (Figure 3.12), and tap on the "t" key on your computer keyboard. If you can tap accurately in time with the music, Pro Tools will work out the tempo from your taps and display this for you. Even if you don't get the tempo exactly right, you should at least be able to get this "into the right ballpark" very quickly using this method.

Using Tempo Events

When you have decided on a tempo for your session, it makes good sense to enable the Conductor track by selecting the Conductor icon in the Transport window and enter the correct tempo for your session into the Tempo ruler's Song Start Marker.

> ### Note
>
> The small, red Song Start Marker located at the beginning of the Tempo ruler defines the initial tempo of the Session and defaults to a tempo of 120 BPM. You can move the Song Start Marker by dragging it to the left or right in the Tempo ruler, but it cannot be deleted.

To edit the default tempo, go to the Tempo ruler and double-click the red Song Start Marker triangle at the start of the track to open the Tempo Change dialog.

Figure 3.13
Clicking on the
Song Start Marker
in the Tempo
Ruler.
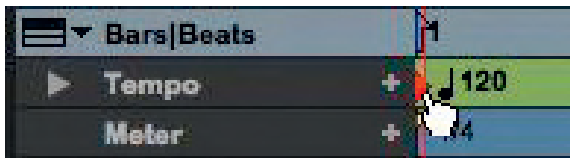
Type the tempo you want to use for your session in the BPM field and click OK to replace the default 120 BPM value at the start of the song.
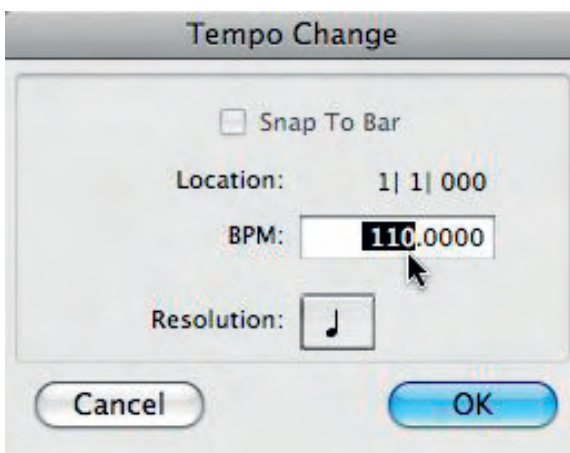

Figure 3.14
Tempo Change
dialog.

Building a Tempo Map

If you know what tempos you want to use for your music, you can build a tempo map for the Conductor track by inserting Tempo events into the Tempo ruler at the locations where you want the tempo to change.

To insert Tempo events, click in the Tempo ruler at the location where you want to insert the tempo event, and then click the Add Tempo Change button to the left of the Tempo ruler to open the Tempo Change dialog.

Figure 3.15
Adding a Tempo
Change to the
Tempo Ruler.
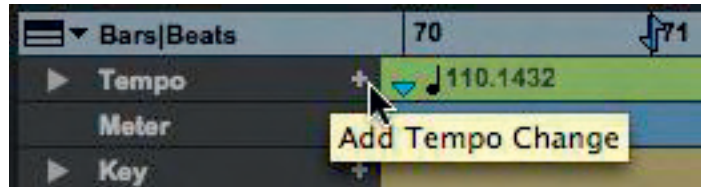
In the Tempo Change dialog, you can type the exact location where you wish to add the new tempo (very useful if you just clicked somewhere nearby this to open the dialog), type the new tempo in BPM, and click OK.

> **Tip**
> To save typing the location if you are close to this, you can tick the "Snap To Bar" option to place the new tempo event exactly on the first beat of the nearest bar.

Figure 3.16
Tempo Change
dialog with Snap
To Bar option
selected.
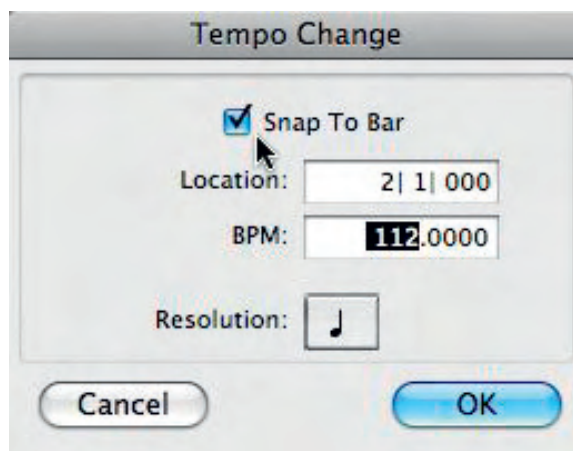
Editing Tempo Events

If you need to adjust the position of your Tempo events, you can simply drag these back and forth along the timeline. When you drag a Tempo event to a new location, the sample and SMPTE locations for the event are also updated, and any neighboring MIDI events and audio regions on tick-based tracks, along with the ruler, shrink or expand as necessary to adjust for the new tempo location. However, the BPM value for the dragged tempo event remains constant, as do any other Tempo events in the session.

To delete a Tempo event, you can simply Option-click (Mac) or Alt-click (Windows) on the Tempo event. To delete several Tempo events at once, drag to select these using the Selector tool and then press the Backspace key or choose Clear from the Edit menu.

If you double-click with the Selector tool in the Tempo ruler, all the Tempo events will get selected. You can then cut, copy, and paste these using the standard computer keyboard commands.

Tempo Operations

You can also apply tempo changes to a time selection using the Tempo Operations dialog, which you will find in the Event menu's Tempo sub-menu. There are six Tempo Operations windows to choose from here, including Constant, Linear, Parabolic, S-Curve, Scale, and Stretch.

The first of these, which you will probably use the most often, lets you set a constant tempo at a specified bar position or between two specified bar positions. The next three windows let you create a linear, parabolic, or S-curved "ramp" of tempo changes between a pair of specified bar positions. The final two windows let you scale or stretch existing tempos between the specified bar positions. Each window has a basic set of controls and a more advanced set that is revealed when you check the "Advanced" check box.

For instance, to change the tempo between specific locations (which returns to the original tempo afterwards), you would use the Constant Tempo Operations dialog. To see how this works, select, say, Bar 5 to Bar 7 by dragging the cursor along the rulers, and then open the Constant Tempo Operations window from the Event menu. Type the new tempo into the Tempo field and tick the box "Preserve tempo after selection." This causes the tempo to go back to the original value after selection of the new tempo.

To ramp up the tempo from one value to another using a series of equal increments over a range of bars, you can use the Linear Tempo Operations dialog to specify the selection of bars and beats, the start tempo, and the end tempo. Using the Advanced settings, you can also specify the resolution and density of the Tempo events that you are creating across this range of bars.
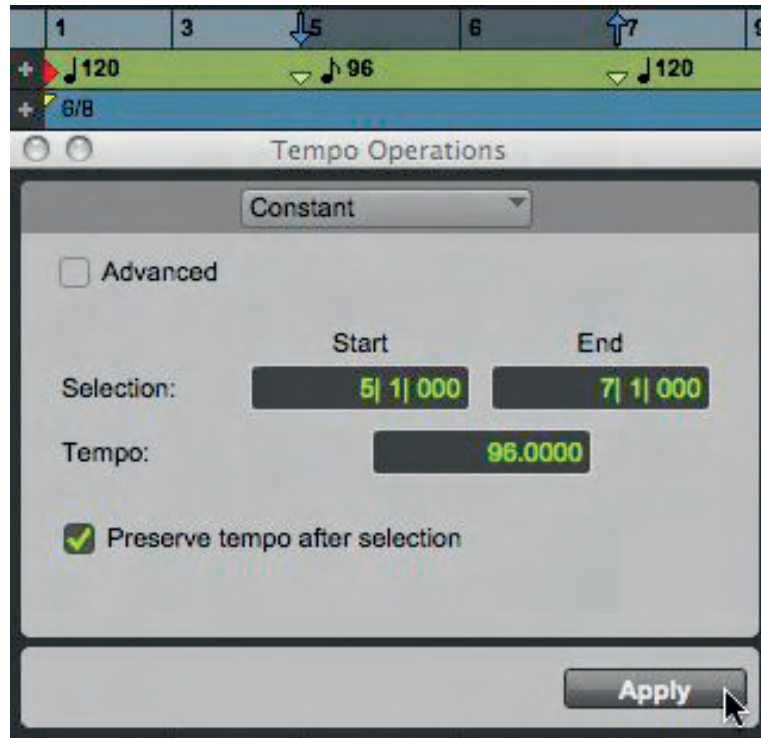
Figure 3.17
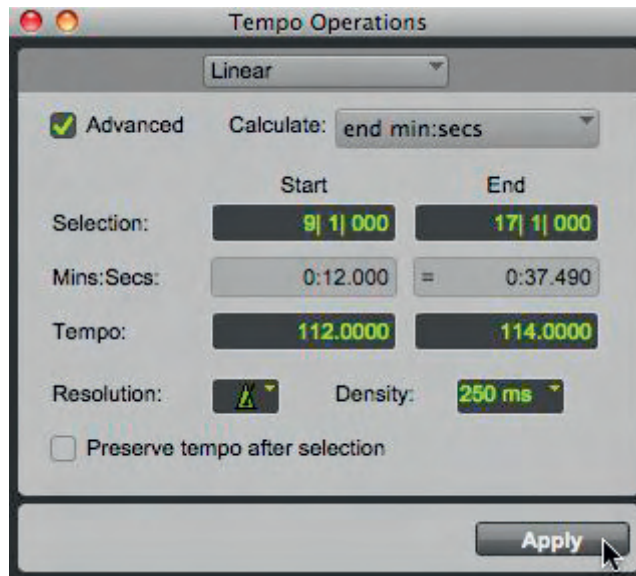Applying a constant Tempo change to a range of bars.

Figure 3.18
Using the Linear Tempo Operations dialog to ramp between tempos over a range of bars.

Graphic Tempo Editor

Pro Tools often provides various alternative ways of doing things and tempo editing is no exception! If you click on the small arrowhead at the left of the Tempo ruler, it will expand downwards to reveal the Tempo Editor. Here, you can see tempo information represented graphically.

> ## Note
> Tempo events are visible in the Graphic Tempo Editor only when the Conductor is enabled in the Transport window.

You can change the location or value of any Tempo events by dragging these to left or right, or up or down.
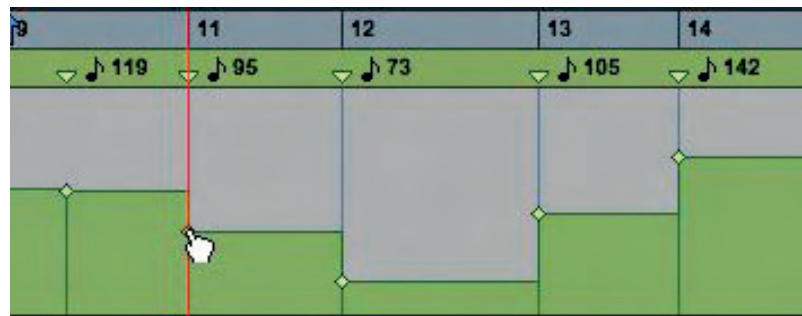

Figure 3.19
The Graphic
Tempo Editor.

Selected Tempo events can be copied and pasted, nudged, or shifted; and you can raise or lower any group of selected Tempo events using the Trimmer tool. First, make a selection that encompasses the Tempo events you want to trim, and then just click and drag up or down using the Trimmer tool.
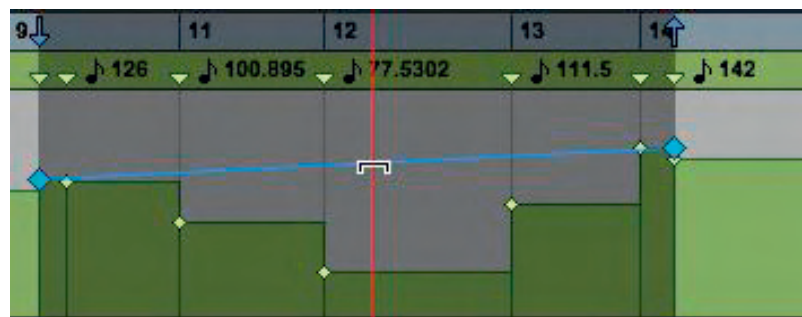

Figure 3.20
Using the Trimmer
Tool in the Graphic
Tempo Editor.

You can also "draw" in the new Tempo events, replacing existing ones, using the Pencil tool. The Line tool lets you draw straight lines, and with this tool, the Tempo values change in steps according to both the Tempo Edit Density and Resolution. There are seven drawing 'shapes' available for the Pencil tool. These can be selected by clicking and holding the mouse button down on the Pencil tool icon, moving the mouse to the required tool shape withe the button held, then letting go of the mouse button when the required tool shape is selected. The Free Hand tool lets you draw freely by moving the mouse, producing a series of steps that depend on the Tempo Edit Density setting. The Parabolic and the S-Curve tools let you draw the best possible curve to fit your freehand drawing, again producing a series of steps that depend on the Tempo Edit Density setting. The Triangle, Square, and Random Pencil tool shapes cannot be used to create Tempo events.

There are two popup selectors located at the left of the Tempo Editor that let you choose Tempo Resolution and Tempo Edit Density settings for the Tempo events that you draw. Using the "Res" popup selector, you can choose a Tempo Resolution or BPM rate by selecting a beat note value. The beat note value that you select will normally be based on the meter. For example, in 4/4, the beat would be a quarter note; and in 6/8, the beat would usually be a dotted-quarter note.
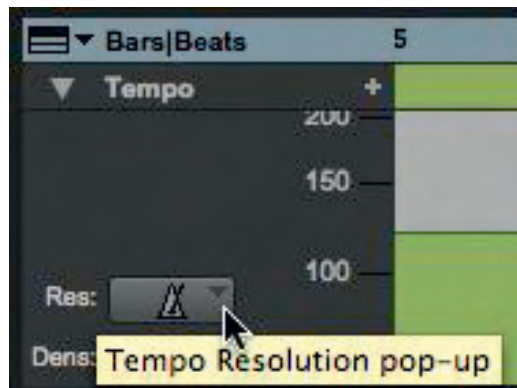
If you select Follow Metronome Click, Tempo events created by drawing with the Pencil tool will automatically mirror the click values set by Meter events in the Meter ruler.

> **Note**
>
> Although a tempo curve can have different BPM values if there are meter click changes within the selected range, it can be a complicated business to set Meter events separately for each Tempo event; so Avid recommends selecting Follow Metronome Click in most cases.
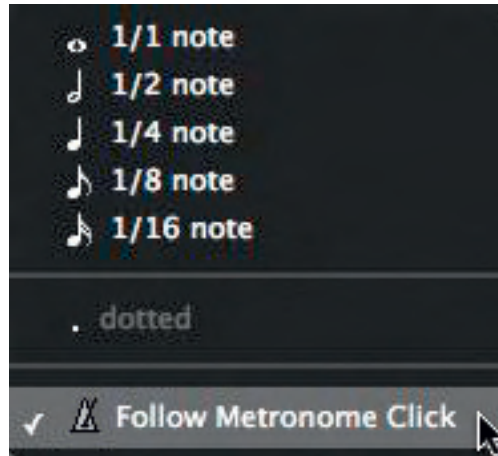
Figure 3.22
Tempo Resolution
selector.

The Tempo Editor also lets you specify the density of Tempo events created in the Tempo ruler when you draw a tempo curve with the Pencil tool. If you click on the Tempo Edit Density (Dens) selector, you can use the pop-up menu to select a suitable time value either as a note sub-division or in milliseconds.
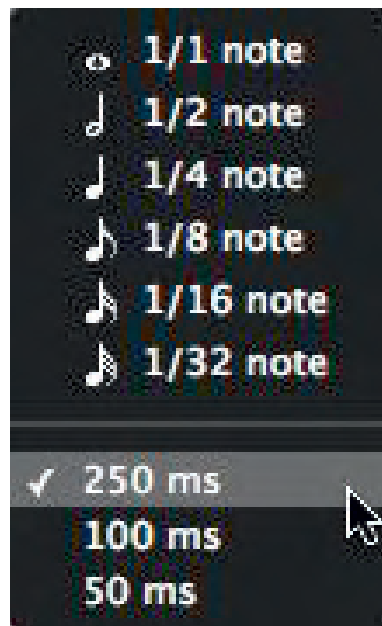

Figure 3.23
Tempo Edit
Density selector.

Changing the Track Timebase

By default, Pro Tools uses sample-based time for audio, measured in minutes and seconds, and tick-based time for MIDI, measured in bars and beats.

However, it is possible to change the Timebase of audio tracks to be tick-based or MIDI tracks to be sample-based.

If the track's height is set to medium or large, the Timebase selector button, with its tick-based or sampled-based icon, will be visible among the track controls. When you click on this, a popup selector appears, allowing you to change the Timebase for the track.
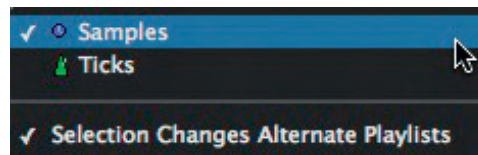
Figure 3.24
Timebase Selector.

Figure 3.25
Popup Timebase selector.

If the track's height is set to small or less, you can click the small arrow to the left of the Track Name to access the Track Options popup menu. Here you can choose the timebase using the Track Timebase submenu.
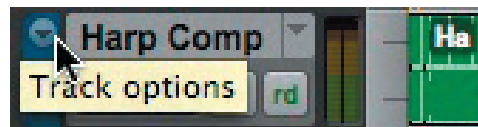
Figure 3.26
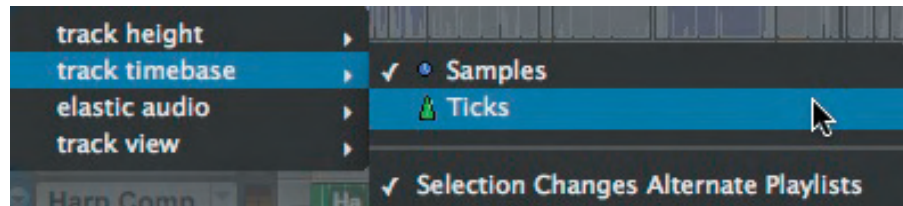Track Options arrow.

Figure 3.27
Track Options Timebase Sub-menu.

By default, when you change a track's timebase, the change is applied to any alternate playlists that exist on the track. If you want the change to be applied only to the active playlist, simply deselect the "Selection Changes Alternate Playlists" option.

> **Note**
>
> When you change the timebase for an audio track that is part of an active group, all the tracks in the group will change to the same timebase.

Sample-Based Audio and MIDI

Audio is stored as individual audio samples within audio files on disk. In Pro Tools, regions representing all or parts of these files are used to represent the audio on tracks in the Edit window. Audio tracks are designated by default as sample-based, so any particular audible sound is located at a particular sample location on the timeline. These locations are absolute locations in time, measured in samples from the start of the session.

If you change the tempo of the session, the bars and beats will move relative to the absolute (unchanging) locations of the sample-based audio regions, but these audio regions and the audio that you hear playing back will not be affected in any way.

> **Note**
>
> If you make a MIDI track sample-based, all the MIDI events in the track will have an absolute location on the timeline—just like sample-based audio regions—and these will stay fixed to this time location, no matter what tempo or meter changes take place.

Tick-Based Audio and MIDI

MIDI (and Instrument) tracks use tick-based timing, which tie events to bar|beat locations—not to sample locations. Tick-based locations are relative locations in time measured in bars, beats, and ticks from the start of the session. So, if you change the tempo of the session, a MIDI region located at a particular bar|beat location will not move—but the location of any sample-based regions in the same session *will* change relative to this bar|beat location.

If you increase the tempo on a tick-based track, the data plays back more quickly, and so the individual events take place sooner in time relative to any sample-based audio in the session. If you decrease the tempo, events will play back more slowly, and so the individual events will take place later in time relative to any sample-based audio in the session. Another way of thinking about this is to keep in mind that the bars and beats play back more quickly and last for a shorter time at faster tempos and vice versa.

If you are using Elastic Audio, REX, or ACID audio files; you will want to change the sample-based audio tracks to be tick-based, so that the tempo of the audio will automatically change when you change the tempo of the session.

> **Note**
>
> Pro Tools Elastic Audio uses exceptionally high-quality transient detection algorithms, beat and tempo analysis, and Time Compression and Expansion processing algorithms. Tick-based Elastic Audio tracks actually change the location of samples according to the changes in tempo, because the audio stretches or compresses to match these tempo changes.

Keep in mind that tempo changes will affect the locations of the start points (or the sync points if these are set differently) of any standard (i.e., non-Elastic Audio) audio regions in tick-based audio tracks. You can slice a drum loop into beats in Pro Tools, make the track tick-based, and it will play each slice back earlier or later according to the tempo—in a similar way to REX files.

> **Note**
>
> In tick-based audio tracks, the location of an audio region is determined by the region's start point, unless the region contains a sync point. If the region contains a sync point, the sync point determines where the audio region is fixed to the grid.

Time Scales and Tick Resolution

When you are working on music in Pro Tools, you will normally set the Main Time Scale to Bars:Beats with the Sub Counter Time Scale set to Mins:Secs. Because you are working with music, it will make most sense to use bar, beat, and tick values for a number of operations including placing and spotting regions, setting lengths for regions or MIDI notes, locating and setting play and record ranges (including pre- and post-roll), specifying settings in the Quantize and Change Duration pages of the Event Operations window, and setting the Grid and Nudge values. You would not normally want to set these using samples, although this may be useful at times.

With the tick-based Time Scale, the bars and beats are sub-divided into clock "ticks" with each quarter note represented by 960 ticks. This is often quoted as a tick resolution of 960 PPQN (pulses per quarter note), and all MIDI sequencers have a similar specification. Some MIDI sequencers have the same resolution as Pro Tools, while others offer less or more PPQN, and some allow you to select the resolution that you feel is appropriate.

> **Note**
>
> In Pro Tools, the actual internal MIDI resolution is 960,000 PPQN, with 960 PPQN used as the display resolution so that the numbers are more manageable.

The Linearity Display Mode

You can choose to view the timeline using either a Linear Sample scale or a Linear Tick scale that you can select using the Linearity Display Mode pop-up menu. The Linear Sample scale uses an absolute timebase while the Linear Tick Scale uses a relative timebase; so MIDI and Instrument tracks, audio tracks, and Tempo curves will look and behave quite differently depending on which of these you choose.

Figure 3.28
Linearity Display
Mode Selector.
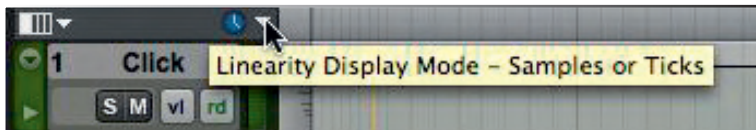
When you are working primarily with sample-based material, which is usually the case when recording or mixing audio, you should use the Linear Sample Display mode—especially if you intend to align the tempo and meter map to sample-based events. In Linear Sample Display mode, because the timeline display is sample-based, the locations of tick-based events such as bars and beats will shift whenever you change tempo. So, for example, the locations of the bars and beats will move to different time positions—as you will see if you display minutes and seconds on the sample-based timeline.

While using the Linear Sample display, the Min:Secs ruler shows each second occupying the same distance along the Timeline. In the screenshots shown here, you can see that the number of seconds displayed stays the same (with no change made to the zoom level), while the corresponding number of beats displayed depends on the tempo. At slower tempos, fewer bars and beats play back in a given time while at faster tempos more bars and beats play back in that same time interval. Another way of looking at this is to notice that, as the tempo increases, the length of the bars along the timeline gets shorter.

Figure 3.29 Each beat at 93 beats per minute occupies around 2.6 seconds. So in 4 seconds shown in this example, less than 2 complete bars will play back.
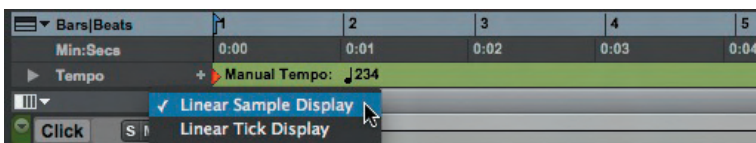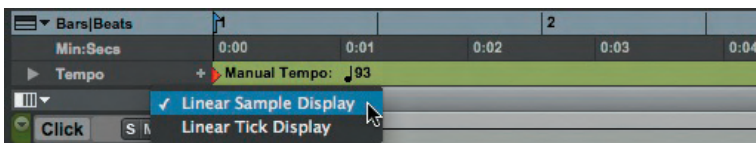

Figure 3.30 Each beat at 234 beats per minute occupies about 1 second. So with the Linear Sample display selected, you will see more bars playing back within the same number of seconds along the timeline—4 complete bars playing back in the 4 seconds displayed in this example.

When you are working with a tick-based material, such as MIDI notes or Elastic Audio events, you may find it more useful to switch to the Linear Tick Display mode. When you make tempo changes in Linear Tick Display mode, the bars and beats will remain fixed in the timeline, while sample-based events will move to different bar and beat locations along the timeline. In Linear Tick Display mode, all the bars are evenly spaced, whatever is the tempo. So, for example, sample-based audio regions will expand along the timeline as you increase the tempo—although they will still play back the audio that they contain in the same length of time. Tick-based material, such as MIDI notes or Elastic Audio material on tick-based tracks, will play back at whatever tempo you set the session to.
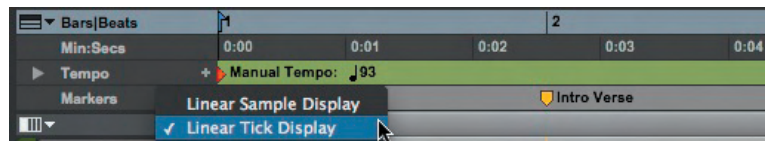

Figure 3.31 At 93 BPM, about one and a half bars are displayed here in Linear Tick mode, while the time elapsed shows 4 seconds.
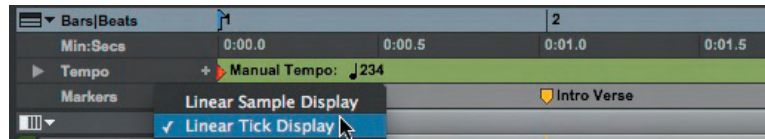

Figure 3.32 At 234 BPM, one and a half bars are still displayed with the timeline display in Linear Tick mode (with no change made to the zoom level), but the time elapsed shows one and a half seconds.

Tip

You should use Linear Tick Display when drawing tempo changes, for example, because using the Linear Sample Display causes Bar|Beat-based material to move, making it awkward to work on tick-based material such as Tempo events.

Note

When the Tempo Edit Density setting (in the Tempo Editor) and the Linearity Display Mode setting are both set to either a Bars|Beats Time Scale or to an Absolute Time Scale, Tempo edits appear evenly spaced. When one of these is set to an absolute Time Scale and the other to a Bars|Beats Time Scale, the number of Tempo edits will appear to increase or decrease over time (against absolute time).

Tempo Events and Bar|Beat Markers

Tempo events are intended for use with tick-based tracks, while Bar|Beat Markers are for use with sample-based tracks. They cannot be mixed; therefore if a session contains Tempo events and you insert Bar|Beat Markers, the existing Tempo events are converted to Bar|Beat Markers (and vice versa).

> ### Note
> Tempo events are displayed as small green triangles in the Tempo ruler. Bar|Beat Markers look similar to Tempo events, but are blue in color.

Tempo events can be manually converted to Bar|Beat Markers and vice versa using the Tempo Ruler popup menu. When you hold down the Command (Mac) or Control (Windows) key on your computer keyboard and click the "Add Tempo Change" button, the Tempo ruler popup menu opens, where you can select which of these you wish to use.

Figure 3.33
Clicking while holding the Command (Mac) or Control (Windows) key to convert Tempo events to Bar|Beat Markers.
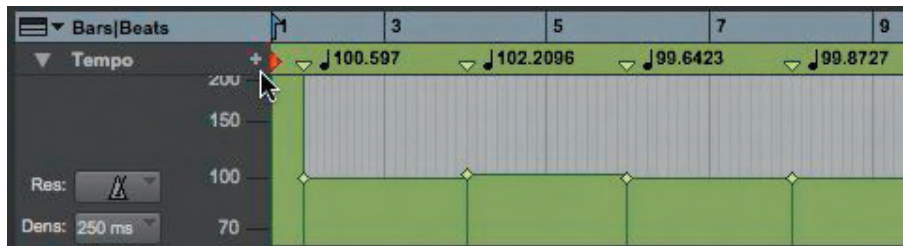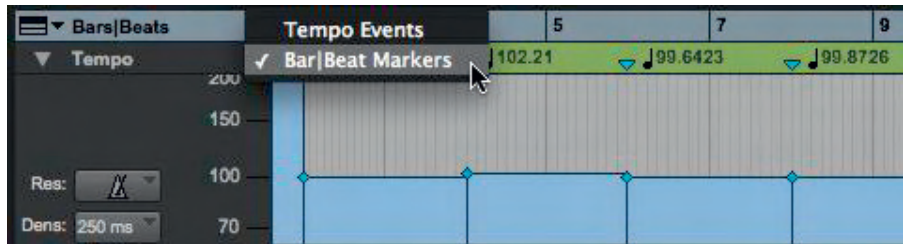

Figure 3.34
Using the Tempo Ruler popup menu to change Tempo events to Bar|Beat Markers.

> ### Note
> If you build a tempo map in a MIDI sequencer such as Digital Performer, Logic, or Cubase and then transfer this to Pro Tools using a MIDI file, this tempo map will appear as Tempo events in Pro Tools.

If you are working primarily with MIDI instruments in Pro Tools, it makes sense to use Tempo events for any tempo changes. On the other hand, if you are working primarily with audio and you want to map out where the barlines and beats fall within the audio material that was not recorded to a click, it makes better sense to use Bar|Beat Markers.

Building a Tempo Map by Inserting Bar|Beat Markers

You can insert individual Bar|Beat Markers anywhere in the timeline by setting an Edit insertion point (instead of making a selection) and then using the Identify Beat command. The ability to identify each individual beat is particularly useful when you just need to make a few corrections to tighten up the correspondence between the Pro Tools bars and beats and the audio that you are working with. If the tempo gets a little faster or slower, even within a bar, you can easily insert a new Bar|Beat Marker to make sure that Pro Tools keeps in step with your audio.

In the example shown, this drumbeat was played a little late at bar 68, beat 4, clock tick 22.
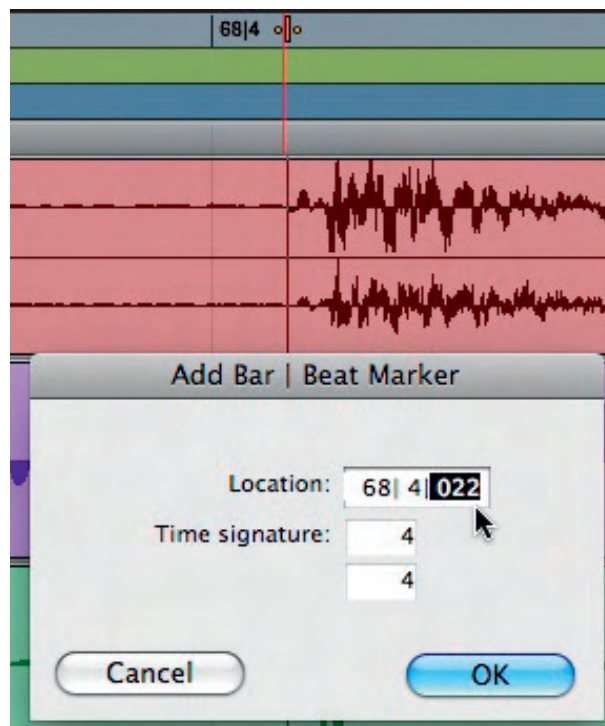

Figure 3.35
Inserting a Bar|Beat Marker at an Edit insertion point.

To move the beat in Pro Tools to correspond with the actual drum beat, make an Edit insertion point using the Selector tool at the beginning of the beat and then use the Identify Beat command to open the Add Bar|Beat Marker dialog. Use this dialog to tell Pro Tools that this Edit insertion point is where this beat is supposed to be, by typing the correct bar beat and clock tick location. When you click OK in the the dialog, Pro Tools inserts a beat marker at this point along with a tempo event that adjusts the Bar|Beat location to correspond with this point.
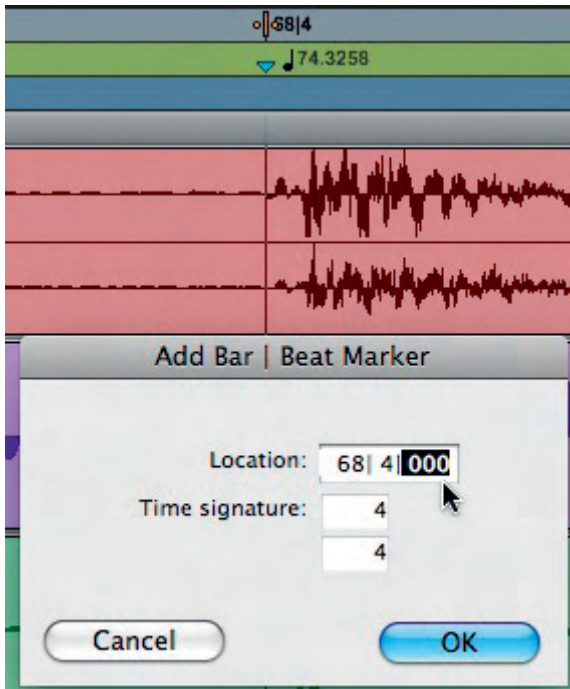
Figure 3.36
Bar|Beat Marker
inserted into the
Tempo Ruler to
make the beat
in Pro Tools
correspond with
the actual beat in
the audio.

Tip

To delete a Bar|Beat Marker, just hold down the Option (Mac) or Alt (Windows) key, move the cursor over the Bar|Beat Marker, and click.

When you have your Bar|Beat Markers in place, you may need to finely adjust the locations to position these even more accurately—dragging each marker, as necessary, to align with the associated beat within the audio.

Note

When you drag Bar|Beat Markers back and forth along the timeline to re-position their locations, neighboring MIDI data get adjusted to align with the new tempo map.

Re-Positioning Bar|Beat Markers

Because Bar|Beat Markers are sample-based, they behave differently from tick-based Tempo events when you drag them in the Tempo ruler. When you drag a Bar|Beat Marker, its bar and beat location is dragged *with* the Bar|Beat Marker. This location does not change.

So, for example, if the Bar|Beat Marker was originally placed at 3|1|000, it will still be at this location (unless you specifically change this). However, its BPM value is recalculated along with the BPM value of the Bar|Beat Marker to its immediate left. Also, the Bar|Beat Marker's sample and SMPTE locations will be recalculated according to the new tempo of the Bar|Beat Marker. Bar|Beat Markers to the right of the dragged marker remain unchanged. Neighboring MIDI events, along with the Bars|Beats ruler, shrink or expand as necessary to adjust to the new tempo.

If you want to change the bar and beat location of a Bar|Beat Marker, you must use the Edit Bar|Beat dialog instead. If you double-click on a Bar|Beat Marker, the Edit Bar|Beat dialog opens, where you can make changes to its bar and beat location and also change the time signature if you wish.
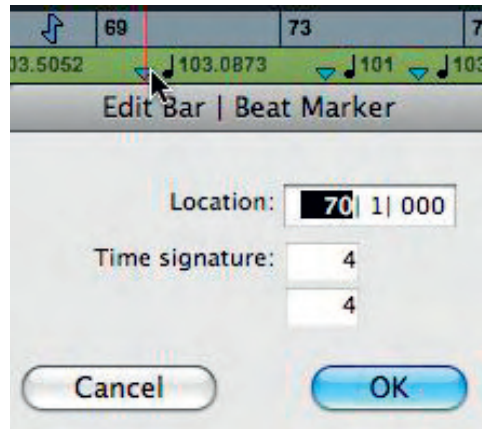

Figure 3.37
Edit Bar|Beat
Marker dialog.

Time Operations

The Time Operations window provides four important functions controlled on separate pages. You can use this to change the meter, Insert or cut time, or move the song start position.

Setting the Meter

Pro Tools defaults to 4/4 meter, which is the time signature of most of the popular music. If you want to work in other meters such as 3/4 (waltz time) or 5/4 (like Dave Brubeck's jazz hit "Take Five") or with the changing meters that are used in various forms of music such as classical and orchestral film scores, then you will normally need to set these before you start recording.

To open the Meter Change dialog, you can either click on the "+" sign in the Meter ruler or double-click on the displayed time signature in the MIDI controls section of the Transport window.
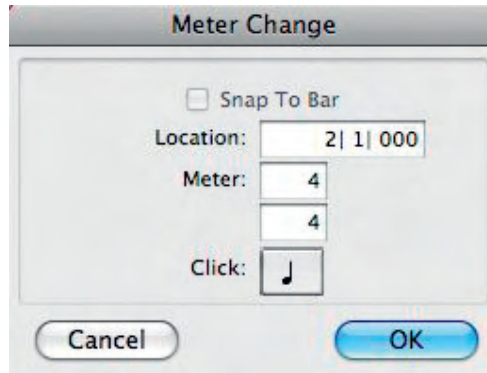
Figure 3.38
Meter Change
window.

Alternatively, you can use the Change Meter dialog, which you can select from the Event menu's Time Operations sub-menu.

Figure 3.39
Time Operations
Change Meter
dialog.

One situation where you will need to map out tempo or meter changes is when you have recorded a musician playing without a click, perhaps to capture an improvised performance. This could involve meter changes where the musician plays a bar of 3/4 or a bar of 5/4 by just "feeling" how many beats to play in a particular section. Sometimes this is done deliberately and sometimes not, but whatever the reason, you can use the Tempo and Meter rulers to follow.
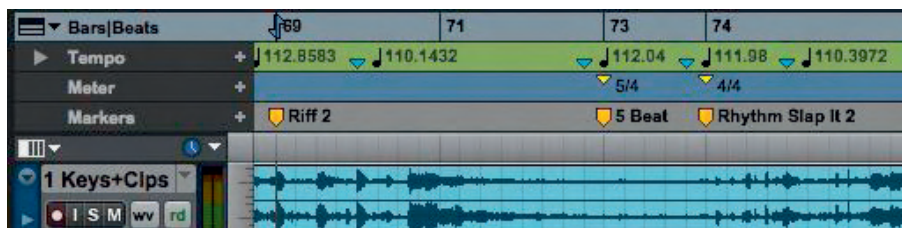

Figure 3.40
Tempo, Meter,
and Markers
rulers constructed
to follow an
improvised
performance.

Insert or Cut Time

When you are working on your musical arrangements, it is quite likely that you will need to insert some bars or remove some bars at some time or other.

You could just move everything in your session forwards or backwards by inserting or deleting the correct number of bars, but this can be quite awkward and is not what you usually want to do. Pro Tools has features that enable you to do this conveniently and properly—adding or removing "time" to or from the timeline.

The Insert Time dialog lets you insert time from any particular start location and lets you specify the amount of time you wish to insert in terms of bars, beats, and clocks. It also moves any tempo markers forward from the insertion point.

Figure 3.41 Insert Time dialog.

The Cut Time dialog lets you remove time, starting from any particular start location, and lets you specify the amount of time you wish to remove in terms of bars, beats, and clocks. This also moves any tempo markers backward from the insertion point.

Figure 3.42
Cut Time dialog.

Move Song Start

Sometimes you may need to move the actual start point of the song. Pro Tools provides a dialog to let you specify the bar, beat, and clock location that you want to move it to. Normally, all tick-based markers and tracks will move, along with any meter and Tempo events. You can choose whether or not to move sample-based markers and track.

Figure 3.43
Move Song Start
dialog.

Key Signatures

Pro Tools provides a Key Signature ruler for adding key signatures to Pro Tools sessions. Key signatures are an important part of any musical composition that will be displayed as notation for musicians to read. Now that Pro Tools has Score Editor and separate MIDI Editor windows, it is becoming much more likely that you will need to enter key signatures as necessary into the Key Signature ruler for each Pro Tools session. The default key signature is C major, but it is highly unlikely that every piece of music you work on will be in this key!

Key signatures can be imported and exported with MIDI data. This is especially useful when exporting MIDI sequences for use in notation programs like Sibelius and can save you lots of time if you have an existing MIDI sequence to import, so as to help you get started with your music production.

All MIDI and Instrument tracks in Pro Tools now have an option called Pitched. When this is enabled, these tracks will automatically be transposed or conformed to any key signature changes—although this should be disabled on drum tracks (which should not normally be transposed). You can also make quick transpositions using the Real-Time Properties for any track or region.

The Key Signature Ruler

The Key Signature ruler lets you add, edit, and delete key signatures. You can use key signatures to indicate key and key changes in your Pro Tools session. Key signatures can also be used for various other functions such as transposing in key or constraining pitches to the specified key.
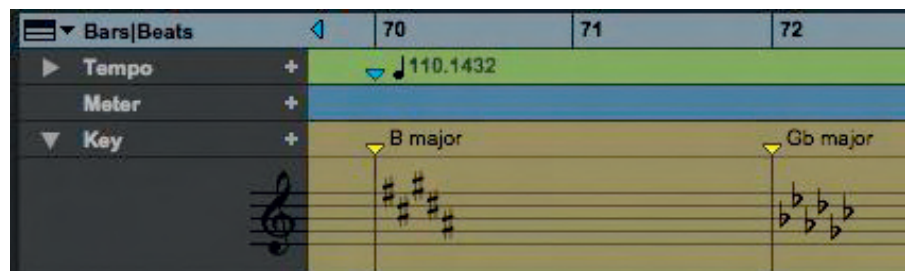

Figure 3.44
Key Signature ruler.

To view the Key Signature ruler, select it using the Rulers sub-menu in the View menu or from the popup View selector near the top left of the Edit window. If you click on the small Show/Hide triangle at the left of the Key ruler, the Key Signature Staff will be revealed.

To the right of the ruler's name in the Edit window, there is a small "+" button that can be used to add a key signature at the current timeline position. Alternatively, you can choose "Add Key Change" from the Event menu. Using the Key Change dialog that appears, you can select the mode (major or minor),

the key, its location and range, and how you want it to affect pitched tracks. You can also edit an existing key signature by double-clicking its marker in the Key Signature ruler to open the Key Change dialog.

To delete a key signature, simply Option-click (Mac) or Alt-click (Windows) the Key Signature Marker in the Key Signature ruler. Another way to do this is to make a selection in the Key Signature ruler that includes the key signature you want to delete and choose Clear from the Edit menu or press Delete.

The Key Change Dialog

Using the Key Change dialog, which opens whenever you add (or double-click to edit) a Key Signature Marker, you can choose whether the key should be major or minor, select from any of the flat keys or sharp keys, specify a range of bars throughout which the key change will apply, and choose whether or not the existing MIDI notes on pitched tracks should be transposed or constrained to the key.
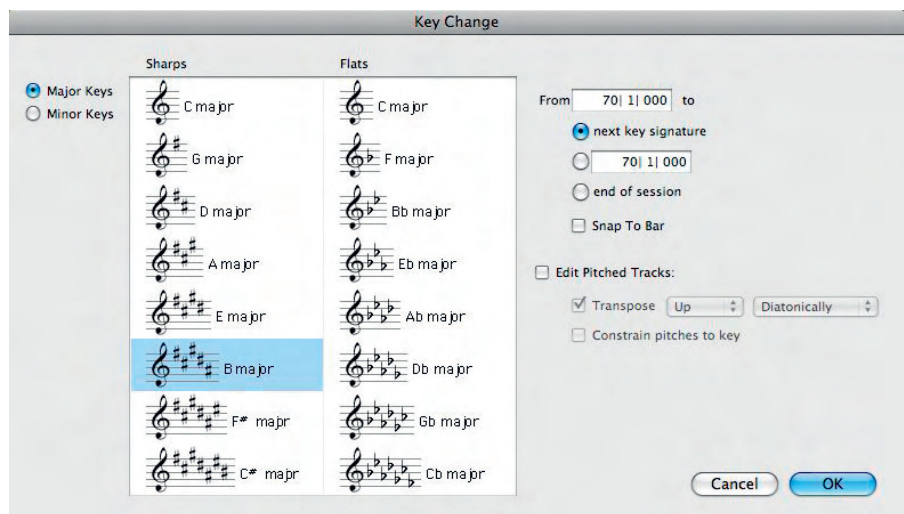

Figure 3.45
Key Change dialog.

You can view the sharp keys in the left hand column and the flat keys in the right hand column. To the left of these columns is a pair of "radio" buttons, which lets you select major or minor keys (from the natural minor mode). To the right of the key change columns, there are various options. You can specify the Bar:Beat locations at which and until which the key change will be applied (to the next Key Signature Marker, to a selection, or to the end of the session). An option is also available to "snap" the Key Signature Marker to the bar line, which can sometimes be useful.

Enabling the "Edit Pitched Tracks" option lets you transpose existing MIDI notes on Pitched tracks up or down, either diatonically or chromatically based on the key change—or you can constrain pitches to the new key.

For example, if the session is in C major and you want to change the key to D minor, you would select "Edit Pitched Tracks," "Transpose," "Up," and "Diatonically." When you click OK in the dialog, notes on Pitched tracks will be transposed up a whole step and then the third, sixth, and seventh scale degrees will be lowered by a half step to make the key minor. Specifically, the notes C, D, and E would be transposed to D, E, and F natural. If you transpose these notes chromatically instead of diatonically, E would be transposed to F sharp instead.

So, diatonic transposition alters notes to make them conform to the type of key change that you want, whether major to minor or minor to major. Any chromatic note alterations that exist in the material being transposed, such as a flattened 7th, are left unaltered by diatonic transposition. So, for example, if you change the key from C major to E major and there is a Bb note among those you have selected for transposition, the B-flat will be transposed to D-natural—which is the flattened 7th note in the scale of E major.

The "Constrain Pitches To Key" option lets you constrain pitches to the notes of the new key. When you use this option, any diatonic pitches of the old key on Pitched tracks that are not in the new key are individually transposed to the nearest diatonic pitch of the new key, while notes that are in the new key are left untouched.

For example, when changing from C major to D major, the sequence of notes C, D, E, F, and G will become C-sharp, D, E, F-sharp, and G. The way this works is that C gets transposed to C-sharp which is in the scale of D major; D is not transposed because it is already a valid note in the scale of D major; E is not transposed because it is already a valid note in the scale of D major; F gets transposed to F-sharp which is in the scale of D major; and G is not transposed because it is already a valid note in the scale of D major.

Constraining pitches to key also constrains any chromatic pitches to the new diatonic scale. For example, going from C major to D major, the sequence of notes C, D, D-sharp, and E will be changed to C-sharp, D, D, and E. The way this works is that C gets transposed to C-sharp which is in the scale of D major; D is not transposed because it is already a valid note in the scale of D major; D-sharp is moved to D to keep it within the scale of D major; and E is not transposed because it is already a valid note in the scale of D major.

Diatonic versus Chromatic

This is most simply explained by discussing the notes on the piano keyboard: When you play the black and white keys of a piano one after the other, this is called the chromatic scale and always consists of a series of semitone intervals.

A diatonic scale is what you hear when you play the white keys of the piano one after the other. If you start on C, you get a major scale, also known as the Ionian mode. If you start on A, you get the natural minor scale (the descending form of the melodic minor scale), also known as the Aeolian mode. If you start

on any other note, you get one of the other "church modes": the Dorian starting on D, the Phrygian starting on E, the Lydian starting on F, the Mixolydian starting on G, or the Locrian starting on B. You can also play a major scale starting on any black key and derive diatonic scales from this in a similar way.

Diatonic intervals are understood to be the intervals between pairs of notes taken from the same diatonic scale. Any other intervals are called chromatic intervals. Diatonic chords are understood to be those that are built using only the notes from the same diatonic scale; all other chords are considered to be chromatic. The meanings of the terms diatonic note and chromatic note vary according to the meaning of the term "diatonic scale," which is defined slightly differently by different authorities. Generally—not universally—a note is understood as diatonic in a context, if it belongs to the diatonic scale that is used in that context; otherwise it is chromatic.

Pitched Tracks

MIDI and Instrument tracks are regarded as "pitched" tracks, because MIDI note data specifies the pitch of the notes. Normally, you will want these tracks to be affected by transpositions due to key changes. But if these tracks are controlling drum machines or samplers, the opposite is true: you normally will not want these tracks to be affected by key changes because it would mess up the key mappings that cause particular drums or samples to be played.

Pro Tools allows you to override the default "pitched" behavior on individual tracks using the track's Playlist selector. Simply deselect the Pitched option (so that it has no tick mark next to it in the Playlist selector) for specific MIDI and Instrument tracks—and these won't be affected by key changes.
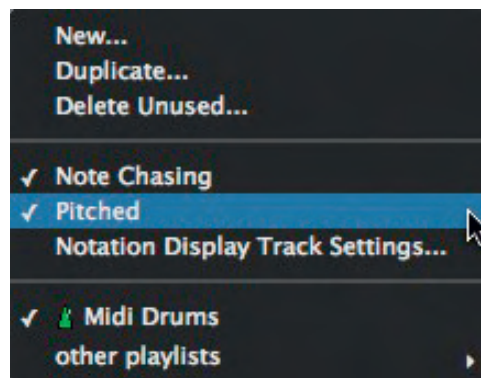

Figure 3.46
Using the Playlist selector to deselect the Pitched option.

Diatonic Transposition

Various diatonic transposition options are available from the Transpose dialog, which you can access using the Event Operations sub-menu in the Event menu. The Transpose Event Operations dialog allows you to transpose by octaves and

semitones, or from one specified pitch to another, or to transpose all the notes you have selected to a specified pitch. It will also allow you to transpose in key, up or down, by scale steps. For example, if you have a sequence of notes that you want to double in thirds, you can simply copy this to a new track, select the MIDI notes on the new track, and transpose them up by two scale steps. In C major, for example, the sequence C, D, and E would be transposed to E, F, and G.
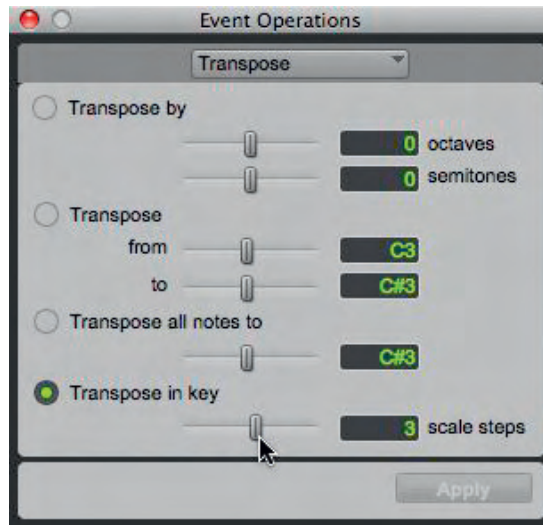

Figure 3.47
Event Operations
Transpose dialog.

You can also use the track-based MIDI Real-Time Properties or the MIDI Real-Time Properties window from the Event menu to transpose up or down by octaves and semitones, to a named pitch, or to a key.
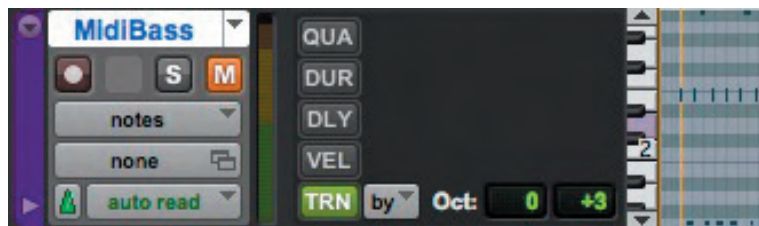

Figure 3.48
Track-based MIDI
Real-Time
Properties
Transposition
feature.

Both of these have a Transpose Mode popup selector that lets you choose the type of transposition that you want. The default is to transpose by octave and/or semitone. You can also transpose to a specified pitch or in key.

Changes that you make using either the track-based MIDI Real-Time properties or the Real-Time Properties window are reflected in the other.

You can also apply MIDI Real-Time properties to any region on a track by selecting the region and opening the Real-Time Properties window from the Event menu.

Figure 3.49
MIDI Real-Time
Properties window
Transposition
feature.

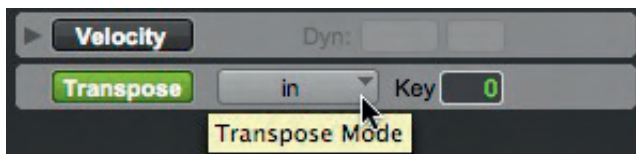**Figure 3.50**
Transposing to a
specified pitch.

Figure 3.51
Using the
Transpose Mode
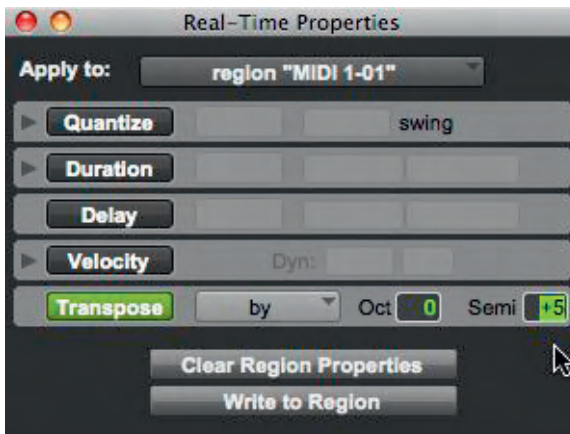button to choose
Transpose in Key.

Figure 3.52
Region-based Real-
Time Properties
window.

Elastic Audio Region-Based Pitch Transposition

Elastic Audio can be used to change the pitch of audio regions in real time, in semitones and cents, by up to two octaves above or below the original pitch. However, just because it can change the pitch within this incredibly wide range doesn't mean that it can do this without introducing artifacts into the sound—and it does! Even when using the non-realtime X-Form rendering, you may hear warbling, phasing sounds in the pitch-shifted audio, even when you shift the pitch by as little as 1 semitone! Nevertheless, the pitch does shift, allowing you to quickly find out if things are "working" musically or not.

> **Tip**
>
> It can often be useful to shift the pitch of a musical part to assess how this would sound in a different key before going to the trouble of re-recording the part in the new key.

To apply a pitch-shift, Elastic Audio must be enabled for the track first, choosing the Polyphonic, Rhythmic, or X-Form algorithm.

Figure 3.53
Enabling Elastic Audio.

With Elastic Audio enabled on the track, select any whole region or regions within the track using the Grabber or Selector tool and then open the Elastic Properties window from the Region menu or by pressing Option-5 (Mac) or Alt-5 (Windows) on the numeric keypad. In the Elastic Properties window, you can enter the pitch shift in semitones and cents.

You can also use the Transpose window to transpose the pitch of audio regions on Elastic Audio-enabled tracks. As with the Elastic Properties window, only the regions that are completely selected will be affected. In the Transpose window, you can either transpose by octaves and semitones or you can use the "Transpose From and To" settings to transpose from one specified key note to another.
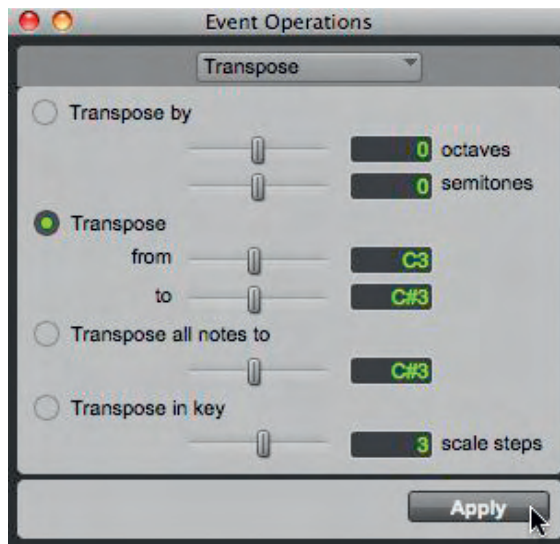
Figure 3.54
Elastic properties
window.

Figure 3.55
Event Operations
Transpose window.

Note

The "Transpose All Notes To" and the "Transpose In Key" settings can *only* be applied to MIDI notes, so these options are not active when you select audio regions.

Removing Region Pitch Shifting

If you have applied any pitch shifting to a region and you are not happy with the results, or change your mind later on, you can always remove this pitch shifting and revert the region to its original pitch.

To remove any pitch transposition applied to a selected region, you can either open the Elastic Properties window or Transpose window and remove the transposition (changing either of these, changes the other) or you can use the Remove Pitch Shift command from the Region menu—which is faster.

> **Note**
>
> You can only use the Remove Pitch Shift command with regions—and not with region groups. If you need to remove pitch shifting from the regions within a group, ungroup the region first, then remove the pitch shift from the individual regions, and then regroup the regions.

Elastic Audio Tempo Changes

Regions on tick-based, Elastic Audio-enabled tracks will automatically have Time Compression and Expansion (TCE) applied to alter the playback speed of the audio based on any tempo changes. So if you make simple changes to the tempo, the tempo of these audio regions will automatically follow.

> **Note**
>
> Tempo changes will not affect sample-based tracks, even if Elastic Audio enabled.

To Make Audio Tempo Follow Session Tempo

To have the tempo of your audio tracks speed up or slow down when you change the tempo in your Pro Tools session, simply click on the popup Elastic Audio Plug-in selector in the Track Controls area of the track containing the audio you want to affect and choose the Elastic Audio plug-in that best suits your track material and the effect you are trying to achieve.

Options include Polyphonic, Rhythmic, Monophonic, Varispeed, and X-Form. For example, with a stereo mix that you want to speed up or slow down without changing pitch, you will normally get the best results using the Polyphonic algorithm.

Real-Time Processing will be selected by default. The audio region in the track will temporarily go offline and the waveform will be grayed-out for a short time until the analysis is completed.

Make sure that the track's timebase is set to Ticks, instead of Samples. Then all you need to do is to move the Manual Tempo up or down, and the tempo will follow immediately—it couldn't get much easier than this!
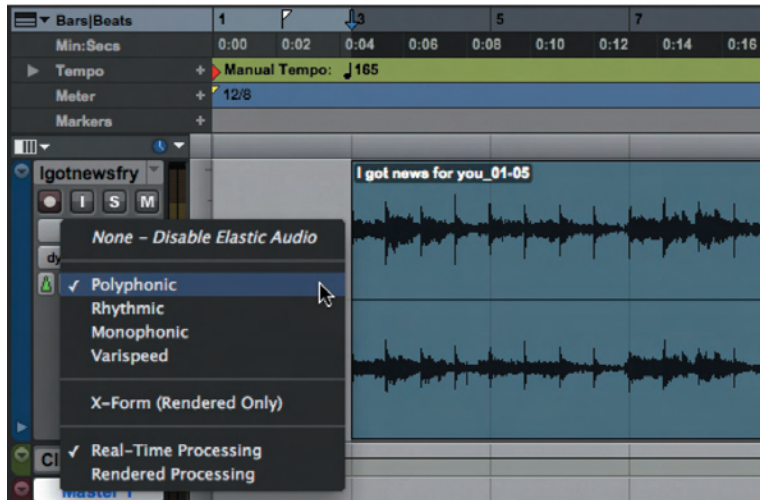
Figure 3.56
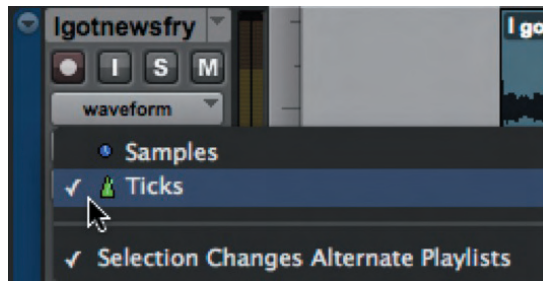Enabling Elastic
Audio Polyphonic
Real-Time
Processing.

Figure 3.57
Changing the
track timebase to
Ticks.

Tip

To change the tempo manually, first make sure that the Conductor icon is
deselected in the Transport window. Use the mouse to point, click, and hold,
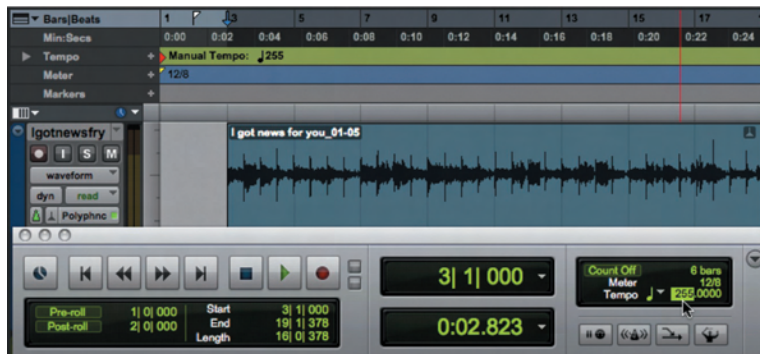and then drag up or down on the tempo field in the Transport window.

Figure 3.58
Changing the
tempo of an Elastic
Audio-enabled
track.

> **Note**
>
> Although the tempo of the audio will change when you change the session tempo, the audio will not necessarily match the tempo of the session—unless the tempo of the audio is constant and you originally set the tempo of the session to match this.

> **Tip**
>
> To match a recording with changing tempos to the session tempo, you need to use Elastic Audio's advanced Warp matching features.

Conform to Tempo Command

A quick way to make the tempo of an audio region conform to a fixed session tempo is to use the Conform to Tempo command. Assuming that a tempo is already set in Pro Tools, all you need to do is enable one of the Elastic Audio's analysis modes on the track containing the audio region.

When you select an audio region within the track, the Conform to Tempo command becomes available in the Region menu. If you go ahead and choose the Conform to Tempo command, it analyzes the selected region to determine its tempo and duration in bars and beats. If the tempo of the region is different from the tempo of the session, Elastic Audio processing is then automatically applied to match the tempo of the region to the tempo of the session.

> **Note**
>
> The Conform to Tempo command can only be applied to regions and cannot be applied to region groups. To conform region groups to the tempo, you must first ungroup the region group, then apply Conform to Tempo to the underlying regions, and then regroup those regions.

Beat Detective

An alternative way of conforming audio to the tempo of a Pro Tools session is to use Beat Detective. Unlike Elastic Audio, Beat Detective does not use time compression/expansion. This has the advantage that it does not affect the quality of the audio that has been conformed. It may introduce audible glitches where regions have been separated, but an Edit Smoothing capability helps to alleviate this problem.

For example, Beat Detective can split beats in a drum part into separate regions that can then be moved to line up with the bars and beats grid in Pro Tools.

Take a look at the accompanying screens to see how this works with a clave pattern played using sixteenth notes. Although these are quite close to the correct bar/beat positions, they are not exact.

Using Region Separation, first capture the selection—checking that the start and end points are correct, the time signature is correct, and that you have chosen the correct beat sub-divisions (1/16 note in this case)—and then analyze this to find the beats within the selection. With this done, you can click the Separate button to split the selection into regions—each containing just one of the beats.

Figure 3.59
Region Separation using Beat Detective.
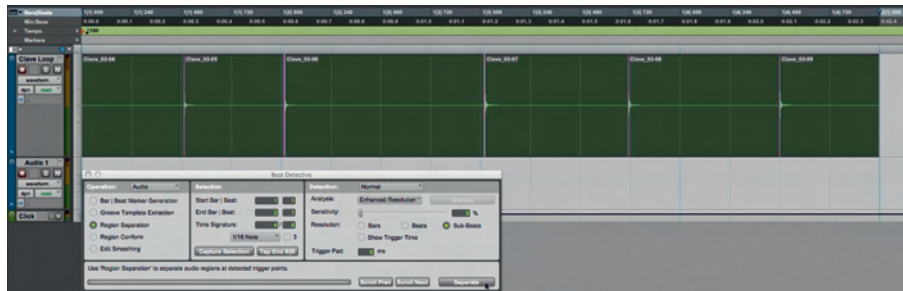
The next step in the process is to use the "radio" buttons at the left of the Beat Detective window to switch to Region Conform, hit the Conform button, and watch the beats/regions move to line up with the barlines!

Figure 3.60
Region Conform using Beat Detective.
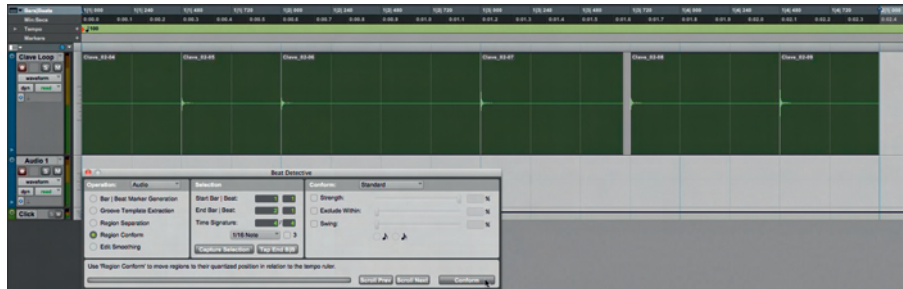
Typically, you will find that moving the regions will leave one or more gaps, which may be audible. Beat Detective offers a "quick fix" for this. Having separated and conformed the regions, you can switch to the Edit Smoothing operation and choose whether to simply fill the gaps (automatically trimming the region endpoints to fill the gaps) or to fill and crossfade (which also adds a few milliseconds of pre-fade before each region start point to further reduce the possibility of hearing these edit points). When you click Smooth, everything is adjusted for you automatically—which can save a lot of editing time if there are lots of gaps to fill.
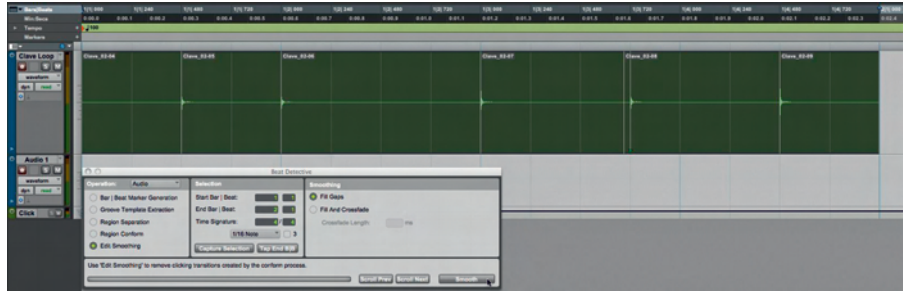
Beat Detective is a versatile tool, which is well worth exploring and learning how to use. Many engineers prefer to use Beat Detective's Collection mode when working with drumkits to conform the drums to the session tempo—or to have the session tempo follow the drummer's beats.

Summary

Having control of the tempo, meter, and key signature of your music is essential if you are to act as the "conductor" of the musicians, band, or orchestra that you are recording—whether real or "virtual"!

If your role is to engineer the session, then you need to be able to act on the instructions of the producer, arranger, composer, musical director, or of the musicians who are performing on the recording to establish the tempo, meter, and key. This, ideally, should be done before you start recording or as soon as possible after recording, while the people who performed (including any conductor, arranger, or producer directing the performances of the musicians) are still present at the session.

There will be times when the people involved do not want to be constrained by having to play to a click. Everyone needs to clearly understand that any further recording, editing, or mixing of the track will be much more difficult until the correct tempo(s), time signature(s), and key signature(s) have been worked out for the session. If this has to be done after the recording, it can take a significant amount of time to sort all this out. Fortunately, Pro Tools provides excellent tools to help you do this, including Identificaton of Beat, Beat Detective, and Elastic Audio.

You need to be clear about the differences between the sample-based (absolute) and the tick-based (relative) timebases and how these are displayed using the rulers. Also you need to know how and why you can change tracks to be sample-based or tick-based; the differences between Tempo events and Bar|Beat Markers; when to choose Bar|Beat or Absolute Reference Markers; and when to view the timeline using either the Linear Sample Display or the Linear Tick Display Mode. You should also be aware of how to carry out Time

Operations such as changing the meter, inserting or cutting time from your session, and moving the Song Start.

Understanding the differences between chromatic and diatonic key transposition requires some knowledge of music, but should not be beyond the capabilities of anyone who can master the other intricacies of using the Pro Tools software. Appreciating the differences and what is possible when transposing MIDI and audio regions also requires understanding of music and of MIDI itself. There are many good books published elsewhere that cover these topics more thoroughly than is possible here.

Elastic Audio and Beat Detective are great "tools" to have at your disposal when you need to make your audio follow the session tempo, or to edit or move notes to align with others and are well worth spending time with so that you are familiar with all their applications.

Anyway, if you are still unsure about any of these things, please go back and review this chapter, and make sure that you try everything for yourself on your own system. For some people, myself included, it can take a little while before the importance of all these things becomes apparent. When this does happen—learning follows much more quickly!