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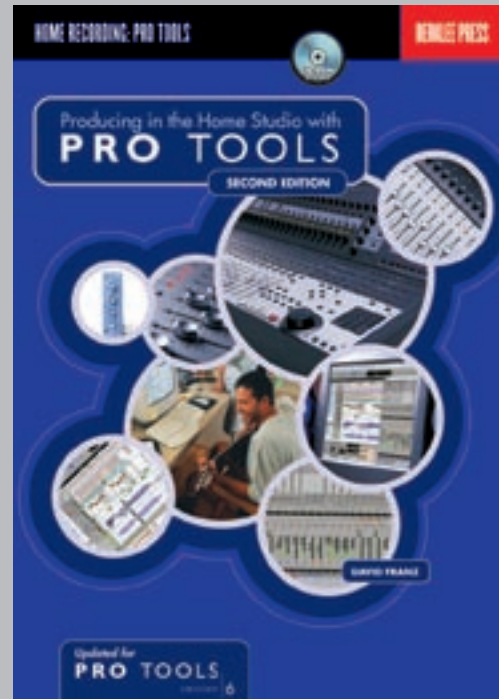
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**Producing in the Home Studio  
with Pro Tools, Second Edition**  
David Franz

Chapter 3  
Deeper into Recording with Pro Tools

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In this chapter:

- **Recording levels**
- **Sample rate and bit depth**
- **Buffer settings and latency times**
- **Conductor tracks, importing audio, and session templates**
- **The basics of sends, returns, and busses**
- **Headphones and headphone mixes**

Chapter 2 set you up with enough practical knowledge of recording in Pro Tools to be dangerous. The projects showed off the first step in the preproduction process for songwriting — song idea generation and recording. In this chapter I'll delve deeper into the recording process and explain some of the technology, theory, and advanced features of Pro Tools. I'll also take the projects further down the path of preproduction by expanding on the song ideas from the last chapter.



Always keep an eye on input levels! I often find that once the Record button is pushed, players play harder and singers sing louder than when you were first checking their levels. In Pro Tools LE, you can view large individual track meters by clicking the fader button  near the volume and pan controls of any track. (The asterisk (\*) button next to any track fader in Pro Tools 5.1–5.3 has the same function.)

## SETTING RECORDING LEVELS

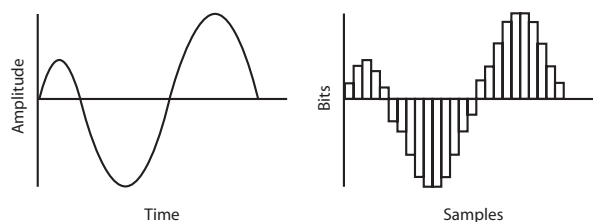
When recording to analog tape, most people try to push the recording level to the highest point they can without distortion. This is done to maximize the **signal-to-noise ratio** – in this case, the ratio of audio signal recorded to the amount of inherent noise on the analog tape medium. Recording at high levels on analog tape increases the clarity of the recording and keeps the inherent noise as low as possible. And in fact, many people even like the sound of slight analog *distortion*. This occurs when the tape is overloaded with audio signal (sometimes called “tape saturation”), and can create a pleasingly “warm” sound. The ability to do this is one reason that some people are still partial to analog recordings over digital ones.

However, recordings you make in your Pro Tools home studio can rival high-end analog recordings made in professional studios! In contrast to analog tape, there’s very little noise associated with digital recording, so the signal-to-noise ratio is higher, providing very accurate representations of your music. As with analog, most people push digital recording levels, but in this case to allow for the use of greater bit depth. As you will see in the next section, using the entire bit depth provides the most accurate “picture” of an analog waveform. Unlike analog distortion, however, overloading a digital track causes digital clipping – the audio signal is literally cut off at 0dB, often creating a decidedly nasty sound. “Digital distortion” isn’t pleasing like analog distortion can be, so digital levels should always remain below 0dB (the clipping point).

Yet, even if you see the red peak indicator on one or several of your tracks, that doesn’t necessarily mean your signal has been digitally clipped. Pro Tools has a certain amount of headroom between when the red peak light is activated and when the actual audio is clipped. Watch the meters, but also use your ears to experiment with recording levels and find what works well for your system. In general, if a signal peaks very occasionally that’s usually fine. However, if the signal peaks often, then decrease the input level.

## SAMPLE RATE AND BIT DEPTH

Now that you’ve had some experience recording digitally into Pro Tools, let’s talk about two primary determinants in the accuracy of a digital recording: sample rate and bit depth. These two parameters provide a grid onto which the analog audio signal is plotted and determine how well the digital recording represents the original sound.



**Fig. 3.1.**

Here we see an analog waveform and a digital representation of it. Faster sampling rates and larger bit depths provide more accurate digital representations of analog sounds.

In discussing **sample rate**, consider photography as an example. If you set up a camera to take a picture of the sky once every hour, you could follow weather patterns in a very rough way. With this low “sample rate” you would probably miss many significant events. However, if you took pictures every second you would see much more detail (like the moment rain began to fall or when sun broke through the clouds).

Digital recording is like taking pictures of music at a speed determined by the sample rate. If the sample rate in your session is 44.1kHz, Pro Tools takes 44,100 pictures of your input audio every second. Each picture captures the amplitude (level) of the audio signal at that moment.

Each sample is digitally “mapped” to an exact digital value and converted into binary digits (or bits). The number of bits in the system is referred to as bit depth. The higher the bit depth, the more accurate the digital representation of the analog sound.

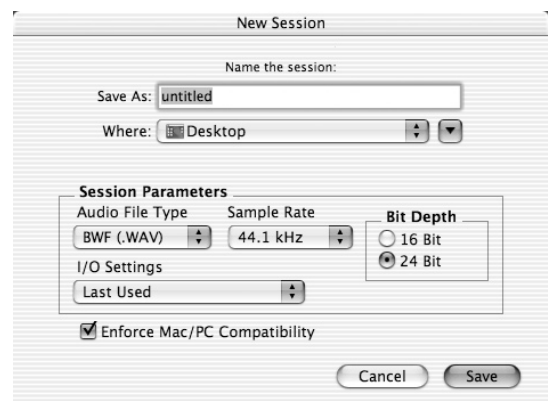
The precision of the amplitude value depends on the **bit depth** – small bit depths yield less precise representations of the audio signal. Back to our photography example: In color photography, a photo taken with a bit depth of 4 bits ( $2^4$ ) would only allow 16 different colors ( $2^4 = 2 \times 2 \times 2 \times 2 = 16$ ). If the color of a photographed object is not precisely one of the 16 colors allowed, the closest color would be assigned to it. Obviously, 16 colors can’t possibly describe all of the shades and hues found in our colorful world. The same logic applies when describing the myriad nuances of sound with an audio signal – usually, the more bits the better. That’s why depths of 16 bits and 24 bits are offered in Pro Tools: 16-bit resolution offers 65,536 (or  $2^{16}$ ) levels of audio amplitude and 24-bit resolution offers 16,777,216 (or  $2^{24}$ ). With bit depths this high, it’s like having thousands (or millions) of colors to choose from instead of only 16.

For each new session you open in Pro Tools you’re asked to choose between 16-bit or 24-bit recording, as in figure 3.2. Be aware that you can’t mix bit depths and sampling rates within sessions; you’ll need to convert any audio being imported if the file was recorded at a different bit depth or sampling rate than the session.

CDs are recorded with 16-bit resolution and a sample rate of 44.1kHz. However, faster sample rates and higher bit depths yield more detailed audio representations and improve the accuracy of your recordings. The most accurate digital representation of music that Pro Tools LE software currently offers is 24-bit resolution with a sample rate of 48kHz, with the exception that Digi 002 can record 88.2kHz and 96kHz tracks. Pro Tools Free (Win) supports up to 48kHz as well, while the Mac version only supports up to 44.1kHz.

**Fig. 3.2.**

The New Session dialogue lets you choose the audio file type, bit depth, sample rate, and I/O settings, as well as Mac/PC compatibility.





Regardless of the 16-bit/44.1kHz CD standard, many people record at the highest resolution possible simply to have a hi-res archive to remaster from, if or when the standard moves to 24-bit/44.1kHz (or the 24-bit/96kHz and 24-bit/192kHz capabilities of Pro Tools HD systems).

Beware: Recording at 24-bit resolution requires 50% more hard disk space than 16-bit recording. For example, a mono audio track recorded at 16-bit resolution and 44.1kHz sample rate requires 5MB per minute of hard disk space; the same track recorded with 24-bit resolution requires 7.5MB per minute. Using a sample rate of 48kHz or higher also increases the memory needed to store files. If you do a lot of high-resolution recording, you may need an extra hard drive or two. (The “Support” section of Digi’s Web site lists approved drives.)

Despite the bit depth and sample rate you use when recording, you must convert the files to 16-bit/44.1kHz to burn them to a CD. I often record at the highest sampling rate and bit depth available to ensure the highest recording quality, then apply dither during mixing and mastering to convert tracks to 16-bit. More on file conversion and dithering is found in chapter 13.

**Fig. 3.3.** Memory requirements for different sampling rates and bit depths. If you plan to do a lot of hi-res recording, you may need to stock up on hard drives.

| Number of tracks and length   | 16-bit at 44.1 kHz | 16-bit at 48 kHz | 24-bit at 44.1 kHz | 24-bit at 48 kHz | 16-bit at 88.2 kHz | 16-bit at 96 kHz | 24-bit at 88.2 kHz | 24-bit at 96 kHz |
|-------------------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| 1 track, 1 minute             | 5 MB               | 5.5 MB           | 7.5 MB             | 8.2 MB           | 10 MB              | 11 MB            | 15 MB              | 16.4 MB          |
| 2 tracks (stereo), 5 minutes  | 50 MB              | 55 MB            | 75 MB              | 83 MB            | 100 MB             | 110 MB           | 150 MB             | 165 MB           |
| 2 tracks (stereo), 60 minutes | 600 MB             | 662 MB           | 900 MB             | 991 MB           | 1.2 GB             | 1.3 GB           | 1.8 GB             | 1.9 GB           |
| 24 tracks, 1 minute           | 120 MB             | 132 MB           | 180 MB             | 198 MB           | 240 MB             | 164 MB           | 360 MB             | 396 MB           |
| 24 tracks, 5 minutes          | 600 MB             | 662 MB           | 900 MB             | 991 MB           | 1.2 GB             | 1.3 GB           | 1.8 GB             | 1.9 GB           |
| 24 tracks, 60 minutes         | 7 GB               | 7.8 GB           | 10.5 GB            | 11.6 GB          | 14 GB              | 15.6 GB          | 21 GB              | 23.2 GB          |

**Fig. 3.4.** The Disk Allocation window enables you to choose the exact location where each track you record will be stored. To assign all tracks to a specific drive, press Alt (Win) or Option (Mac) while selecting a drive name.



## DISK ALLOCATION

Every audio track you record is stored on either an internal or external hard drive. Tell Pro Tools where to record each track by specifying the location in the Disk Allocation window. Choose Disk Allocation from the Setups menu to open a window like figure 3.4.

Audio files folder are kept in each session’s Audio Files folder. However, spreading these files over several drives can improve your entire system’s performance because one hard drive won’t be doing all

the work. But don't worry about losing track of your files. DigiBase, the file management utility in Pro Tools, can help you keep track of all of these files. Chapter 9 has more information on DigiBase.

### WINDOWS AND MACINTOSH SESSION COMPATIBILITY

Pro Tools now lets you save your sessions and audio so they can be opened on both Windows and Macintosh computers. Checking the Enforce Mac/PC [or PC/Mac] Compatibility box in the New Session dialog (figure 3.2) forces Pro Tools to create files that are usable on both Mac and Windows platforms. (The box can't be checked unless AIFF or WAV is selected under Audio File Type.)

Sound Designer II files were the standard file format for previous versions of Pro Tools, but they're only read by Macintosh systems. Thus, if you want your session and associated audio files to be compatible on both Windows and Macs, choose the AIFF or Wave file type. **AIFF** (Audio Interchange File Format) and **Wave** (sometimes written WAV or .wav because of the file extension) can be read by both Windows and Mac software.

Note that some ASCII characters can't be used for naming regions, tracks, files, or plug-in settings in Mac/Windows-compatible sessions. These characters are slash [/], backslash [\], colon (:), asterisk [\*], question mark [?], quotation marks [""], less-than and greater-than symbols [< >], vertical line [|], and any character typed with the Mac's Command [⌘] key. If you type one of these characters, a dialog will appear to prompt you for a new name.

I recommend making all of your Pro Tools sessions Mac/PC compatible so that if you ever need to take them to another studio, there'll be no compatibility hassles.

## BUFFER SETTINGS AND LATENCY TIMES

Through the process of digital recording, analog audio signals are converted into digital data, the data is recorded, and then the data is converted back into an analog signal for playback. Although very fast, this conversion process is not instantaneous. The time it takes your computer to receive an input signal, process it, and send it to an output is called **latency**. Latency values can be as low as 3.0 milliseconds (essentially unnoticeable) or as high as 50 milliseconds or up (quite noticeable). These times vary depending on the hardware buffer size (H/W Buffer Size) that you choose from the Hardware window in the Setups menu.

Anytime you convert an analog signal to digital or vice versa, the analog-to-digital (A/D) or digital-to-analog (D/A) converter delays the signal by about 1.5 milliseconds. Thus, when a signal is converted on the way in to your computer (A/D) and then converted as it's played back out of the computer (D/A), the conversion delay adds up to 3.0

milliseconds. Your computer also takes some time to process the audio (depending on the buffer size set in Pro Tools) as it comes and goes, which means the total latency of your system equals the conversion delay (3.0 milliseconds) plus double the latency amount given in the following chart (figure 3.5). For example, recording with a sample rate of 44.1kHz and a buffer size of 128 samples, the total latency is  $2.9\text{ms} \times 2$  plus 3.0ms, equaling 8.8ms.

**Fig. 3.5.**  
Latency can be a groove killer if it's not properly accounted for during recording.

| Sample Rate (kHz) | Buffer Size (samples) | Latency Amount (ms) | Total Latency (ms) | Use for:   |
|-------------------|-----------------------|---------------------|--------------------|--|
| 44.1              | 128                   | 2.9                 | 8.8                | Recording drums and other timing-critical instruments                          |
| 48                |                       | 2.7                 | 8.4                |  |
| 44.1              | 256                   | 5.8                 | 14.6               | Recording vocals and instruments with slower attack times (guitar, bass, etc.) |
| 48                |                       | 5.3                 | 13.6               |  |
| 44.1              | 512                   | 11.6                | 26.2               | Mixing with 24 tracks  |
| 48                |                       | 10.7                | 24.4               |  |
| 44.1              | 1024                  | 23.2                | 49.4               | Final mixdown or many plug-ins   |
| 48                |                       | 21.3                | 45.6               |  |

While recording you'll often want to operate with the lowest possible level of latency. Unless you're using an Mbox, Pro Tools LE offers **Low Latency Monitoring** (under the Operations menu) as an excellent option. It provides a latency time of only 3.0 milliseconds (the converter delay), because the audio you hear never actually goes into the computer for processing – there's a mixer in your 002/001/AM III card that returns the audio immediately. The following restrictions apply when using Low Latency Monitoring:

- You can only record tracks with inputs set to an audio interface (not a bus).
- You can only listen to tracks assigned to outputs 1 and/or 2.
- All plug-ins and sends assigned to record-enabled tracks (routed to outputs 1–2) are automatically bypassed, and must remain bypassed.
- Record-enabled tracks will not register on meters for master faders.

These restrictions are easy to work around. I use Low Latency Monitoring during many of my sessions and it works great. In fact, the only time I don't use it is when I absolutely have to hear the output of a plug-in while recording.

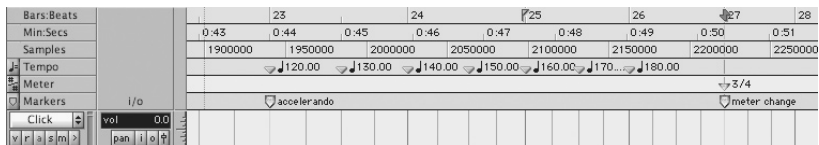
The Mbox handles latency in a different way. It allows you to monitor the input signal before the signal leaves the Mbox, thus creating no latency. This zero-latency feature is controlled with the Mix knob on the front panel, which allows you to blend and adjust the monitor ratio between the Mbox inputs and Pro Tools playback.

OK. Enough heady stuff. Let's get into some more Pro Tools recording and production techniques. In chapter 2 I covered the basics of recording with Pro Tools providing enough knowledge to get your initial song ideas onto your hard drive. Here I'll cover some topics that you can use to expand upon your initial song ideas and start to create "demos" of your songs—the conductor track, importing audio, session templates, send and return effects loops, and headphone mixes.

## THE CONDUCTOR TRACK

In chapter 2, you learned about the conductor rulers and how to create a simple click track. Well, what if your song is not so simple? What if it has tempo and meter changes... and maybe even tricky rubato sections where time is flexible? No problem. In Pro Tools speak, a conductor track is basically a click track with changes in its tempo and/or meter. And you can program in any changes you want. In short, the conductor track refers to the combination of the tempo and meter events in the session.

For instance, say you want an *accelerando* (an increase in tempo) at bar 23 and a change in meter at bar 27 in your song. To do this, open the Tempo/Meter dialog (using one of the ways you learned in chapter 2), enter your tempo and meter changes, and click Apply after each one. The new changes will appear in the Tempo and Meter rulers (as in figure 3.6).



**Fig. 3.6.**

The Tempo and Meter rulers show all of the conductor track information.

Although it is very easy to make a complicated conductor track in Pro Tools, that doesn't mean you always should. Some songs are not suited for recording with a click, particularly very rubato songs. Also, clicks can be detrimental to the feel of some songs. As always, let your ears be the judge.

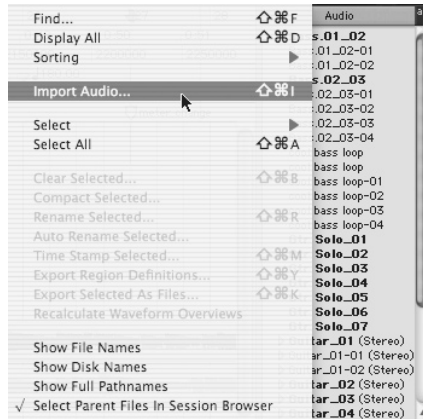
## IMPORTING AUDIO

What if you've got some killer samples (e.g., drum loops, bass lines, sound effects, etc.) that you want to add to an existing Pro Tools session? Pro Tools makes it easy to bring in samples and tracks from other sessions. To import an audio file to its own track in your session, choose Import Audio to Track from the File menu. To import an audio file into the Audio Regions list, choose Import Audio from the Audio Regions List menu, as in figure 3.7. Both commands open the same Import Audio dialog, as seen in figure 3.8.

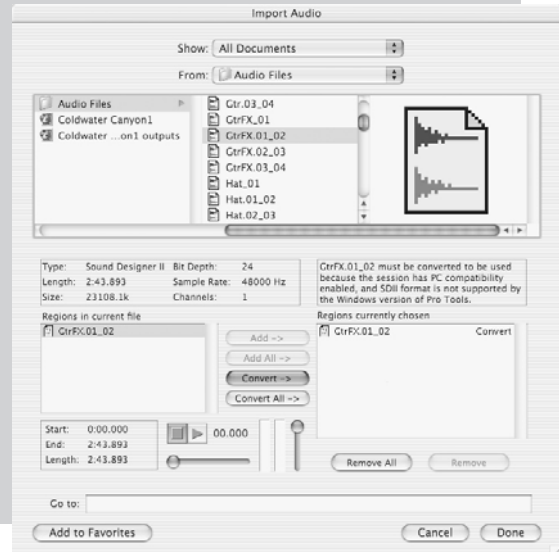


**Fig. 3.7.**

Besides importing audio, the Audio Regions list pop-up menu has a lot of powerful features, as you'll see in later chapters.

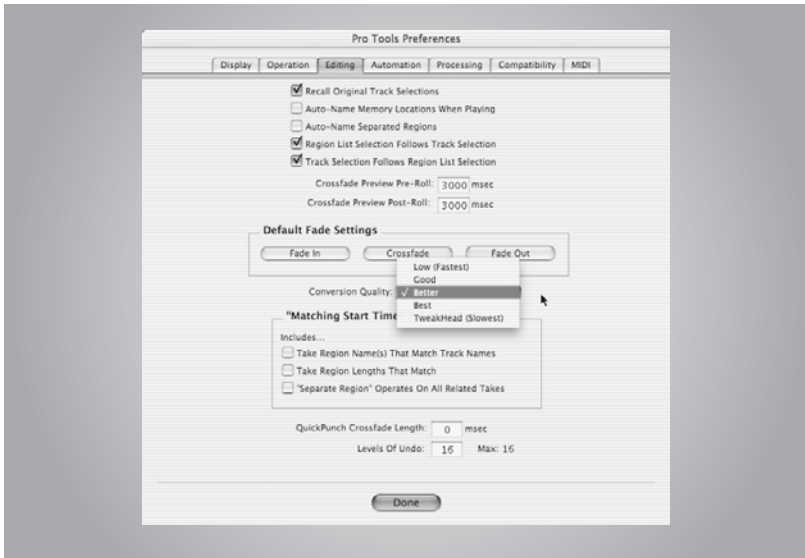
**Fig. 3.8.**

The Import Audio dialog box enables you to bring samples and other audio files into your current session and will convert them to the session's sampling rate and bit depth if necessary.



In the Import Audio dialog, choose the files you want to import, audition them if you want using the Play and Stop buttons, and click “Add” and/or “Convert.” All files that are in the bottom right box will be added to the current session when you click “Done” and will be available in the Audio Regions list immediately after they are converted (if necessary) to the current session’s sampling rate and bit depth.

You can choose the quality of sample rate conversion used when converting and importing audio into your session. Choose Preferences from the Setups menu, and click on the Editing tab. From the Conversion Quality pop-up menu, choose the conversion quality (as in the figure on the next page). With the choices come tradeoffs between quality and time. “Good” and “Better” settings are usually fine and the conversion time is not very long. “Best” and “Tweak Head” can take large amounts of time and should only be used when the highest quality conversion is required.



I've included several useful Pro Tools session templates on the CD-ROM. Copy the Session Templates folder from the CD-ROM to your desktop. When starting a new session, simply click on the most appropriate template and begin working from there. The templates are a starting point to get you and Pro Tools set up and recording quickly. If you want, alter the templates or create new ones to fit your needs.

## SETTING UP A SESSION TEMPLATE

When recording new song ideas and demos, don't let time hinder your creativity. To capture a new idea while in the moment, recording must be quick and easy. You don't want to spend 15 minutes setting up your studio gear, musical instruments, and a Pro Tools session to capture a fleeting idea or musical brainstorm – the moment will be lost. Make it easy to record your ideas by setting up a Pro Tools session template, and you'll only be 15 seconds away from capturing your stroke (or riff) of genius.

A session template is a customized Pro Tools session that includes track setups, mixer setups, window arrangements, and zoom level memory locations configured to your liking. Specifically, session templates save audio and MIDI track configuration, track names, shown/hidden tracks, track input and output assignments, MIDI channel assignments, track volume and pan, soloed and muted tracks, aux inputs, bus assignments, track width and color, track groups and group lists, click track settings, disk allocation, and keyboard focus. A session template also includes all session setups found in the Setups menu (i.e., Hardware, Preferences, etc.) including I/O Settings (remember those from chapter 1?).

To create a Windows session template, right-click the Pro Tools session that you've configured and choose Properties. Click the General tab and choose the Read-only check box. That's it. Close the Properties window.

To create a Macintosh session template, select the Pro Tools session by clicking it once, then choose Get Info from the File menu. In the window that appears, click on the Stationery Pad check box. That's it. Close the Get Info window.

You can have several templates for different occasions. For instance, you may create a setup for recording just two mics – one for voice and another for acoustic guitar. You may set up a template for doing a sequence using several pieces of MIDI gear, or you can have one for recording your entire band. I suggest setting up a template for any configuration you work with on a fairly regular basis, though it doesn't hurt to save templates from weird or complex one-off sessions as a jumping off point for other projects.

Once you've created your own template files, make them easy to find. I recommend putting an alias (Mac) or shortcut (Windows) on your computer's desktop. You may even want to create a folder with multiple templates for easy access to any setup you need.

When you choose to start a new project from a session template, you

need to name the new session and save it as a different file, or you'll be editing your actual template. Pro Tools will warn you about this with an alert message like the one in figure 3.9.

**Fig. 3.9.**

After opening a session template, Pro Tools will ask you if you want to create a new session based on the template, or if you want to edit the template.



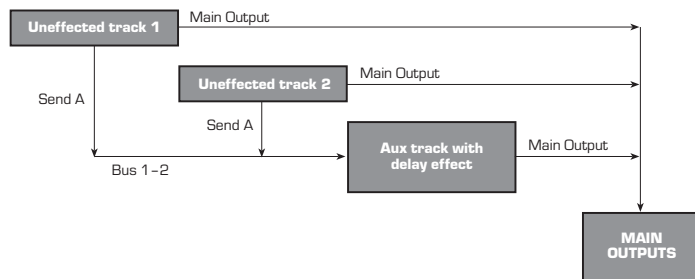
## THE BASICS OF SENDS, RETURNS, AND BUSES

If you want to hear effects while recording or do some basic mixing in the preproduction process, it's important to understand sends, returns, and busses. If you're familiar with the signal routing of a mixer, you're probably familiar with these terms. Pro Tools uses sends, returns, and busses in the same way as a hard-wired mixer – you just have more flexible routing options in Pro Tools.

I'll explain with an example: Let's say you want to put the same delay effect on several tracks using a plug-in. Instead of putting that plug-in on each of the tracks, you can put one delay plug-in on an aux track and use it for any other tracks that need delay (aux is short for auxiliary input). You do this by sending copies of all the tracks that need delay (via a bus) to the aux input, where they're processed using the plug-in. They are then sent out, usually to the main stereo outputs. In this case, the aux track is called an effects return. See figure 3.10 for a visual representation of the signal flow.

**Fig. 3.10.**

Send/return configurations allow one plug-in to effect several tracks.



Here's how this delay send and return is specifically set up in Pro Tools:

1. Activate a send (the “diamond” buttons above tracks’ Input selectors in the Mix window) on each track that you want to put delay onto – adjust the volume and panning. I recommend starting with the volume at 0.0. Select a mono or stereo bus output (e.g., bus 1–2) as the path to the aux track.
2. Create a new aux track by selecting New Track from the File menu or by typing  $\text{⌘} + \text{Shift} + \text{N}$  (Mac) or  $\text{Control} + \text{Shift} + \text{N}$  (Win), and then choosing Aux Input from the dropdown menu above the Create button. Choose Mono for a mono return/mono plug-in or Stereo for a stereo return/stereo plug-in.
3. Choose the bus path (e.g., bus 1–2) as the input of the aux track from the track sends (in the Mix window). The output of the aux track usually goes to the main outputs, unless you want to route it somewhere else. See figure 3.11.



**Fig. 3.11.** Effects loops like this offer flexible signal routing as well as a reduced load on your CPU.

With this setup, the individual send faders control the amount of signal that's sent from each track to the delay plug-in on the aux input. The aux track fader controls how much of the delay effect on those tracks is added to the overall mix.

Sends, returns, and busses are integral parts of recording and mixing in Pro Tools. Their functions are explained in greater detail in chapters 11 and 12.

## HEADPHONE MIXES AND HEADPHONES

A large proportion of recording in professional and home studios is done with headphones on to avoid feedback, create sound separation, and have separate mixes for individuals (if needed). As an engineer you need to be constantly aware of the recording and playback levels of the headphone mix, the routing of audio signals, the hardware you're routing it through, and how the overall mix sounds.

There are several ways to get multiple “feeds” to different sets of headphones. Here are some ideas:



After copying it to your hard drive, open up the Pro Tools session titled “Basic Effects Send Aux” on the CD-ROM and try playing around with the sends, busses, and aux tracks (effects returns). The signal flow of this setup is often misunderstood...take some time to really digest the concepts so you can use effects sends/returns easily.

- If you're using your home stereo as the monitor output, plug a splitter into the headphone jack and run your headphones from there.
- If you have the Mbox/002/001 you can split the headphone output.
- If you're using a mixer there are probably several stereo outputs that can feed headphones.
- If you're using a home stereo and a mixer, you can utilize the headphone jacks from both units (as well as the one from the Mbox/002/001), giving you a total of at least four headphone outputs. However, using all of these different headphones with separate levels might get confusing.

A better solution might be to buy a headphone amplifier specifically made to supply multiple sets of “cans.” Simply plug any of the monitor outputs (home stereo headphone out, Mbox/002/001 headphone out, or mixer out) – or two direct outputs from the Mbox/002/001 (e.g., analog outputs 1–2) – to the input of a headphone amp. Each amp supplies multiple pairs of headphones with your stereo signal and every pair has its own volume control, allowing each person to adjust their own overall level. Headphone amps may also accept multiple input signals, so technically you could supply some headphones with one mix and other pairs with a different mix. (Creating two or more different headphone mixes is covered in chapter 11. This is a really cool feature – check it out. To jump right in, open up either Multiple HP Mix session on the book's CD-ROM.)

### KEEP FEEDBACK IN CHECK

Except when they want Jimi Hendrix-like guitar feedback, most people try to avoid feedback in studio environments. Acoustic **feedback** is created when two magnetic pickups (e.g., microphone and speaker) feed each other the same audio signal. An audio signal going into the mic comes out of the speaker back into the mic and so forth, creating a loop. This **feedback loop** is the result of the signal building upon itself and creating a sometimes painful and injurious noise. Feedback at high decibel levels can cause hearing loss – not to mention damage to equipment – so be careful! It's a good idea to keep your monitor level down or *preferably off* when recording using microphones that are in the same room. Create a headphone mix instead.

## Buying Headphones

Let's continue with the headphone topic. When buying headphones for your home studio it's most important to consider how they'll be used. Will you be using them during recording sessions? Consider buying closed-ear headphones so there's minimal sound leakage while tracking.

Will you be using them to mix? Consider buying headphones with a flat frequency response so you're sure of their accuracy. Will clients be using these headphones for extended periods of time during sessions? Consider comfort as an important factor in the equation.

There are three types of headphones: open-air, semi-open, and closed-ear (or sealed). These terms refer to how much sound isolation the headphones provide. Often the open-air or semi-open are more comfortable than closed-ear headphones because they don't fit so tightly. However, open-air and semi-open headphones allow some amount of sound to escape into the room. That means the sound could leak into microphones in the recording studio – particularly important to consider if you'll be recording with a click track. Sealed headphones allow very little leakage, so click tracks and other loud signals won't be picked up by mics in the room.

There are other factors to consider when choosing headphones:

- Long-term wearing comfort – people might have to wear them for many hours at a time
- Spatially accurate sound field – that is, they accurately reproduce the stereo image you've created
- Extended, smooth frequency response – at least 20Hz to 20kHz
- Reliability and durability – people tend to toss around headphones like they're indestructible
- The ability to produce high levels with very low distortion – some people like their headphones loud (see sidebar on noise levels at the end of this chapter)

Whatever headphones you buy, compare them to other products. Being aware of the characteristics of headphones will provide useful information during recording, critical listening, mixing, and mastering. (I'm not advocating using headphones to mix or master, but sometimes that might be the only option if your roommates, family, or neighbors are sleeping or otherwise sensitive to volume.)

For example, the headphones I use for recording sessions in my home studio are closed-ear, comfortable, loud, and bass-heavy. This information tells me that (a) I don't need to worry about leakage into microphones, (b) I should be careful of the overall volume of the headphone mix, (c) I don't need to pump the bass in the headphone mix, (d) I may need to bump up the mid and high frequencies in the headphones to compensate for the bass response, and (e) if I'm recording a bass part, I'll know that what I record into Pro Tools isn't as boomy as it sounds in the phones. For critical listening, I use a separate pair of headphones that are closed-ear, extremely comfortable, and have a softer volume and flat frequency response.

**[DON'T] STICK IT IN YOUR EAR**

Listening to high levels of any type of sound (whether it's music, jackhammers, or jet engines) can be dangerous if done even for short periods of time. OSHA (Occupational Safety and Health Act, 1970) has published the following data:

**Permissible Exposure to Noise Levels**

| SPL<br>(A-weighted) | Daily<br>Exposure |
|---------------------|-------------------|
| 90 dB               | 8 hours           |
| 92                  | 6                 |
| 95                  | 4                 |
| 97                  | 3                 |
| 100                 | 2                 |
| 102                 | 1.5               |
| 105                 | 1                 |
| 110                 | 0.5               |
| 115 dB              | 0.25 hours        |

**Decibels** (dB) are the units used to measure the ratio of sound pressure level (SPL) of an audio source to the lower threshold of human hearing. An SPL of 130dB is the upper threshold of human tolerance; a noisy factory might have an SPL of 90dB; your house or apartment has an SPL of approximately 45dB. (Apparently some Who concerts reached a noise level of 120dB . . . it's no wonder Pete Townsend is having difficulties hearing these days!)

Please be careful with listening levels and be sure to give your ears a break from time to time — allow them to recover from loud levels. If you *must* listen at loud levels try to protect your ears (using plugs, etc.), because permanent damage to your hearing could mean permanent damage not only to your career, but also to your basic enjoyment of music. **||**

## PRO TOOLS HANDS-ON

### Experimenting with Recording Levels and Different Sample Rates/Bit Depths

You always need to be aware of your recording levels and how each device that your signal is going through affects the overall recorded sound. And, because of what you now know about bit depths and sampling rates, it's imperative to maintain good levels when recording through those devices.

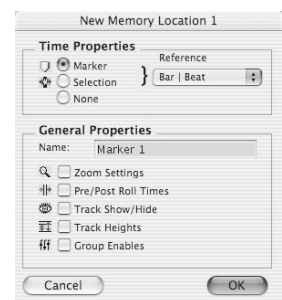
Revisit the gain stages along your signal path and optimize their levels to get the best possible sounds into Pro Tools. Also, try recording at different sampling rates and bit depths. Create a new session with a sampling rate of 44.1kHz and a bit depth of 16. Record a track. Save the session and create a new 48kHz/24-bit session. Without changing anything in your signal path, record a similar track. Import the track in the 44.1kHz/16-bit session into the 48kHz/24-bit session and compare the sound of each track. Even though the 44.1/16 track was converted into 48/24, can you hear a difference? Digi 002 owners can try this at even higher sample rates.

### Creating a Conductor Track — Tempo, Meter, and Markers

Open a pre-existing session or create a new one. Once in the session, open the Tempo/Meter window and make a conductor track by inserting tempo and meter events. Push the limits: try extreme tempo changes and wacky meter changes. Turn on the click track and listen to the madness that you created.

We haven't talked about markers, the third part of the conductor track. Let's talk about them here in the context of recording demo material and so that you can use them to edit in the next chapter.

Markers (a subset of memory locations) are useful for identifying significant locations in your sessions for use in playback and editing. There are several ways to create a marker, the easiest of which is to press the Enter key on the numeric keyboard. Choose a location in the session with the Selector tool and hit Enter or create a marker on the fly by hitting Enter while playing back or recording. The memory location dialog box will open, as seen in the figure at right.



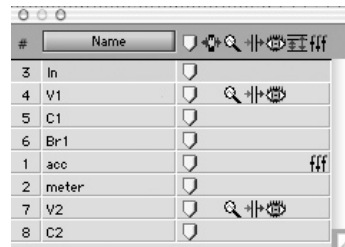


Name the marker. I usually give my markers short names so that I can still see their names in the Markers ruler on the top of the Edit window, even if I'm zoomed out in the session, as in the figure below.



As seen in the memory location dialog, you can save General Properties (zoom settings, pre-/post-roll times, track heights, group enables, and which tracks are shown or hidden) with a marker. Experiment with General Properties and find out which are most beneficial to you.

Click on a marker in the Marker Ruler to recall its location and its General Properties. Select Show Memory Locations from the Windows menu to open the Memory Locations window (as in the figure at left). Click on a marker in the window to recall it.



You can move markers by dragging them in the Marker Ruler. You can delete them by Alt-clicking (Win) or Option-clicking the marker in the Memory Location window.

Try it. Play around with markers in a session. Create, move, and delete them. Assign General Properties to them and see how they affect your workflow. Markers will quickly become an indispensable tool for organizing your sessions and for improving your Pro Tools efficiency.

## Further into Preproduction — Putting Song Demos Together

Those ideas and song demos from the last chapter have begun to take shape. Open up any or all of the sessions titled “Chap3Rock,” “Chap3Hiphop,” “Chap3Jazz,” and “Chap3Electronica” to hear additional ideas for each of these songs. Check out the comments and experiment with the tracks. The new ideas are submixed together, and in some cases the submixes include effects and imported samples.

It's your turn to try importing audio samples and adding effects loops to your sessions. Also try creating conductor tracks in your sessions and creating a session template. These techniques can really increase the speed at which you transfer ideas from your head into Pro Tools. In the next chapter I'll show you how to edit those ideas once they're in Pro Tools.