Cakewalk© Pro Audio™
User's Guide

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Preface

The Cakewalk Pro Audio User's Guide is designed to help you learn and use Cakewalk Pro Audio Version 9. In everyday language, this *Guide* explains how Pro Audio works and how to use it to create, edit, produce, and perform. We've made this *User's Guide* easy to read and task-oriented, with lots of cross-references so that you can find the information you need. The *User's Guide* also includes a comprehensive index that you can use to find information on any specific topic.

About This Book

The *User's Guide* is organized as follows:

Chapter 1, *Introduction*, provides an overview of Pro Audio and instructions for installing the software and setting up your equipment.

Chapter 2, *Getting Started*, is a set of three hands-on tutorials that will give you some practical experience with Pro Audio and some exposure to many of its capabilities.

Chapters 3 through 9 cover all the basic skills you need to use Pro Audio to play, record, edit, arrange, and mix your projects. By the time you complete these chapters, you'll know all about the different ways you can work with your projects, and you'll know about most of the tools you need to create music and sound using your computer.

Chapters 10 through 16 cover the advanced features of Pro Audio. By the time you complete these chapters, you'll know how to customize Pro Audio both to make the best use of all the MIDI and audio equipment you have in your studio and to be more efficient and productive in your work.

The appendices contain additional information you can use for troubleshooting, advanced installation and setup, use of MIDI files, and some tips and tricks for using Pro Audio. If you've used earlier versions

of Pro Audio, be sure to turn to Appendix G to see a summary of the new features in Pro Audio Version 9.

Registering Pro Audio

Please be sure to complete and return the registration card in your product package or to register your product on our World Wide Web site (www.cakewalk.com). If you do not register, we cannot provide you with technical support, or inform you when upgrades become available.

Getting Help

In addition to this *User's Guide*, Pro Audio includes on-line help that can provide you with quick reference information whenever you need it. Simply press F1 or click the Help button in any dialog box to find the information you need.

If you need more information than you can find in the *User's Guide* or the on-line help, here are two great places to look:

- Check the Support page of our World Wide Web site (www.cakewalk.com) for updated technical information and answers to frequently asked questions

- Post messages to the Pro Audio user community using one of the Cakewalk newsgroups. For more information about the newsgroups, visit www.cakewalk.com.

You can also get technical support directly from Cakewalk. In order to obtain technical support, you must submit the product registration card that is included with your Cakewalk product, or register your product on our World Wide Web site. You can obtain technical support for this product in the following ways:

- E-mail your questions to support@cakewalk.com. Be sure to include your serial number in your e-mail.

- Call Cakewalk Technical Support at (617) 441-7891 on weekdays, 10:00AM to 6:00PM, Eastern time. Be sure to have your serial number ready when you call.

Technical support hours, policies, and procedures are subject to change at any time. Check our web site for the latest support information.

1 Introduction

Cakewalk Pro Audio is a professional tool for authoring sound and music on your personal computer. It's designed for musicians, composers, arrangers, audio and production engineers, multimedia and game developers, and recording engineers. Pro Audio provides all the tools you need to do professional-quality work rapidly and efficiently.

Pro Audio is more than an integrated MIDI and digital audio authoring software package—it's an expandable platform that can function as the central nervous system of your recording studio. With drivers for common high-end audio hardware, full support for DirectX audio plug-ins, StudioWare and MIDI Machine (MMC) control of external MIDI gear, and the Cakewalk Application Language (CAL), Pro Audio can handle your most demanding projects.

Introduction

In This Chapter

About Pro Audio

Pro Audio is the flagship product of the Cakewalk line of integrated MIDI and digital audio sequencers for the Windows platform. Pro Audio has a comprehensive feature set that makes it the single most productive tool for sound and music authoring. Here are some of the ways you can use Pro Audio.

Music Composition and Exploration

Pro Audio is a powerful music-composition tool, providing tools to record your own musical performances; enhance or improve the quality of those performances; and edit, arrange, and experiment with the music. With a few simple clicks of the mouse, you can arrange, orchestrate, and audition your composition. Fully integrated sequencing allows you to combine the convenience and flexibility of MIDI composition with the high-quality sound and subtlety of digital audio sound recording and reproduction. Change the feel of a piece by locking it to a musical groove, or add delicate delays, anticipations, or echoes that add richness to the music.

Pro Audio displays and lets you edit your music using standard musical notation and guitar tablature, so you can adjust individual notes, add performance markings, and print individual parts or full scores. You can graphically draw tempo and volume changes, or add lyrics to display on-screen or to include with printed scores.

Game Sound Development

There's no better tool than Pro Audio for composing music for electronic games. Clip-based sequencing lets you create and reuse musical themes freely, so you can associate musical sections with game characters, locations, objects, and actions. Your creations can be saved and replayed using the compact MIDI file format, which adapts its sound automatically to the target hardware for the best possible sound reproduction.

Sound Production and Engineering

If you want to produce music CDs or master tapes, Pro Audio has virtually everything you need from recording to mixing and mastering. Multichannel recording lets you capture studio or live performances track by track. Pitch correction lets you adjust vocals or create harmonies "on the fly." Reconfigurable buses provide full control over your mix. Real-time stereo effects like chorus, flange, reverb, parametric EQ, and delay/echo can be applied as track inserts, in effects loops, or to the master mix. Pro Audio supports 44.1 KHz sampling for CD-quality sound and lets you choose from lower or higher sample rates as well. All

audio effects are 32-bit floating point for faster processing and high-quality sound reproduction.

Web Authoring

Pro Audio is the ideal tool for developing and producing music and sound for the World Wide Web, because it lets you save your work in the formats that are most commonly used on web sites: MIDI, RealAudio, MP3, and Windows Media Advanced Streaming Format. Any Pro Audio project—musical composition, audio clip, commercial spot, jingle with voice-over—can be stored in a web-compatible format with a few simple mouse clicks.

Film and Video Scoring and Production

Pro Audio has many of the tools you need to execute audio post-production projects quickly and efficiently. Pro Audio provides chase lock sync-to time code for frame-by-frame accuracy when synchronizing audio or MIDI to film or video. Or, you can turn chase-lock off to conserve CPU power. Pro Audio provides high-quality time stretching and sample-accurate editing with zero-crossing detection so you can make the fine adjustments you need in record time. In addition, Pro Audio's new support for video files gives you convenient synchronized access to digitized video, making film and video scoring easier than ever.

Flexibility

Pro Audio works the way you want to work—you can customize screen layouts, toolbars, and audio and MIDI system configurations to make your work more efficient. Pro Audio integrates with other sound- and music-editing tools so you can access them in an instant without leaving Pro Audio. There are custom software modules to support specialized audio devices from Roland and Yamaha. Pro Audio's unique StudioWare technology provides software interfaces for common studio hardware and lets you create your own custom software interfaces to any external MIDI-equipped gear. You can even create a single control panel to manage your entire studio.

Pro Audio Basics

Pro Audio looks and acts like many other Microsoft Windows programs. The **menus** and **toolbars** give you quick access to all the features of Pro Audio. Some menu choices and tools display **dialog boxes** that let you choose among various options or type in the values you want. If you click in most views, in time rulers, or on certain other items with the right

mouse button, you see a pop-up menu that provides quick access to many common operations.

The **project** is the center of your work in Pro Audio. If you're a musician, a project might contain a song, a jingle, or a movement of a symphony. If you're a post-production engineer, a project might contain a 30-second radio commercial or a lengthy soundtrack for a film or videotape production. By default, every project is stored in a file (known as a **work file**). The normal file extension for a work file is *.wrk*.

Pro Audio organizes the sound and music in your project into tracks, clips, and events.

Tracks are used to store the sound or music made by each instrument or voice in a project. For example, a song that is arranged for four instruments and one vocalist would normally have 5 tracks—one for each instrument and one for the vocals. Each project can have up to 256 tracks. Some of these tracks may be used in your finished project, while others can hold alternate takes, backup tracks, and variations that you might want to keep for future use. Each track is made up of one or many clips.

Clips are the pieces of sound and music that make up your tracks. A clip might contain a horn solo, a drum break, a bass or guitar riff, a voice-over, a sound effect like the hoot of an owl, or an entire keyboard performance. A track can contain a single clip or dozens of different clips, and you can easily move clips from one track to another.

Events are the individual bits of sound and music that make up a clip. A note played on a piano or bass is an event, as is the pressing of a sustain pedal on a keyboard or the turn of a pitch wheel. Each continuous piece of digital audio in your project is an event.

Views

Pro Audio displays your project in windows on the screen that are known as **views**. You can have many views open at once, all showing the same project. When you edit a project in one view, the other related views are updated automatically.

The Track View

The **Track view** is the main window that you use to create, display, and work with a project. When you open a project file, Pro Audio displays the Track view for the project. When you close the Track view for a project, Pro Audio closes the file.

The Track view is divided into two sections: the **Track pane** and the **Clips pane**. You can change the size of the two panes by dragging the vertical splitter bar that separates the two panes.

Each row is a track The Track pane   The Clips pane
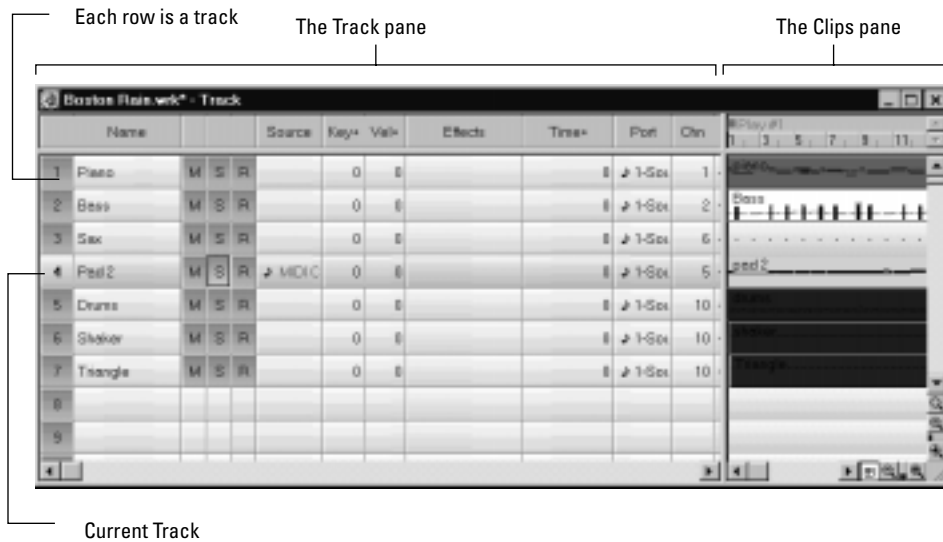
Current Track

The Track pane lets you see and change the initial settings for each track. One track—the current track—is always displayed in color or marked by a rectangle around one cell. To change the current track, move the highlight using the mouse or the keyboard as follows:

Key...	What it does...
Arrow	Moves one cell in any direction
Page Down	Displays the next page of tracks
Page Up	Displays the previous page of tracks
Home	Moves the highlight to track the first track (track 1).
End	Moves the highlight to the last track (track 256).

The Clips pane shows the clips in your project on a horizontal timeline that helps you visualize how your project is organized. Clips contain markings that indicate their contents. The Clips pane lets you select, move, cut and copy clips from place to place to change the arrangement of music and sound in your project.

The Track view makes it easy to select tracks, clips, and ranges of time in a project. These are the most common selection methods:

To...	Do this...
Select tracks	Click on the track number, or drag over several track numbers
Select clips	Click on the clip, or drag a rectangle around several clips
Select time ranges	Drag in the time ruler, or click between two markers
Select partial clips	Hold down the Alt key while dragging over a clip

As with most other Windows programs, you can also use the Shift-click and Ctrl-click combinations when selecting tracks and clips. Holding the Shift key while you click adds tracks or clips to the current selection. Holding the Ctrl key while you click lets you toggle the selection status of tracks or clips.

The Console View

The **Console view** is the place where you mix the sounds on all the different tracks to create the final mix of your project. You use the Console view to adjust the levels of sound for the different tracks in your project, to change the stereo panning, and to apply real-time effects to an individual track, combinations of tracks, or the final mix.

The mixing console contains several groups of controls. There is one module for each track in your project, and one module for each output device. You can use auxiliary sends (or **aux sends**) to direct certain tracks to special modules that are known as **submixes**.

The Console View:

Audio module

MIDI module

Patch point for
real-time effects

Aux Sends slider
and on/off buttons

Mute, Solo, and
Track Arming
buttons

Pan and volume
fader for each
track

Master
volume
faders
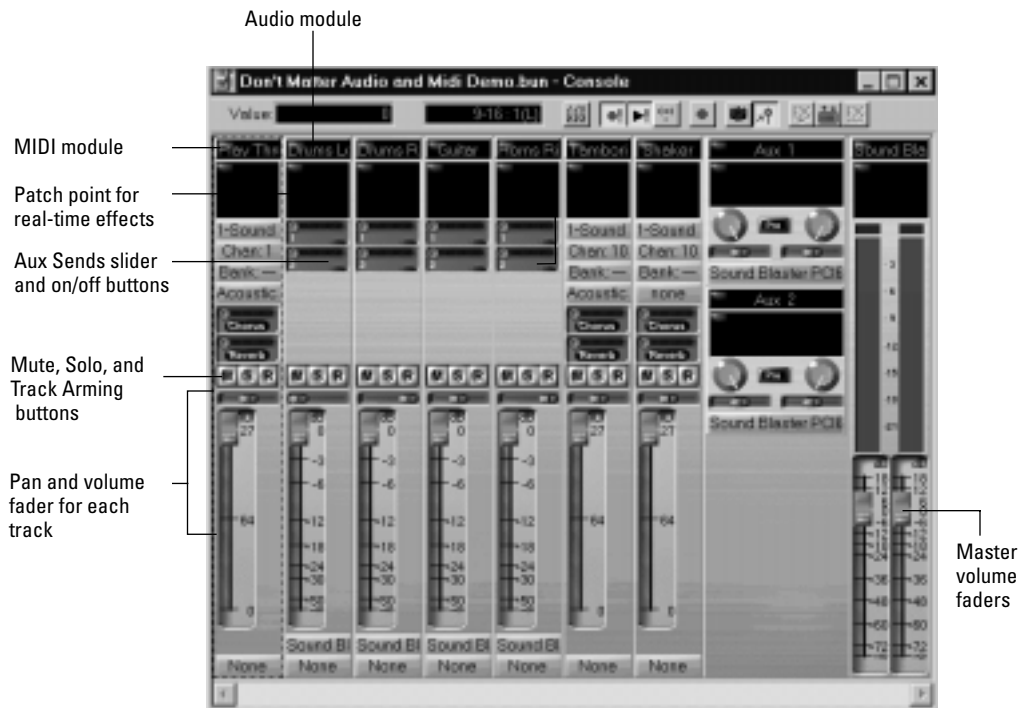
As in the Track view, you can change track settings or record new music
or sound in the Console view. You may choose to use one view or the
other, or the choice you make may depend on which project you are
working on.

Other Views
Pro Audio has a number of other views you can use to display and work
on your project. To display these views, select one or more tracks and:

- Click the icon for the view

- Choose the view you want from the *View* menu

- In the Track view, right-click on a selected track and choose the view
  you want from the menu

The **Piano Roll view** 🔲 shows the notes from a track or track as they would appear on a player-piano roll. You can move the notes around, make them longer or shorter, and change their pitches by just dragging them with the mouse. You can also use the Piano Roll view to display and edit MIDI velocity, controllers, and other types of information.
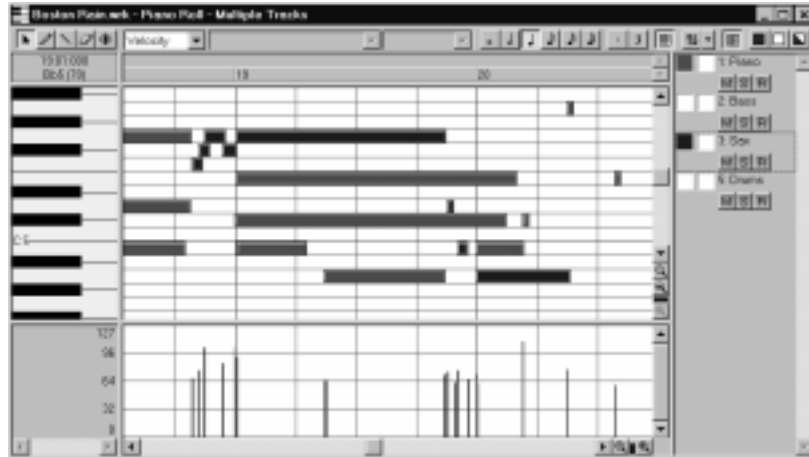
The **Staff view** 🔲 displays the notes from one or more tracks using standard music notation, similar to the way the notation would appear on a printed page. You can add, edit, or delete notes; create percussion parts; add guitar chords and other notation markings; display guitar

tablature; display the Fretboard pane; and print whole scores or individual parts to share with other musicians.

The **Audio view** ⊞ displays the sound waves that make up one or more audio tracks of your project and provides tools to edit, arrange, and apply effects to audio events.

The **Event List view** ▦ displays the events in a project individually, so that you can make changes at a very detailed level.
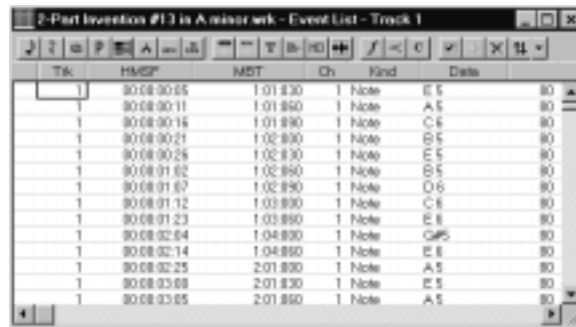
Pro Audio has several other views that are used for very specific purposes:

View...	How you use it...
Meter/Key ♩	To change the meter (time signature) or key signature or to insert changes in the meter or key signature at specific times in a project
Big Time 2:2	To display the Now time in a large, resizable font that you can read more easily
Markers ▦	To add, move, rename, or delete labels for parts of your song that make it easier to move from one point to another
Lyrics ▥	To add and display lyrics for a track
Video ▦	To display a loaded video file
Sysx ▦	To create, display, store, and edit System Exclusive MIDI messages used to control instruments and other gear that are MIDI capable
StudioWare ▦	To use custom software interfaces to control your MIDI gear
Tempo ⋀	To view and edit the project's tempo changes

Zoom Controls

Many of the views contain Zoom tools that let you change the horizontal and vertical scale of the view:

Lasso zoom
Zoom out vertically
Zoom in vertically
Zoom in horizontally
Zoom out horizontally
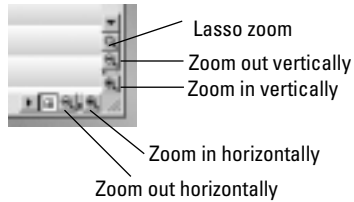
The zoom tools are used as described in the following table:

Tool...	How you use it...
Zoom out	Click to zoom out incrementally, or press Shift and click to zoom all the way out
Zoom in	Click to zoom in incrementally, or press Shift and click to zoom all the way in
Zoom fader	Click and drag to zoom continuously
Lasso zoom	Click to arm, then click and drag in the view to select the zoom area

Lasso zoom is automatically disarmed after use. Double-click the lasso zoom button to make the selection stick.

You can also zoom with the keyboard:

Key...	What it does...
I	Zoom in vertically and horizontally
O	Zoom out vertically and horizontally
G	Go to (center) the Now time, without zooming
Z	Arm lasso zoom
U	Undo the current zoom

Layouts

You may spend a lot of time making sure that all the views are laid out on the screen just the way you want. When you save your work, you can save the screen layout along with it. You can also save the layout by itself and then use the layout with other projects. See "Layouts" on page 12-2.

Working on a Project

Much of your time in Pro Audio is spent recording and listening to your project or song as it develops. The Transport toolbar, shown below, contains the most important tools and other pieces of information you'll need to record and play back your project.

Every project has a current time, known as the **Now time**. As you record or play back a project, the Now time shows your current location in the project. When you create a project, the Now time is set to the beginning of the project. The current Now time is saved with your project.

You control recording and playback using tools on the Transport toolbar, which work a lot like the ones on your tape deck or CD player:
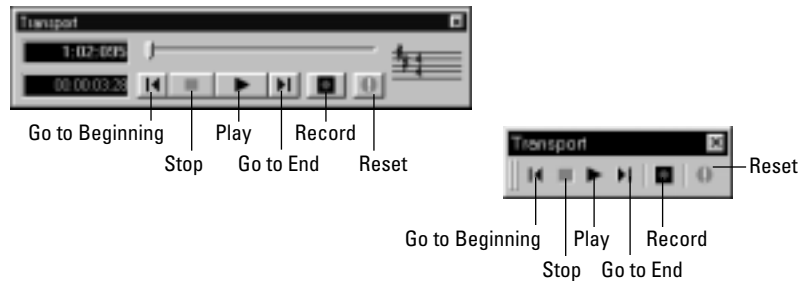
As you work with a project, you can use Pro Audio's mute and solo features to choose which tracks are played, or you can create loops to play a particular section over and over again. You can also create **markers**, which are named time points you add to your project to make it easy to jump to a particular location.

Other Types of Files

Pro Audio lets you create and work with several other types of files, in addition to the work files that store your songs and other projects:

File type...	Purpose...
Play List	To play a series of Pro Audio projects and standard MIDI files, one after another
CAL	To write, edit, and run CAL programs that extend the capabilities of Pro Audio
StudioWare	To control external MIDI devices from Pro Audio

Computers, Sound, and Music

This section provides some background on the different ways that computers store and play sound and music. Computers work with sound and music in two different forms: **MIDI** and **digital audio**.

MIDI

MIDI (short for Musical Instrument Digital Interface) is the way computers communicate with most sound cards, keyboards, and other electronic instruments. MIDI refers to both the type of cables and plugs used to connect the computers and instruments, and to the language those computers and instruments use to talk to each other. The MIDI standard is accepted and used worldwide. Almost any electronic instrument you buy today will have MIDI connectors and can be used with other MIDI instruments and with your computer's MIDI interface.

The MIDI language conveys information and instructions, both from the computer to the instrument and from the instrument to the computer. For example, if your computer wants your keyboard to play a note, it sends a MIDI "Note On" message and tells the keyboard which note to play. When your computer wants the keyboard to stop playing that note, it sends another message that stops the note from playing.

The MIDI language has many other instructions, such as messages to change the sound that is used to play the notes (the bank and patch), messages used to work the sustain pedal and the pitch-bend wheel, and others. By sending the right messages at the right times, your computer can control your electronic instrument and make it play music.

MIDI information can be sent on 16 different channels. You can set up your MIDI equipment to listen for messages on all channels or on only a few.

MIDI files contain all the MIDI messages and timing information that are needed to play a song. MIDI files can be read and played by many different programs, including Pro Audio, and can even be played by programs on other types of computers. MIDI files have the extension .MID.

There are several important advantages of the MIDI format:

- Large amounts of music can be stored in a very compact form

- Different parts of a piece can easily be assigned to any instrument you can imagine

- The music contains information on notes, tempos, and key signatures that makes it possible to display and edit the piece using standard musical notation

The primary disadvantage of MIDI is that the quality of the music a listener hears will vary depending on the MIDI equipment the listener is using. For example, MIDI usually sounds much better on an expensive synthesizer than it does on an inexpensive sound card.

Digital Audio

Digital audio is a simple way to record and play sounds of any type. It works like a tape recorder—you record something, then later play it back. Digital audio stores the sound as a long series of numbers.

Sound Waves

Sound waves are vibrations in the air. Sound waves are generated by anything that vibrates; a vibrating object causes the air next to it to vibrate, and the vibration is passed through the air in all directions. When the vibrating air enters your ear, it makes your eardrum vibrate, and you hear a sound. Likewise, if the vibrating air hits a microphone, it causes the microphone to vibrate and send electrical signals to whatever it's connected to.

These vibrations are very fast. The slowest vibration frequency you can hear is about 20 vibrations per second, and the fastest is around 16,000 to 20,000 vibrations per second.

Recording Digital Audio

To record digital audio, your computer monitors the electrical signal generated by a microphone, an electric guitar, or another source. At equal intervals of time (for CD-quality sound, this means 44,100 times a

second), the computer measures and saves the strength of the electrical signal from the microphone, on a scale from 0 to 65,535.

That's it. The digital audio data is just a long series of numbers. Later, the computer can send these numbers, in the form of electrical signals, to a speaker. The speaker then vibrates and generates the same sound that was recorded.

The primary advantage of digital audio is the quality of the sound. Unlike MIDI, a digital audio recording is very rich, capturing all the nuances, overtones, and other characteristics of the sound exactly as performed. The main drawback of digital audio is that it takes up a lot of disk space. If you record a 1-minute segment of stereo, CD-quality digital audio, you need about 10 megabytes of disk space to store the resulting file.

On the PC, digital audio is usually stored in wave files, with the extension .WAV. There are many programs available that let you create, play, and edit these files. Pro Audio reads, writes, and lets you edit wave files.

More information about digital audio can be found in Chapter 7, *Editing Audio*.

Installation and Setup

You can install Pro Audio on any computer that runs Windows 95, 98 or NT and has a sound card or built-in sound module. If you want to hook up other devices, like a MIDI keyboard, an electric guitar, or a microphone, you need the right cables, and you need to find the right connectors on your computer.

Before you install Pro Audio, take a minute to register the software so we can let you know when updates become available and provide you with technical support. To register your copy of Pro Audio, fill in the registration card in your product package and mail or FAX it back to us. Or, register at our web site: www.cakewalk.com.

To connect a MIDI keyboard to your computer, you need to have a MIDI adapter cable. One end of the cable should have two 5-pin DIN connectors that connect to your keyboard or other MIDI device. At the

other end, you need a 15-pin connector to connect to a sound card through its MIDI/joystick port.

MIDI to 15 Pin Connector

5-pin DIN connector

15-pin connector (DB15)
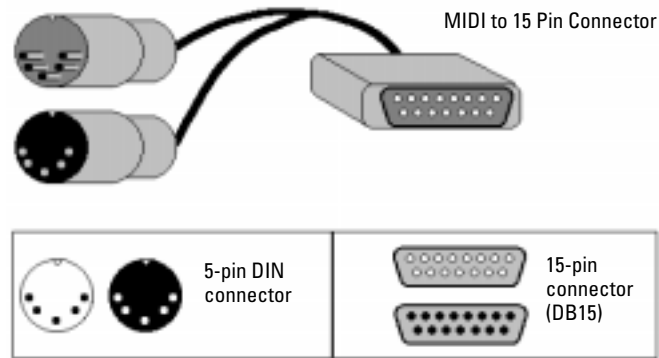
If you have a dedicated MIDI interface, lots of electronic music gear, or work with many different music software packages, you should read *Appendix C: Advanced Setup*.

Before you attach or detach any cables from your computer, you should shut down your computer and turn off the power to all your equipment. This greatly reduces the chance of electrical damage to your equipment while plugging and unplugging cables.

To Connect a MIDI Keyboard to Your Computer...

1. One of the 5-pin connectors on the MIDI cable is labeled Out. Plug this connector into the MIDI In jack on your electronic keyboard.

2. The other 5-pin connector on the MIDI cable is labeled In. Plug this connector into the MIDI Out jack on your electronic keyboard.

3. Plug the 15-pin connector on the MIDI cable into the MIDI/joystick port on your sound card. (If you have a joystick, unplug it, plug in the MIDI cable, and plug the joystick into the pass-through connector on the MIDI cable.)

To Connect an Electric Guitar to Your Computer...

1. Plug your 1/4" mono guitar cable into a 1/8" stereo adapter.

2. Plug the 1/8" jack into the microphone input or line input jack on your computer sound card.

To Connect a Microphone to Your Computer...

1. If your microphone does not have a 1/8″ mono or stereo plug, plug the microphone into a 1/8″ adapter.

2. Plug the 1/8″ jack into the microphone input jack on your computer sound card.

That's it! Now that your instruments are all set to go, you can restart your computer and turn on your keyboard, guitar, and microphone.

Installing Pro Audio...

Pro Audio is easy to install. All you need to do is choose the folder where the program and sample project files should be stored. Before you start, make sure you have your serial number and CD-KEY handy. Your serial number is located on your registration card. Your CD-KEY is located on the back of your CD case.

To Install Pro Audio...

1. Start Windows.

2. Place the Cakewalk Pro Audio CD in your CD-ROM drive. The Cakewalk Pro Audio CD Autorun screen displays automatically. If Autorun is disabled, double-click on Setup.exe in your CD directory.

3. Click the Install Pro Audio button to start Cakewalk Setup.

4. Follow the installation instructions displayed on the screen.

The setup program walks you through the installation process, making suggestions as you go. The setup program also adds a Cakewalk folder and program icon to your desktop.

You can also install Pro Audio by choosing *Start-Run* and running the application named SETUP.EXE from the CD.

Introduction

Uninstalling Pro Audio...

When you installed Pro Audio, the setup program placed an Uninstall icon in the Cakewalk folder. To uninstall Pro Audio, simply click on this icon. You can also uninstall Pro Audio from the Windows Control Panel as follows:

To Uninstall Pro Audio...

1.   Click the Start button, and choose Control Panel.

2.   Double-click on the Add/Remove Programs icon.

3.   Choose Pro Audio, then click Add/Remove.

4.   Click Yes to confirm that you want to uninstall Pro Audio.

Starting Pro Audio

There are many different ways to start Pro Audio. Here are a few:

- Click on the Pro Audio icon on your desktop.

- Click on the Start button, and choose **Cakewalk-Cakewalk Pro Audio 9** from the Programs menu.

- Right-click on the desktop, and choose **New-Cakewalk Song**. When the song icon appears, type a name for the song. Then double-click the icon to start Pro Audio.

- Click the Start button, point to Documents, and choose a Pro Audio project from the menu.

- Double-click the Pro Audio program or any Pro Audio document from the Windows Explorer or the Find menu.

When you start Pro Audio, you see the Quick Start dialog box:
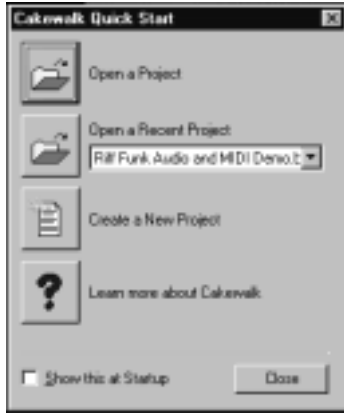
The Quick Start dialog box has several options:

Option...	How to use it...
Open a Project	Choose a project from the Open File dialog box to open it
Open a Recent Project	Select a project from the list, and click this button to open it
Create a New Project	Choose a template for the new project in the New dialog box, and click OK to create the project
Learn More about Cakewalk	Click here to view the Getting Started topic in the help file. This topic has links to tutorials, a glossary of terms, as well as some basic procedures.

If you don't want to see the Quick Start dialog box in the future, uncheck the box at the bottom of the dialog box, and click Close. You can see the Quick Start dialog box later by choosing ***Help-Quick Start***.

Starting to Use Pro Audio

This chapter has provided you with an overview of Pro Audio and basic information on how to install the software and configure your system. To get started with Pro Audio, you can do two things:

- Try the tutorials that appear in Chapter 2.

- Watch the TECHniques video tutorials to see some of Pro Audio's features in action. These tutorials are available on the Cakewalk Pro Audio CD and can be launched from the Autorun menu.

When you're finished with the tutorials and videos, move on to Chapter 3 to learn the details of how you can use Pro Audio to create your music and sound projects.

2 Getting Started

Now that you've learned some of the basics, it's time to put that knowledge to work. The three tutorials in this chapter will give you some hands-on practice in playing, recording, and mixing your projects. If you want to learn more about any topic, you'll find references to the appropriate part of the *User's Guide*.

In This Chapter

Getting Started

Tutorial 1—Playing a Song

The first tutorial teaches you the basics of playing MIDI with Pro Audio. You'll learn how to:

- Open and play a project file

- Make the song repeat automatically

- Use markers

- Speed or slow the tempo

- Mute a track and play a track solo

- Change a track's instrument

- Play a track on a MIDI keyboard

- Transpose the song

If you have not already done so, please read Chapter 1, *Introduction,* for basic background information about projects, tracks, clips, the Track view, and the Console view.

Rehearsal Time

You're a member of a garage band preparing to make a demo tape. The band practices three nights a week, but you'd like a little extra time to work on a solo in one of your songs. Fortunately, one of your fellow performers is also a Pro Audio owner and has created a project file containing a portion of the song. So, on your off nights, rather than practice your solo all by yourself, you can load the song into Pro Audio and play with the other instruments.

So, it's rehearsal time. Let's go!

Opening a Project File

As you learned in Chapter 1, Pro Audio stores MIDI and digital audio data in **project files**. The first thing you need to do is load the project file containing your band's song.

1. If you haven't already done so, start Pro Audio.

2. Choose ***File-Open***.

3. In the Open dialog box, select the file *tutorial1.wrk*. Click the Open button.

Pro Audio loads the project and opens the Track and Console views. Feel free to move and resize these views to better fit your screen; we'll be doing a little work in each of these views later in the tutorial. Right now, though, let's play the song!

Playing the Song

Buttons in the Large Transport toolbar, shown in the following picture, can control most of Pro Audio's basic playback functions. If you don't see the Large Transport toolbar, then choose *View-Toolbars* and check *Transport (Large)*.

Now time (MBT)   Now time slider

Transport

1:01:000

00:00:00:0

Meter/Key

Rewind   Play   Record   Reset

Stop   Go to End

Now time (SMPTE)
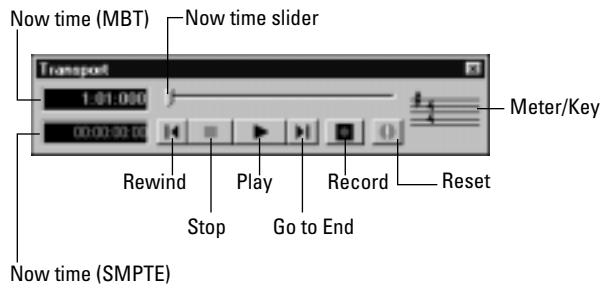
Starting Playback

1. To play the song, click the Play button ▶, or press the space bar.

Do you hear music? Go ahead, get out your instrument and jam along! If you don't hear anything, see *Appendix A: Troubleshooting* for some troubleshooting tips.

Restarting the Song

When Pro Audio gets to the end of the song, it stops. To play the song again, do the following:

1. Click the Rewind button ◄, or press W to go back to the first measure.

2. Click the Play button, or press the space bar.

Pausing Playback

1. To temporarily pause playback, click the Play button ▶ or the
    Stop button ■, or press the space bar. Click the Play button
    ▶ again to resume playback.

Certain Pro Audio functions can only be used when the song is paused.
If a function or command does not seem to work, try pausing the song.

The Now Time

The **Now time** is the current time in the song. In the Clips pane of the
Track view, the Now time is indicated by a vertical line. The Now time is
also shown in the Transport toolbar, both in MBT (measure/beat/tick)
format and in time code format (hour/minute/second/frame). During
playback, the Now time increases in accordance with the progress of the
song.

You can set the Now time of the song by clicking in the ruler in the Clips
pane or (when playback is paused) by dragging the Now slider in the
Transport toolbar.

While you are playing with the song, you may want to keep an eye on the
Now time. The Big Time view displays the Now time in a large font so
you can more easily see it from a distance. To open this view, choose
View-Big Time. You can change the time format displayed in the Big
Time window by clicking on it. You can change its font by right-clicking
on it.

Starting from a Marker

Markers make it easier to find certain points within the song. You may
want to set markers at the beginning of each section of your song or at
times with which some event must be synchronized. The Markers
toolbar lets you move the Now time to a marker, add a new marker at

the Now time, and edit the marker list. If you don't see the Marker
toolbar, then choose **View-Toolbars** and check **Markers**.

Marker list — Previous marker — Next marker — Insert marker — View markers
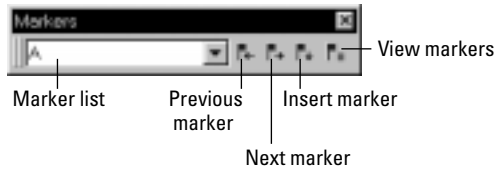
The current song contains several markers. Let's try starting playback
from the marker labeled C:

1. If the song is playing, pause playback by clicking the Stop button
   ▪.

2. In the drop-down list in the Markers toolbox, select the marker
   labeled C. The Now time moves to the start of measure 17.

3. Click the Play button ▶.

For more information about markers, see "Creating and Using Markers"
on page 5-17.

Restarting the Song Automatically

Wouldn't it be easier to practice your solo if you didn't have to rewind
and restart the song each time it ended? Rather than manually
rewinding and restarting the song, you can make Pro Audio
automatically jump back to the beginning and keep playing.

Looping Over the Entire Song

To control looping, use the tools in the Loop/Auto Shuttle toolbar. If you
don't see this toolbar, choose **View-Toolbars** and check **Loop**.

Loop On/Off — From time — Thru time — Copy selection time — Loop properties
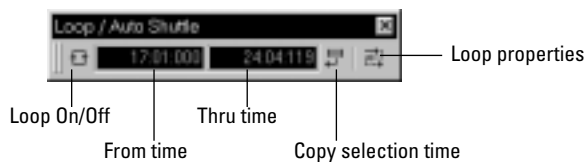
To loop over the entire song, do the following:

1. Click the Loop From time. The time display changes to an edit box with spin controls.

2. To loop over the entire song, the loop must start at 1:01:000. If the Loop From time is not already set to 1:01:000, use the keyboard or spin controls to enter this value.

3. Click the Loop Thru time.

4. Press F5 to open the Markers dialog box.

5. Select the marker named <End> and click OK. The Loop Thru time is set to the end of the song.

6. Click the Loop button [icon] to enable looping.

7. Click Play.

When looping is enabled, the time ruler displays special flag markers that indicate the loop start and end times. You can drag these markers to change the loop start and end times.

Loop From ———— [graphic] ———— Loop Thru

To turn looping off, click the Loop button again.

Looping Over a Section of the Song

Maybe you would like to practice one section of the song over and over. Or, maybe you'd like one section played repeatedly so you can practice an extended solo. In either case, you need to set the start and end times of the loop section. Let's have Pro Audio loop over the section between markers C and D:

1. Click on the Loop From time.

2. Press F5 to open the Markers dialog box.

3. In the Markers dialog box, select marker C and click OK. The loop start time is set to the marker time.

4. Click on the Loop Thru time.

5.   Press F5.
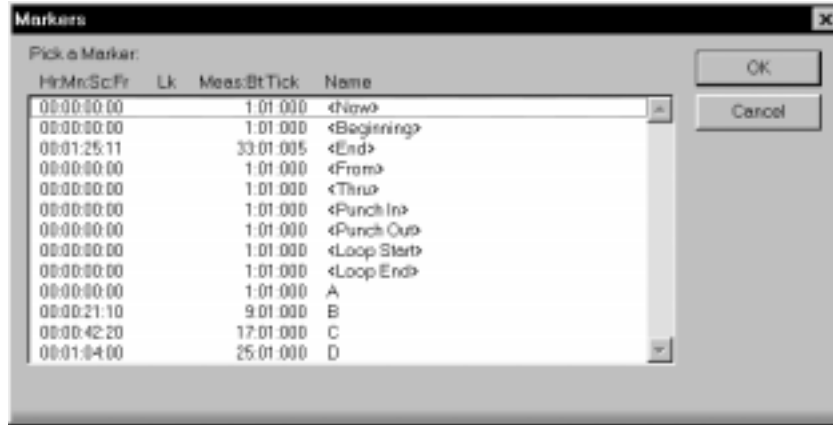
6.   In the Markers dialog box, select marker D and click OK.

7.   Click the Loop button 🔁 to enable looping.

8.   Click Rewind. The song rewinds to the Loop From time.

9.   Click Play.

A quicker way of selecting the loop times in the preceding example would be to simply click in the area between the markers at the top of the Clips pane, then click 🔲 to copy the selection start and end times to the Loop/Auto Shuttle toolbar.

Click here to select the portion of the song
between markers C and D
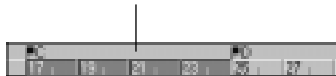
Changing the Tempo

If the song is having trouble keeping up with you (or if you're having trouble keeping up with the song!), you can easily speed up or slow down the song. There are two ways to do this: you can change the tempo, or you can change the **tempo ratio**, which determines the tempo by multiplying it by a user-defined amount. The controls for either method

are found on the Tempo toolbar. If you don't see this toolbar, choose *View-Toolbars* and check ***Tempo***.
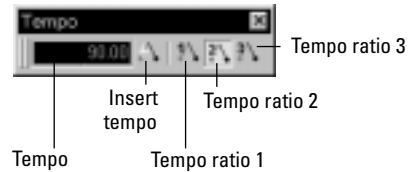
Setting the Tempo
Let's pick up the pace a little. Do the following:

1. With the song playing, click on the tempo. The tempo will be highlighted and spin controls will appear.

2. Use the spin controls to increase the tempo to 100 beats per minute.

3. Press Enter. The song will play a little faster.

Changing the Tempo with the Tempo Ratio Buttons
By default, the Tempo Ratio buttons let you play the song at half or double tempo. Try this:

1. Click the first button ⬛. The song slows to half its normal tempo. Note that the actual song tempo (100.00) has not changed.

2. Click the third button ⬛. The song speeds to twice its normal tempo.

3. Click the middle button ⬛. The song returns to its normal tempo.

Setting the Tempo Ratios
Tempo ratios can be changed by Shift-clicking on them and entering a new number in the dialog box. By default, tempo ratios are set to 0.50, 1.00, and 2.00, respectively.

Advanced Tempo Control
This song is a special case in that it has only one tempo for the entire song. If you need to vary the song's tempo, Pro Audio lets you insert tempo changes. Tempo changes can be inserted individually so that different sections can be played at different tempos, or they can be

inserted graphically in the Tempo view. For more information, see "Changing Tempos" on page 5-26.

Tempo ratios affect the entire song, even if there are tempo changes. Pro Audio always multiplies the current tempo in the song by the tempo ratio to determine the playback tempo.

Muting and Soloing Tracks

Muting a Track

Frequently you will want to temporarily turn off one or more instruments in your ensemble. Pro Audio makes it easy to mute the parts you don't want to hear.

For example, suppose that you are practicing the piano part for this song and want to hear only the other instruments. Let's mute the piano part. With the song playing, do the following:

1. In the Track pane, click on the Mute button in the Piano track (track 1). The button turns yellow, and the piano part drops out of the song.

2. To turn the piano back on, click the Mute button again.

Note that the yellow MUTE indicator lights up in the status bar whenever a track is muted. This can be very helpful if there are muted tracks that aren't visible.

Let's try using a different method to mute two tracks simultaneously:

1. In the Track pane, click the track number (the leftmost column) of the Piano track. The track is selected.

2. While pressing Ctrl, click the track number in the Sax track. The Piano and Sax tracks are selected.

3. Choose **Track-Mute**. Both tracks are muted.

You can also mute or unmute tracks by using the pop-up menu:

1. In the Track pane, click the track number of the Piano track.

2. While pressing Ctrl, click the track number of the Sax track. The piano and sax are selected.

3. Right-click on either track to bring up the pop-up menu.

4. Choose **Mute** (which should have a check mark beside it). The tracks are unmuted. You can also unmute all tracks by clicking the Mute indicator on the Status bar.

Playing a Track Solo

If you want to hear one track by itself, you could mute all other tracks. But there's a quicker way to do it—the Solo button. For example, to play the drum part by itself, do the following:

1. Click the Solo button ⬜ in the Drum track (track 5). Voila, a percussion solo!

2. To let the other instruments back into the song, click the Drum track's Solo button again.

Solo is not exclusive—you can let as many instruments as you like into the solo. Note that the green SOLO indicator lights up in the status bar whenever a track is soloed.

Let's use a different method to solo all three percussion tracks:

1. In the Track pane, click the track number in the Drums track. The track is selected.

2. While pressing Shift, click the track numbers in the Shaker and Triangle tracks. All three percussion tracks are selected.

3. Choose **Track-Solo**.

When you want to let the entire ensemble back into the song, click the Solo indicator on the Status bar to unsolo all the tracks, or select all soloed tracks and choose **Track-Solo.** As a third option, right-click, bring up the pop-up menu, and turn off the solo from there.

Note that Solo takes priority over Mute. If both buttons are selected in a track, the track will be played.

Mute and Solo in the Console View

The Console view contains Mute and Solo buttons identical to those in the Track view. The two sets of buttons are synchronized. To see this, do the following:

1. In the Console view, mute the Bass, Sax, and Drums tracks.

2. Solo the Piano track.

3. In the Track view, check that the first track is soloed and that tracks 2, 3, and 5 are muted. Click the selected Solo and Mute buttons to return the tracks to normal.

Changing a Track's Instrument

If your sound card is like most, its internal synthesizer is capable of producing at least 128 different instrument sounds, plus several dozen percussion sounds. Now you'll find out how to get some of those other instruments into the act. Let's try changing the instrument playing the piano line.

Changing the Patch in the Track View

With the song playing, do the following:

1. Solo the Piano track so you can hear the piano part more clearly. To do this, click on the Solo button $\boxed{s}$ in the Piano track (track 1).

2. Right-click on any column (except Bank and Patch) in the Piano track to open the pop-up menu.

3. Choose **Track Properties** to open the Track Properties dialog box.
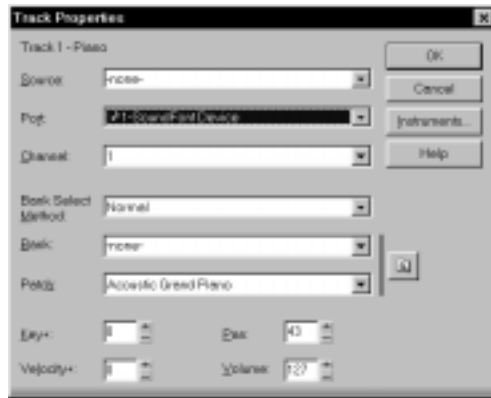
4. Find the Patch setting. This setting indicates which patch, or instrument, is used by this track. Right now, the Piano track uses the patch called Acoustic Grand Piano.

5. To change the patch, select a new patch from the drop-down list. Pro Audio immediately starts playing the piano part with that new instrument.

6. Have fun trying all the different patches!

7. Click OK to keep the patch you have selected currently, or click Cancel to go back to the original patch.

8. Click the Solo button in track 1 again to unsolo the Piano track.

You can also change the patch by clicking in the Patch field and using the + and – keys to increment through the different patches. To do so:

1. Solo the Piano track by clicking on the Solo button in track 1.

2. Click in the Patch field in the Piano track, moving the highlight to that field.

3. Press the + or – key on the numeric keypad.

4. Click the Solo button in track 1 again to unsolo the Piano track.

You may want to experiment with changing all the instruments used by the song. One thing you should know: Changing the instrument on a percussion track (such as the Drum, Shaker, and Triangle tracks in this song) may have no effect. Percussion instruments are played on MIDI channel 10, which in General MIDI is dedicated to percussion. The note determines the instrument, and the patch is irrelevant.

Changing the Patch in the Console View

It's easier to change a track's patch in the Console view. For example, to change the Piano track's patch, click the Patch button in the Piano module and choose a new patch from the menu.

Playing Music on a Keyboard

If you've connected a MIDI keyboard (or another instrument) to your external MIDI interface or the MIDI interface of your sound card, you can play one or more parts of the song on the keyboard instead of the sound card's internal synthesizer. For instructions on connecting a keyboard to your computer, see "To Connect a MIDI Keyboard to Your Computer…" on page 1-16. For this tutorial, we assume that you want to connect the keyboard to the MIDI in and out of your sound card.

Checking Your MIDI Device Settings

First, let's make sure that Pro Audio is set up to send MIDI output to your keyboard.

1. Choose **Options-MIDI Devices** to open the MIDI Ports dialog box.

2. In the Output Ports column, two devices should be selected. The first should be your sound card synthesizer device; the second should be your MIDI out device. The uppermost selected device will correspond to Port 1, the second device to Port 2, and so on. For help with these settings, see "Setting Up Output Devices" on page 3-17.
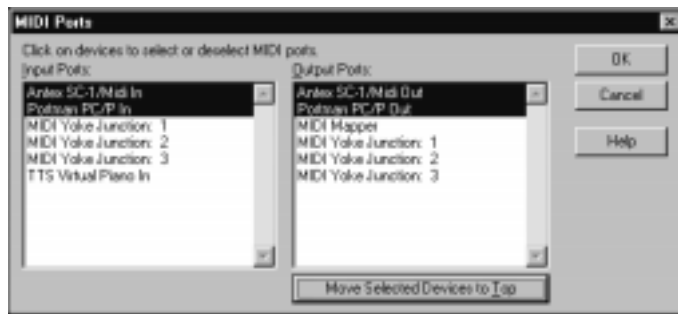
3. Click OK.

Routing MIDI Data to the Keyboard

Let's play the Piano track on the MIDI keyboard. First, turn your keyboard on and make sure it is set up to receive MIDI input on channel one. Then, do the following:

1. In the Track view, right-click on any column in the Piano track (track 1) to open the pop-up menu.

2. Choose **Track Properties** to open the Track Properties dialog box.

3. For Port, select your MIDI out device.

4. Click OK.

Or, if you prefer, the procedure is a little easier in the Console view:

1.   In the Console view, click the Port button in the Piano module.

2.   Choose your MIDI out device from the menu.

If you don't hear anything on your keyboard, see *Appendix A: Troubleshooting* for some hints on troubleshooting.

Transposing

Sometimes it's useful to transpose, that is, to move the pitch of the song upward or downward. You may want to bring the song into someone's vocal range, make the song easier to play along with on your instrument, or simply make an aesthetic adjustment.

Let's raise the pitch of the song by a fifth. With the song playing, do the following:

1.   In the Track pane, drag over the track numbers for tracks 1 through 4 to select them.

2.   Choose **Edit-Transpose**.

3.   In the Transpose dialog box, enter 7 in the Amount box. You can type the number or use the spin controls.
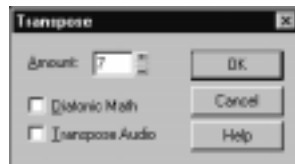
4.   Click OK.

Pro Audio raises all the notes in the selected tracks by seven half-steps (for example, C is raised to G, D is raised to A, and so on). The Transpose dialog box also has an option for transposing by diatonic steps; see "Transposing" on page 6-9 for more information.

To undo your transposition, choose **Edit-Undo**, or press Ctrl-Z.

If you want to transpose to a lower key, do the same thing, except enter a negative number in the Transpose dialog's Amount box. For example, to lower the pitch of the song by a fifth, enter -7.

Note that you do not have to transpose entire tracks at one time; when you learn more about selecting smaller sections of music, you will be able to transpose individual clips, or parts of clips.

Transposing Percussion

You may be wondering why we did not transpose the percussion tracks. As mentioned earlier, in General MIDI each note in the percussion channel is mapped to a particular percussion instrument: a snare, a kick drum, a cymbal, a triangle, and so on. Transposing the percussion tracks will not change the pitch of each note but rather will change the instrument used to play each note! This is not usually the desired effect, so in general you would not use the *Transpose* command on percussion tracks.

On the other hand, when a track contains events for only one percussion instrument (that is, all the notes are the same pitch), you can change the instrument by transposing the track. For example:

1. With the song playing, solo the Triangle track (track 7).

2. To hear the triangle more clearly, click in the Triangle track's Vel+ column and enter 127. This increases the velocities of the triangle notes, which increases their notes' volume.

3. Press Enter.

4. Select the Triangle track by clicking on its track number.

5. Choose *Edit-Transpose* to open the Transpose dialog box.

6. In the Amount box, enter -25.

7. Click OK.

The triangle sound is replaced with the sound of a cow bell.

To undo your transposition, choose *Edit-Undo*, or press Ctrl-Z.

Getting Started

Transposing with Key+

Another way to transpose a track is to use the Key+ column in the Track view. For example, let's raise the Sax track by an octave:

1.   Click in the Sax track's Key+ column.

2.   Enter 12. This raises all notes in the track by 12 half-steps, or an octave.

3.   Press Enter.

Transposing with the Transpose MIDI Effect

One final way to transpose a track is to use the Transpose MIDI plug-in effect. Pro Audio's MIDI and audio effects let you modify notes and sounds on the fly, as they are played, without making permanent changes to your music and sound data. (They can also be used to perform destructive, or permanent, editing.)

For example, let's raise the Bass track by an octave too. In the Console view, do the following:

1.   Right-click in the Bass track effects patch point (the empty box below the track name) and choose *Transpose* from the menu. The Transpose effect is added to the track.

2.   Double-click the Transpose effect to open the Transpose dialog box.

3. In the Offset box, type 12. You can also use the pop-up slider below the box to set the offset value.
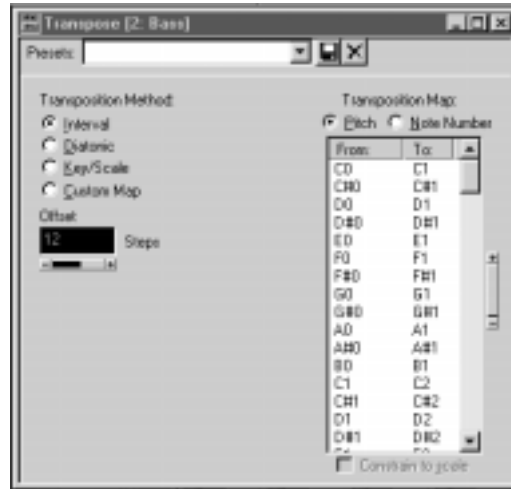
If the song is playing, you'll immediately hear the change. You can use this technique to adjust your effects in real time.

To delete the Transpose effect, click on it and press Delete.

That completes the first tutorial. In the next tutorial, you'll learn to record MIDI and digital audio tracks into Pro Audio.

Tutorial 2—Recording MIDI and Digital Audio

This tutorial teaches you how to record with Pro Audio. You'll learn how to:

- Set up the metronome

- Record MIDI tracks

- Use loop recording

- Use punch recording

- Record digital audio tracks

Rehearsal Time, Part 2

In Tutorial 1, you used Pro Audio to help you rehearse a solo in one of your band's songs. Pro Audio played the backup parts of the song while you played your solo. Now that you've had some time to practice, you'd like to record your solo with Pro Audio so you can play it and hear how you sound.

Pro Audio lets you record two different types of data: MIDI and digital audio. If you have a MIDI instrument connected to the MIDI In port of your sound card or an external MIDI interface, you'll probably want to record your performance as MIDI. Otherwise, you'll need to hook your instrument, preamp, effects rack, mixer, or microphone to the appropriate audio input of your sound card and record your performance as digital audio. For information on how to connect your instrument to the computer, see "Installation and Setup" on page 1-15.

Opening the Project File

If you haven't already done so, the first thing you need to do is load the project file containing your band's song.

1. Start Pro Audio.

2. Choose **File-Open**.

3. In the Open dialog box, select the file *tutorial1.wrk*.

4. Click the Open button.

Pro Audio loads the project and opens the Track and Console views.

Recording MIDI

Let's record a new MIDI track in the song. If you have no MIDI device to connect to your computer, you can use Cakewalk's Virtual Piano (included with Pro Audio) as a MIDI source. For more information about this tool, see "Virtual Piano" on page 4-14.

Setting Up the Metronome

Musicians often use a metronome to keep track of the beat. Pro Audio's metronome is more versatile than most real metronomes. You can configure to sound on playback or recording; it can count off any number of lead-in measures or beats; it can use the PC speaker or a MIDI note; and it can accent the first beat of each measure. It also quickly and accurately follows any tempo changes that happen in the song.

You can set up the metronome with the Metronome toolbar. If you don't see the Metronome toolbar, choose **View-Toolbars** and select Metronome.
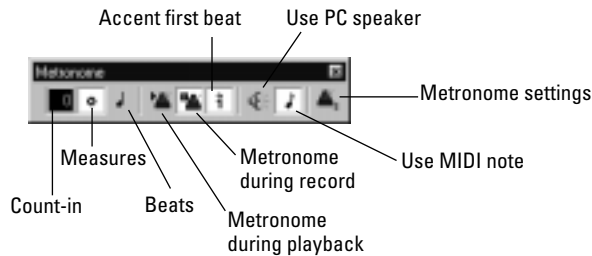
Let's set up the metronome to play two count-in measures on the PC speaker when recording. Here's what to do:

1. In the Metronome toolbar, click in the Count-in box.

2. Use the spin control to set the count-in value to 2.

3. Select the Count-in Measures option .

4. Deselect the Metronome During Record option .

5. Select the Use PC Speaker option .

6. Deselect the Use MIDI Metronome option .

By disabling the Metronome During Record option, you cause the metronome to turn off after the count-in measures. If you would prefer to hear the metronome during the entire song while recording, enable this option instead.

The metronome counts in for recording, not for playback.

Checking Your MIDI Device Settings

Let's make sure that Pro Audio is set up to receive MIDI data from your instrument.

1. Choose **Options-MIDI Devices** to open the MIDI Ports dialog box.

2. In the Input Ports column, select your sound card's MIDI In device or the MIDI In for your external MIDI interface. (If you will be using the Virtual Piano, select the Virtual Piano device as well.) For help with these settings, see "Setting Up the MIDI In and MIDI Out Devices" on page C-15.
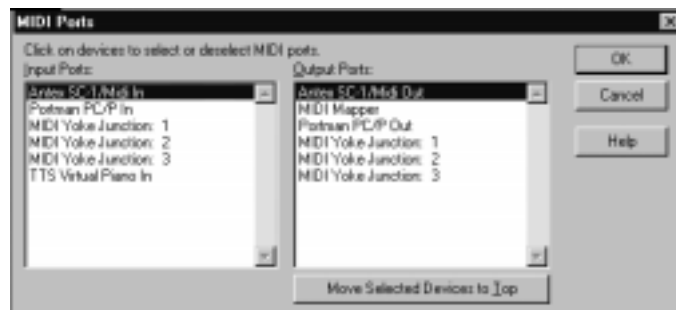
3. Click OK.

Setting Up Playback

During recording, Pro Audio will play the rest of the song as usual. Depending on what instrumental part of the song you are going to record, you may want to mute one or more tracks, or solo certain tracks. For example, if you are going to record a new piano part, you might want to mute track 1 so that you're not competing with the old piano part while recording. To mute any track, click the track's Mute button M.

You can also set other playback options, such as the Tempo ratio, to make your recording session easier.

Recording MIDI

Now you'll record a new track in the song. Do the following:

1. Make sure your instrument is turned on and set up to transmit MIDI data.

2. Double-click the Name column in track 8 and type a name for your new track.

3. Make sure the Source column in track 8 is MIDI Omni. If it isn't, double-click the Source column and set the Source in the Track Properties dialog box to MIDI Omni.

4. In track 8, click the Arm button [R].

5. On the Transport toolbar, click Record [■], or press R.

You'll hear two measures counted in by the metronome, then playback and recording will begin. Go ahead and start playing!

When you finish recording, click the Stop button [■], or press the space bar. If you've played any notes, a new clip will appear in the Clips pane in track 8. If no new clip appears, see "I Can't Record from My MIDI Instrument" on page A-2 for some troubleshooting hints.

Listening to the Recording

Let's play back your performance on your sound card. For an added dimension, we'll open a few other views in the process. Do the following:

1. Double-click in the Source, Port, Channel, or Patch column in track 8 to open the Track Properties dialog box.

2. For Port, select your sound card's MIDI synthesizer.

3. For Channel, select an unused channel, such as 7.

4. For Patch, select any instrument.

5. Click OK.

6. Choose **View-Piano Roll** to open the Piano Roll view.

7. Choose **View-Staff** to open the Staff view.

8. Choose **View-Event List** to open the Event List view.

9. Choose **Window-Tile in Rows** to tile the views.

10. To return to the start of the song, click the Rewind button [◄◄].

11. Click Play [▶].

Getting Started

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It's almost as easy to listen to your performance on your MIDI instrument. For instructions on how to play a track on a MIDI keyboard, refer to tutorial 1.

The Piano Roll, Staff, and Event List views all show the same basic information—the notes in track 8. The Piano Roll view displays the track as a player-piano roll. The Staff view shows notes in traditional music notation. The Event List view lists all MIDI events for the track. When you need to edit a track, you can work in any of these views. On different occasions you may have reason to use different views. More information about the Piano Roll, Staff, and Event List views can be found in later chapters of the *User's Guide*.

When you're ready to continue, close the Piano Roll, Staff, and Event List views.

Recording Another Take

Maybe your first attempt at recording resulted in a perfect performance, but maybe not. If you'd like to remove your first take and try again, do the following:

1.   Choose **Edit-Undo Recording** or press Ctrl-Z to undo your recording.

2.   Click Rewind ◄◄, or press W. The track is still armed for recording, so you don't need to re-arm it.

3.   Click Record ■, or press R.

Alternatively, you could record your next attempt on a new track. That way you can keep all the takes and select the best one later (or combine the best parts of each!). If you record on a new track, be sure to arm the new track for recording and to disarm the previous track. See "Loop Recording" on page 2-23 for more information.

Fine Tuning

After you've recorded a MIDI track, you can use Pro Audio to make automatic adjustments to the timing of notes. For example, the *Quantize* command rounds off the start times and durations of notes to evenly spaced note boundaries (quarter notes, eighth notes, sixteenth notes, and so on). *Quantize* lets you select full or partial rounding, and it even lets you distort the timing into a "swing" beat. For more information on *Quantize* and other related commands, see "Changing the Timing of a Recording" on page 6-16.

Saving Your Work

When you have something you'd like to keep, you can save the project by doing the following:

1. Choose **File-Save As**.

2. In the File Name box, type a new file name, such as *my project*.

3. Click OK.

The project is saved under the new name. From now on, you can click the Save button 🖫 to save your work.

Loop Recording

If you'd like to record several takes successively, you can set up Pro Audio to loop over the entire song, or just some section of it. Pro Audio will record a new take during each loop, storing that take in a new clip. You can set Pro Audio to place each clip in a new track or to pile all clips in one track.

Let's try recording a few takes of the section between markers A and B, placing each take in a new track.

Setting Up Looping

First, let's set up Pro Audio to loop over the section between markers A and B:

1. In the Clips pane, click in the ruler between markers A and B. This selects the range of time from marker A to marker B.

2. In the Loop/Auto Shuttle toolbar, click 🖫 to set the Loop From and Loop Thru times.

When you click 🖫, looping is turned on automatically.

Setting Up the Tracks

Now let's set up the first of the tracks where the takes will be stored:

1. In track 9 (or the first available empty track), double-click the Name column and name the track.

2. Click the Arm 🖫 button.

3. Double-click in the Source, Port, Channel, or Patch column to open the Track Properties dialog box.

4. Set the Source to MIDI Omni.

5. Set the Port to your sound card's MIDI synthesizer.

6. Set the Channel to an unused channel or to the channel you used for your earlier take(s).

7. For Patch, select any patch.

8. Click OK.

As usual, you could set the tracks to play back on your MIDI instrument instead by specifying the appropriate port and channel.

Loop Recording
Finally, let's record our takes:

1. Choose **Realtime-Record Options** to display the Record Options dialog box.

2. Choose the Store Takes in Separate Tracks option to store each new take in a separate track. Each time a new take starts, the settings from the first track will be copied to the new track.
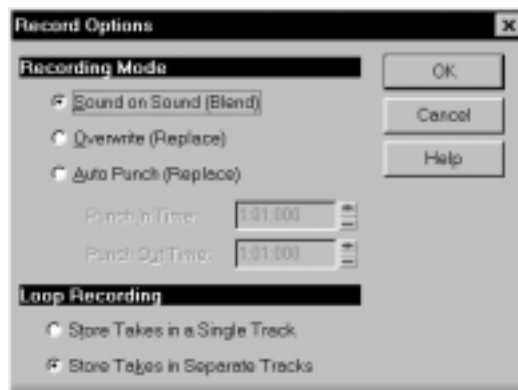
3. Click OK.

4. Click Rewind .

5. Click Record .

Pro Audio loops over the designated section and records your takes to successive tracks. If you want to erase the most recent take during loop recording, choose **Realtime-Reject Loop Take**, or press Ctrl-space bar.

To stop recording, click Stop [■], or press the space bar.

Punch-In Recording

Imagine that one of your takes was close to ideal, except for one or two notes in one measure. Rather than recording another full take, you'd prefer to keep the take but replace that measure.

Punch-in recording lets you replace a section of a track. The way it works is this: First, you set the start and end times of the punch to the section you want to replace and turn on punch recording. Then, you arm the track and start recording. You can play along with the original take to get the rhythm and feeling. However, nothing will be recorded until the punch start time. During the punch, the material already in the track will be replaced with what you record. When the punch ends, the song will continue to play, but recording will stop.

Let's try it. Suppose you want to replace measures 5 and 6 in the take in track 8.

1.   In the Record toolbar, click on the Punch In Time.

2.   Type 5 and press Enter.

3.   Click on the Punch Out Time.

4.   Type 7 and press Enter.

5.   Select Auto Punch from the Record Mode drop-down list.

6.   Arm track 8 and disarm any other tracks that are armed.

7.   If you like, you can mute the tracks containing your other takes, or even solo track 8.

8.   If looping is still on, click the Loop button [⊡] to turn it off.

9.   Click Rewind [◄|].

10. Click Record [●].

Play along until you are past the punch end time, then click Stop ▢ ■ ▢.
Replay your take to hear the difference. If it's still not right, try again!

An alternative method is to select measures 5 and 7 by dragging in the
time ruler. Then right-click the time ruler and choose **Set Punch Points**.

You can combine loop recording with punch recording; see "Punch
Recording" on page 4-20 for details.

When Auto Punch is enabled, the time ruler displays special markers
that indicate the punch in and punch out times. You can drag these
markers to change the punch in and punch out times.

Punch In   Punch Out
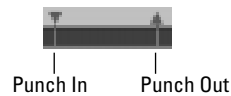
Recording Digital Audio

If your instrument is not MIDI-compatible, you must record your solo as
digital audio data. To record digital audio, you need some sort of device
hooked up to your sound card's line or mic input—an electric guitar, a
preamp, a mixer, and so on. If nothing else, try playing or singing into a
microphone!

Setting the Sampling Rate

Each Pro Audio project has a parameter that specifies the sampling
resolution for all digital audio data in the project. You should set this
rate before recording any digital audio.

1. Choose **Options-Audio**.

2. Click the General tab.

3. Select a Default Sampling Rate. For CD-quality sound, use 44100
    Hz.

4. Click OK.

Lower sampling rates will save disk space but will result in lower-
quality audio. Before embarking on any major project, try sampling at
different rates to determine which one best suits your needs.

Setting Up an Audio Track

Let's set up a track for digital audio.

1. In the Track pane, in the first available empty track, double-click the Name column and enter a name for your new track.

2. Double-click in the Source column and set the Source in the Track Properties dialog box to your sound card's audio input.

Checking the Input Levels

Before trying to record, you need to check and adjust the audio input levels. If your audio input is too low, it will be lost in the background noise. If it is too high, it will overload the input channel and be distorted/clipped.

Here's how to check the audio input levels:

1. Open the Console view and click the Arm button in your new audio track. An audio meter will appear next to the track's volume fader.

2. Perform as you would during recording. Watch the meters respond to the sounds you produce.

3. If the meters never come even close to the maximum, increase the input level using the Windows 95 mixer or your sound card's software mixer.

4. If the meters even occasionally reach the maximum, decrease the input level using the Windows 95 mixer or your sound card's software mixer.

The idea is to try to get the input level to rise as high as possible, but without ever reaching the maximum. That way, you get the strongest possible signal without distortion.

If you don't see any movement of the audio meters, you may have an audio input problem. Refer to "I Can't Record Any Audio" on page A-4 for troubleshooting hints.

Getting Started

Recording Digital Audio

It's time to record!

1. If you haven't already set up the metronome, follow the directions in the "Setting Up the Metronome" section earlier in this tutorial to set the metronome for a two-measure count-in.

2. Mute any tracks you don't want to hear while recording, or solo the tracks you do want to hear.

3. The track is already armed for recording.

4. In the Transport toolbar, click Record ▣.

You'll hear two measures counted in by the metronome, then playback and recording will begin. Go ahead and perform!

When you finish recording, click the Stop button ▣, or press the space bar. A new clip will appear in the Clips pane. If no new clip appears, see "I Can't Record Any Audio" on page A-4 for some troubleshooting hints.

Listening to the Recording

Let's play back your performance. Do the following:

1. Double-click in the Source, Port, Channel, or Patch column in the new track to open the Track Properties dialog box.

2. For Port, select your sound card's audio output device.

3. Click OK.

4. To return to the start of the song, click the Rewind button ◄ .

5. Click Play ▶ .

Recording Another Take

If you'd like to delete your performance and try again, do the following:

1. Choose *Edit-Undo Recording* to undo your recording, or press Ctrl-Z (Undo).

2. Click Rewind ◄ or press W.

3. The track is still armed for recording, so you don't need to re-arm it.

4. Click Record ▣.

Alternatively, you could record your next attempt on a new track.

Loop and Punch-In Recording

Loop and Punch-in work the same for digital audio recording as they did for MIDI recording. For more information, refer to the relevant sections preceding, or to "Loop Recording" on page 4-18 or "Punch Recording" on page 4-20.

Recording Multiple Channels

If you can gather the entire band around your computer, and if you have the proper equipment, you can record a full multiple-instrument performance all at once. If you have several MIDI instruments, you can route their input into your sound card through a MIDI merger; data that arrives on different MIDI channels can be routed to different tracks. Likewise, a typical sound card can record audio on both right and left channels; each can be recorded on a different track. Multiple sound cards and multi-I/O sound cards can expand the number of possible inputs. For more information, see "Configuring Your Audio Hardware" on page 13-3.

That completes the second tutorial. Now you've learned the basics of playing and recording material for your projects. In the next tutorial you'll learn about basic audio editing techniques, audio effects, and mixing with the Console view.

Tutorial 3—Audio Editing and Mixing

The third tutorial teaches you how to edit digital audio and apply audio effects. You'll learn how to:

• Stretch or compress music to fit a certain period of time

• Edit and rearrange audio data

• Apply effects to audio data

• Apply real-time effects in the Console view

• Control the mix during playback

• Save a project as a Pro Audio Bundle file

• Export a project as a RealMedia file

Audio Engineering

You're an audio engineer. One of your clients has an idea for a 20-second radio spot and has sent you a script and a project containing some raw material from which to start. Your task is to finish the radio spot.

Opening the Project File

First, let's load and play the project file from your client. Do the following:

1. Start Pro Audio.

2. Choose **File-Open**.

3. In the Open dialog box, select the file *radiospot.bun*.

4. Click the Open button.

5. Click Play ▶.

The project contains several tracks. Tracks 1 through 6 are MIDI tracks that have an edited version of "Boston Rain," which we'll use as background music for the radio spot.

The Plan

Let's talk about what you need to do to transform this into a 20-second radio spot.

Music

Your client likes the edited version of "Boston Rain" as background music, but it is too long for the 20-second spot. There are two choices: You could fade the volume as you approach the 20-second mark, or you could speed the music to stretch it. In this tutorial, we'll use the second option.

Script

Your client has supplied the following script:

Music...	Announcer...
Edited "Boston Rain"	From Cakewalk, makers of the world's number-one-selling music and sound software, comes Pro Audio Version 9— the most powerful release yet for Windows 95, 98 and NT.
	(Pause)
	With Pro Audio, you can produce complete music and audio projects in one integrated system.
	(Pause)
	Pro Audio is available at finer music and computer stores worldwide or by calling 1-888-CAKEWALK.

Stretching the Music

First, let's speed the music to fit within 20 seconds.

There are two ways the music can be made to fit: by increasing the tempo or by keeping the tempo and changing the note start times and durations. It is usually advantageous when compressing or stretching music to change the tempo rather than the notes, because this will keep the relationship of notes to measures intact and let you edit the music more easily later. In the present case we'll change the tempo

 Do the following:

1. In the Track view, select the area between the markers labeled Start and End.

2. Select all the MIDI tracks (1 through 6), by dragging over the track numbers.

3. Choose **Edit-Fit to Time** to open the Fit to Time dialog box.

4. For New Thru, enter 00:00:20:00. If this field is displayed as Measures:Beats:Ticks, click the Format button.

5. For Modify by Changing, select Tempo Map.
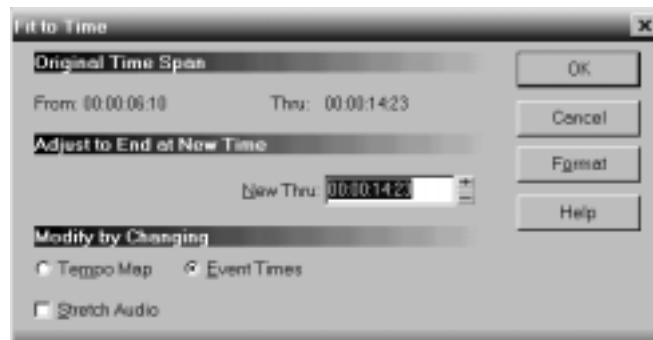
6. Click OK.

Play the project again and note the difference. You'll see that the tempo in the Tempo toolbar has changed from the original 90.00 beats per minute to 95.97. You could have entered this number directly, bypassing the Fit to Time dialog box, but you probably would have had to experiment with different numbers until the MIDI tracks ended up at just the right length. Fit to Time calculated the correct tempo value for you.

Saving Your Work

Because we are going to do some serious editing later in the tutorial, you may want to save your work as you go along:

1.   Choose **File-Save As**.

2.   In the File Name box, type an unused file name, such as My RadioSpot.

3.   For Save as Type, select Normal.

4.   Click OK.

The project is saved under the new name. From now on, you can click the Save button to save your work.

Adding the Announcer

Your next task is to record the announcer track. The procedure is similar to the one we used in the last tutorial, but you don't need to set the sampling rate (because it is already set) and you don't need to turn on the metronome (the music will give you timing cues for the beginning and ending of the spot).

To record the announcer track, you'll need a microphone. For help with connecting a microphone to your computer, see "To Connect a Microphone to Your Computer…" on page 1-17.

Setting Up the Announcer Track

Let's create a new track for the announcer.

1.   In the Track view, select track 1 by clicking the track number.

2.   Right-click the track number and choose **Insert Track** from the pop-up menu to insert a new track.

3.   Double-click the Name column and type Announcer for the name of the new track.

4.   Double-click in the Source column to open the Track Properties dialog box.

5.   Set the Source to your sound card's audio input.

6.   For Port, select your sound card's audio output.

7.   Click OK.

Checking the Input Levels

Before trying to record, you need to check and adjust the audio input levels. If your audio input is too low, it will be lost in the background noise. If it is too high, it will overload the input channel and be distorted/clipped. You can do this by using the Console view, as we did in the previous tutorial. Please refer to that section if you need to know how to do this.

Recording

Let's record the announcer track.

1. Make sure that the Announcer track is armed for recording.

2. In the Transport toolbar, click Rewind [◄], then click Record [■].

3. Read the script, with feeling.

When you finish recording, click the Stop button [■], or press the space bar. A new clip will appear in track 1 in the Clips pane.

Play back what you've recorded and see how it sounds! If you don't like the results, choose ***Edit-Undo Recording*** (or press Ctrl-Z) and try again. It's okay if the announcer's voice over doesn't fit exactly… because we will be editing it to make it shorter soon.

When you have a recording you like, remember to disarm track 1 and save your work.

Trimming the Announcer

Our next task is to edit the announcer segment to make it fit within the 20 seconds. There are two parts to this. First, we'll trim the beginning of the audio and move the entire voice-over so that it starts at the beginning. Then, we'll remove the pauses or breaths and slide the segments around in time until they fit.

Opening the Audio View

We'll perform our editing work in the Audio view. To set up the Audio view, do the following:

1. Solo the Announcer track, so you don't hear the music while you edit.

2. Select the Announcer track by clicking on the track number (track 1).

3. Choose *View-Audio* to open the Audio view. The audio data in track 1 is displayed.

4. If selected, deselect the snap grid ▦.

5. Select the Snap to Zero Crossing option ▨. With this option, any selections we make will snap to the nearest zero crossing in the audio waveform. This prevents unwanted pops and clicks resulting from any edits.

6. Click the H:M:S:F button ▦ to display the ruler in SMPTE time.

7. Use the horizontal and vertical zoom buttons as necessary to zoom out and in on the waveform.

Trimming the Beginning of the Announcer

Now we'll see how to trim the beginning of the announcer's read. This will eliminate any unwanted silence at the beginning. Do the following:

1. In the Audio view, select the Scrub tool ◉.

2. Use the horizontal zoom buttons until you can see enough of the audio event to identify the three separate sections.

3. Click on the event to hear the audio near the beginning of the voice-over. Let go when you have reached the point directly before the first word.

4. Right-click on the event and choose *Split* from the pop-up menu.

5. Click OK in the dialog box that appears.

The event has now been split into two events, each of which has the same name. The first portion, which should only be silence, is currently selected.

1. Right-click on the first portion of the audio event (the one that is only silence) and choose **Delete** from the pop-up menu.

2. In the dialog box that appears, make sure that only Events in Tracks is selected. This means that other items, such as tempo changes and markers, will not be deleted.

3. Click OK.

The silence that existed before the announcer is now gone, and now we can move the remaining piece of voice-over so that it begins right at the start of the spot.

1. Select the Selection tool ![icon] and then click on the announcer's audio event.

2. While holding down the mouse button, drag the event so that it starts closer to the beginning of the music. Let go of the mouse button.

3. In the dialog box that opens, choose the Replace Old with New option and click OK.

4. Rewind to the beginning of the project and hit play. Listen to where the voice-over begins. If you need to move it earlier, follow steps 1 through 3 again.

Renaming Audio Events

Now that we've got the announcer starting in the right place, let's rename that audio event:

1. Right-click on the announcer audio event.

2. Choose **Event Properties** from the pop-up menu.

3. In the Name field, enter the name Edited V/O.
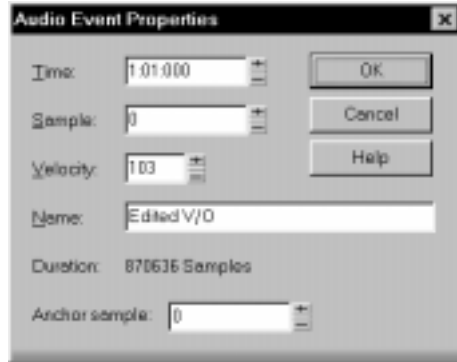
4. Click OK.

Now our audio event bears the name Edited V/O, which is more descriptive. Next, we will remove the pauses between sections of the script. You may want to save your work before continuing.

Editing the Announcer

Now that the announcer's voice begins at the correct time, we will remove any pauses or breaths. This will allow us to fit the entire read into the allotted time. To do so, we will split the audio and delete the silence in the same way that we trimmed the preceding event.

1. In the Audio view, choose the **Scrub** tool .

2. Find the beginning of the silence by clicking and dragging the mouse over the waveform.

3. Right-click and choose *Split*.

4. Click OK in the dialog box.

5. Find the end of the silence.

6. Right-click and choose *Split*.

7. Click OK in the dialog box.

8. Right-click on the newly defined event, which is comprised entirely of silence.

9. Choose *Delete* from the pop-up menu and make sure that only Events in tracks is selected.

10. Click OK.

11. Repeat this procedure so that all silence has been deleted.

The silence has been deleted, so now we should move the audio that followed it.

1. Click on the middle section of voice-over and drag it earlier in the track so that a more natural pause exists between the two sections.

2. Release the mouse button.

3. In the dialog box that appears, choose Blend Old with New or Replace Old with New, then click OK.

4. Listen to the read. If the pause seems natural, do the same to the last section. If not, try moving the middle section until the pause is correct.

Combining Audio Events

After you have moved the audio around and finished tightening pauses, you may want to have a single, continuous audio event instead of three separate ones. To do this:

1. Select all the events by holding Shift while clicking on each.

2. Right-click on any of the events and select **Combine** from the pop-up menu. The events will combine into a single audio event.

If you overlapped any of the events when you moved them, you will be presented with a dialog box asking how to treat the overlapping parts. For more on this, see "Moving and Copying Clips" on page 5-9.

Making It Fit

Now that we've edited the announcer clip, let's see if it fits in our allotted time. Unsolo the announcer track and press Play. Does it fit? If so, move to the next section. If not, you'll have to use the Fit to Time edit on the audio. To do so:

1. From the Track view, select the announcer clip by clicking on it.

2. Choose **Edit-Fit to Time**.

3. In the dialog box that appears, set the New Thru time to 00:00:20:00 and make sure that the box next to Stretch Audio is checked.

4. Click OK. Pro Audio processes the audio so that it runs faster while keeping the same pitch (also known as time compression).

5. Click Play and listen to the spot. The announcer should now fit in the 20 seconds of the music.

If the announcer's clip still doesn't fit, you could remove the middle section, but that's cheating.

You should save your file again now.

Mixing the Radio Spot

Now let's go to the Console view and finish the project. We'll apply real-time audio effects to the announcer track, then automate the faders in real time.

Preparing the Console

Before starting, let's make sure that the Console view is set up correctly.

1. If the Console view is not open, choose **View-Console**.

2. Click the Module Manager button ![icon] to open the Module Manager dialog box.

3. Make sure all options are selected and click OK.

Applying Real-Time Audio Effects

It's quite simple to apply real-time effects to a track. Let's add a small amount of equalization to the announcer track.

1. In the announcer track's effects patch point, right-click and choose **Cakewalk-FX Parametric EQ (Stereo)**. The effect is added to the track.

2. Double-click the effect to display the settings.

3. Make sure that the Current Filter is set to 1.

4. Adjust the Center Frequency knob to around 2500 Hz.

5. Adjust the Q to 6.

6. Adjust the Gain to +3.6 dB.

7. Change the Current Filter to 2.

8. Adjust the Center Frequency knob to around 7500 Hz.

9. Adjust the Q to 6.

10. Adjust the Gain to +3.6 dB.

Play the project to hear what it sounds like. You can continue to adjust the effect while the project plays; there is a slight delay before your adjustments are audible.

At this point, we are nearly finished; all that's left is to balance the mix.

Real-Time Mixing Control

The Console view is a live mixer. During playback, you can control the main volume and the volume and panning of each track. You can mute and solo tracks. You can turn routing to aux buses on and off and change the send levels. And, on MIDI tracks, you can control the Chorus and Reverb and change patches "on the fly." Try it now! To learn more about how to use the controls in the Console view, see Chapter 9, *Mixing and Effects Patching*.

Grouping Controls

To assist in manipulating the controls, you can tie faders to one another. For example, if you want to increase the volume level on three tracks, you can assign them to a group. Then, when you move one volume fader, you move them all. You can even have the controls move in opposite directions For example, you can fade one track in and another out.

To group faders:

1.   Right-click on the fader for track 2 (Piano).

2.   In the pop-up menu, choose **Group** and select **A** from the drop-down list. This assigns the fader to group A.

3.   Repeat this for all the MIDI tracks.

Now you've grouped all the MIDI track faders. When you move one fader, all of the others follow. If you want to move a single fader independently of the others, hold the Ctrl key while moving the fader. For more on creating and using control groups, see "Using Control Groups" on page 9-20.

Automating Your Mix

Finally, you can record the movements and settings of the mix or **automate** them. To do so:

1.   Rewind to the beginning of the project.

2.   Move the faders, pans, and any other controls to the initial settings you desire. You should set up a good balance between voice and music.

3.   Enable automation recording by clicking on the Record Automation button .

4.   Begin playback, and move the faders as needed so that the balance between voice-over and music is maintained throughout the spot. If you want, adjust the pan controls, too.

Near the end of the spot, you may want to fade the music out. To do this:

1.   Grab any of the faders for the MIDI tracks and pull it down. Because the faders are grouped, all will lower.

You've now automated your radio spot. Now let's listen to it again and watch the faders move automatically:

1. Rewind to the beginning.

2. To make sure the faders always show their current value, select the Update option .

3. Press Play.

You'll see the faders move just the way they moved when you recorded their movements. When you're done tweaking the mix, disable the Record Automation button.

For more information about automation and the Console view, see "Recording Automation Data" on page 9-26.

Saving the Project

If you've been good, you've been saving your work all along. So far, though, you've been saving the project as a normal Pro Audio project file (with the extension *.wrk*). The normal Pro Audio file contains all the project's musical data, as well as screen layout and other project information. However, this file does not contain the project's digital audio data, which is managed automatically by Pro Audio and stored in a different location. By managing the digital audio data, Pro Audio is able to store the data more efficiently and save disk space. If you work with large samples, this can be quite significant.

If you would like to send your Pro Audio project to other people, though, you need to create a file containing all the project's data, including the digital audio data. Here are two ways to do it.

Saving the Project as a Bundle File

A Bundle file (with the extension *.bun*) is similar to a normal project file, but it also contains the project's digital audio data. Bundle files must be opened and played with Pro Audio. To save the project as a Bundle file, do the following:

1. Choose ***File-Save As***.

2. Choose Cakewalk Bundle from the Save as Type list.

3. Enter a file name in the File Name box.

4. Click Save.

That's it! You've finished all three tutorials and learned quite a bit about how to use Pro Audio in the process. Now you're ready to move on. Here are some ways to proceed:

- Keep reading. Chapters 3 through 9 cover the core features of Pro Audio in a lot more detail than you've seen here.

- Learn by trying. Now that you've covered the basics, there's a lot you can learn simply by experimenting with the software. Go ahead and try it out. You can always use *Undo* if you make a mistake.

- Use the on-line help. If you need information on a particular topic, look in the on-line help (either the contents or the index) to find the information you need. See your Quick Start card for specific information about the on-line help. Or, simply look in the index of this *User's Guide*.

3 Controlling Playback

Controlling playback is simple with Pro Audio. When you play your song, you have full control over the tempo or speed of playback, which tracks are played, which sound cards or other devices are used to produce the sound, and what the tracks sound like.

In This Chapter

The "Now Time" and How to Use It

Every project has a current time, known as the **Now time**, which keeps track of where you are in a project. The Now time is displayed in both the large Transport toolbar and the Position toolbar, in two formats:

The current time in hours, minutes, seconds, and frames

The current measure, beat, and tick

The measure, beat, and tick number (MBT) identifies the Now time in musical time units. Ticks are subdivisions of quarter notes and indicate the timebase of the song. For more information about the timebase, see "Setting the MIDI Timing Resolution" on page 4-8.

Here are some examples of times expressed in measure, beat, and tick (MBT) format:

Time...	What it means...
1:01:000	First beat of the first measure
9:04:000	Fourth beat of the ninth measure
4:02:060	The 60th tick of the second beat of the fourth measure

The second time format is commonly referred to as the SMPTE time. SMPTE is the acronym for the Society of Motion Picture and Television Engineers. In this format, time is measured in hours, minutes, seconds, and frames. It's not necessary for a project to begin at time zero in this format—any arbitrary time can be used to represent the start of a project. For more information, Chapter 15, *Synchronizing Your Gear*.

Here are some examples of times expressed in this format (assuming that zero is the start time):

Time...	What it means...
00:00:00:00	The beginning of the project
00:05:10:00	Five minutes and ten seconds from the beginning of the project
01:30:00:00	One hour and thirty minutes into the project
00:00:00:05	Five frames into the project

Pro Audio provides many ways to set the Now time. Here are just a few:

To Change the Now Time...

- Click the desired time on the time ruler in the Track, Piano Roll, Staff, or Audio view

- Click on the Now time in the large Transport toolbar, enter the desired time, and press Enter

- Choose **Go-Time** or press F5, enter the desired time, and click OK

- Click on an event in the Event List view

When entering a time in MBT format, the beat and tick values are optional. You can use a colon, space, or vertical bar to separate the parts of the Now time:

You enter...	The Now time is set to...
2	2:00:000
2|1	2:01:000
4 2 0	4:02:000
9:1	9:01:000
5|1:30	5:01:030

When entering a time in SMPTE format, you can enter a single number (hour), two numbers (hour and minutes), three numbers (hour, minutes, and seconds), or all four numbers.

If you click in the time ruler while the snap grid is enabled, the Now time will be snapped to the nearest point in the grid. By setting the grid size to a whole note or quarter note, you can easily set the Now time to a measure or beat boundary.

You can also use the buttons and the scroll bar in the Transport toolbar to adjust the time, as shown here:
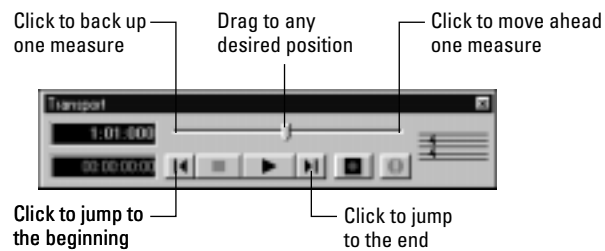
Displaying the Now Time in Large Print

Pro Audio can display the Now time in large print so that it's easier to see when you are far from your monitor (for example, when you're at your keyboard or another MIDI instrument) or when several people need to read the Now time from a distance. Here's how:

To Display the Big Time View...

1. Choose **View-Big Time** to display the Big Time view.
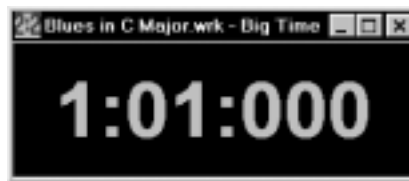
2.   Change the settings according to the table:

To do this...	Do this...
Switch time format	Click on the view to toggle between MBT and SMPTE time
Change font or color	Right-click on the view, choose the font and color you want, and click OK
Change the size of the view	Drag any corner of the view to change its size

Note that Pro Audio ignores font styles and effects such as strikeout and underline.

Other Ways to Set the Now Time

There are a variety of commands and keyboard shortcuts you can use to set the Now time:

Command...	Shortcut...	What it does...
Go-Time	F5	Lets you enter the Now time in the Position toolbar or in a dialog box
Go-From	F7	Sets the Now time to the From time (the start time of the current selection)
Go-Thru	F8	Sets the Now time to the Thru time (the end time of the current selection)
Go-Beginning	Ctrl-Home	Sets the Now time to the beginning of the project
Go-End	Ctrl-End	Sets the Now time to the end of the project
Go-Previous Measure	Ctrl-PgUp	Sets the Now time to the start of the previous measure
Go-Next Measure	Ctrl-PgDn	Sets the Now time to the start of the next measure

If your project has markers, you can use the Marker toolbar to set the Now time:

To do this...	Do this...
Skip to the next marker	Click on the Markers toolbar (or press Ctrl-Shift-PgDn)
Skip to the previous marker	Click on the Markers toolbar (or press Ctrl-Shift-PgUp)
Jump to any marker	Choose the marker name from the list in the Markers toolbar, or press F5 when typing a Now time in the Transport toolbar

For more information about markers, see "Creating and Using Markers" on page 5-17.

Controlling Playback

Controlling playback is very simple, and you have your choice of tools, menu commands, and shortcut keys for most common operations.

When you start playback, the Now time updates continuously to show the current time. When you stop playback, the Now time stops at the time you stopped. When you start playback again, it continues from the same point.

If the Now time is advancing but you don't hear any sound, see *Appendix A: Troubleshooting*. If you are using MIDI sync or MIDI time code sync, Pro Audio waits to receive external timing data before it begins playing. For more information, see Chapter 15, *Synchronizing Your Gear*.

To Start and Stop Playback...

To do this...	Do this...
Start playback	Press the spacebar, click , or choose **Realtime-Play**
Stop playback	Press the spacebar, click , or choose **Realtime-Stop**

Rewind to the start of the project	Click ▐◀, press the W key, or choose *Realtime-Rewind*
Skip to the end of the project	Click ▶▌

Handling Stuck Notes

Under MIDI, the events that turn notes on are separate from the events that stop notes from playing. Normally, when you stop playback, Pro Audio attempts to turn off all notes that are still playing. Depending on how your equipment is configured, it's possible for notes to get stuck in the "on" position. The *Realtime-Reset* command is used to stop all notes from playing.

Note:

You can control the MIDI messages that are sent by the *Realtime-Reset* command. See *Appendix E: Initialization Files* for more information.

To Clear Stuck Notes...

1. Choose *Realtime-Reset*, or click ▮▮ on the Large Transport toolbar.

Loops

Sometimes you want to listen to one portion of a project over and over, either so you can play along and rehearse or because you want to edit that section of the project while it is playing and hear the results as you make changes. Pro Audio has a playback loop feature that makes this simple.

Loops are defined in the Loop/Auto Shuttle toolbar, as shown here:

Click to turn looping on or off

Click to copy the selection (From and Thru) times

Loop/Auto Shuttle

Loop From time   Loop Thru time

Click to open the Loop/Auto Shuttle dialog box
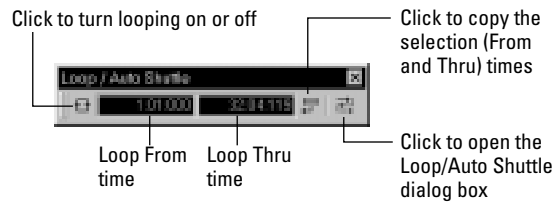
To set up a loop, you do three things:

•   Set the start time of the loop

•   Set the end time of the loop

•   Enable looping

That's all there is to it. From then on, Pro Audio will automatically jump back to the start of the loop when it reaches the end.

When looping is enabled, the loop times are indicated by special markers in the time ruler.

Loop From ———————————— Loop Thru

The Loop/Auto Shuttle dialog box contains three additional settings that affect the details of how looping operates:

Option...	How it works...
Rewind to start time on stop	Whenever you stop playback for any reason, Pro Audio rewinds immediately to the start of the loop (this option is off by default)
Stop at the end time	Playback does not proceed beyond the end of the loop
Loop continuously	When playback reaches the end of the loop and rewinds to the start, playback continues automatically (this option is on by default)

With the default option settings, Pro Audio will play the loop over and over again, continuously. You can stop and resume playback at any point during the loop.

If you start playback before the loop start time, Pro Audio will play until the loop end time is reached, then jump back to the loop start time. If you start playback after the loop end time, the loop is ignored.

The Rewind command operates slightly differently when looping is in effect. The first time you rewind, the Now time is set to the start of the loop. If the Now time is already at the start of the loop, Rewind takes you to the beginning of the project. From then on, Rewind switches back and forth between the loop start time and the start of measure 1.

To Set Up a Playback Loop...

1. Set the loop start and end times in one of the following ways:

    •   Drag the mouse between two points in the time ruler of the Track, Piano Roll, Staff, or Audio view to select a range of times, then click ▣ in the Loop/Auto Shuttle toolbar to copy the selection time to the loop time

    •   Click between two markers in the Track, Piano Roll, Staff, or Audio view to select a range of times, then click ▣ in the Loop/Auto Shuttle toolbar to copy the selection time to the loop time

    •   Type the loop start and end times directly into the toolbar

    •   Select a range of times, then right-click in the time ruler and choose *Set Loop Points* (this method makes step 2 unnecessary)

2. Click ▣ to turn looping on.

To Change the Loop Settings...

1. Click ▣, or choose *Realtime-Loop and Auto Shuttle* to display the Loop/Auto Shuttle dialog box.

2. Check the options you want to use.

3. Click OK.

1.   Click 🔲 on the toolbar to disable looping.

Track-by-Track Playback

Pro Audio lets you play back any combination of tracks at one time by
changing each track's **status**. There are four different status settings for
each track:

Status...	What it means...
Normal	The track is played as usual
Mute	The track is not played, but you can turn it on while playback is in progress
Archive	The track is not played, and you must stop playback to re-enable it. Archived tracks do not tax your CPU during playback so they can be used to store alternate takes.
Solo	Only those tracks that are designated as solo tracks are played; all others are muted

While playback is in progress, you can mute and unmute tracks in any
combination, which means you can hear only the tracks that you want.
You can change the status of a track in the Track view or in the Console
view or by using commands on the Track menu.

The status of each track is shown in the Track and Console views:

Archived track

Normal track

Muted track

Solo track

Normal track

Muted track

Archived track   Solo track
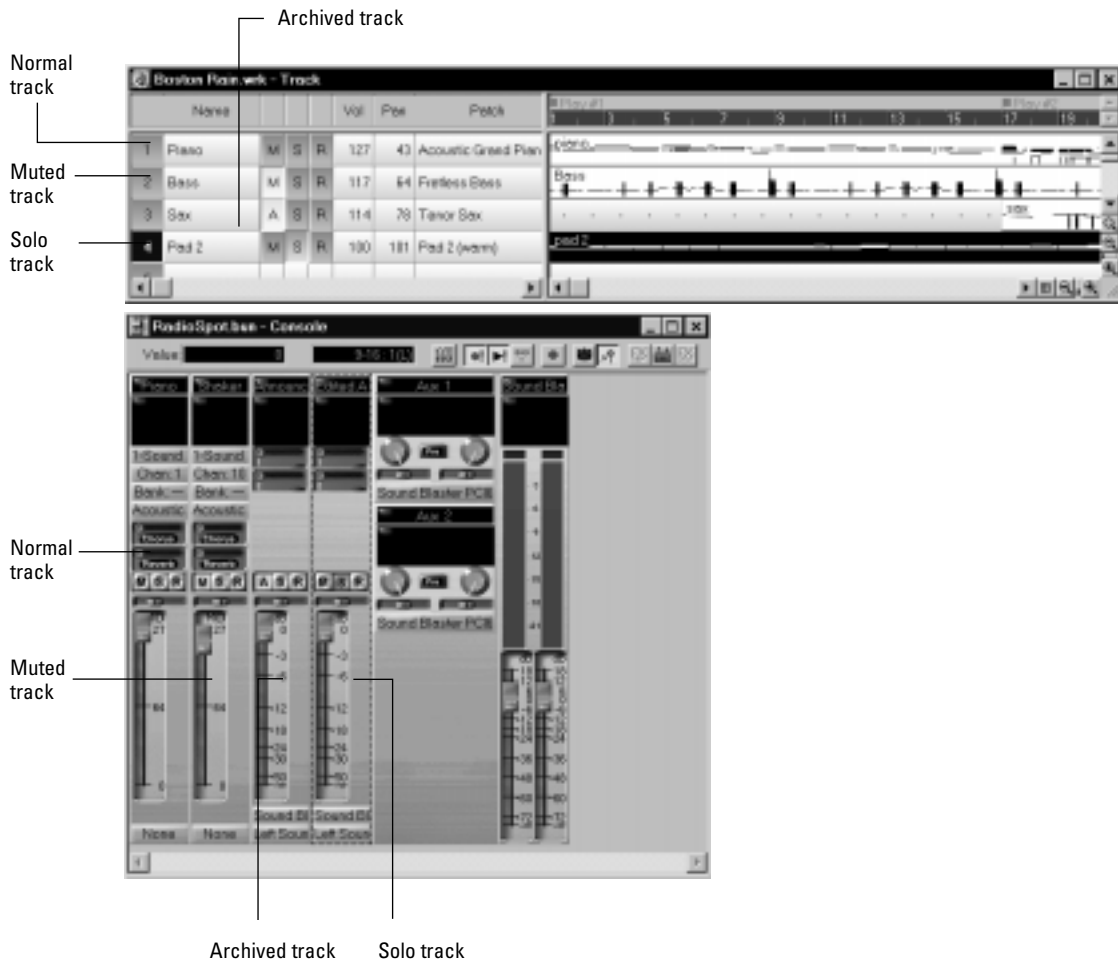
The track status is saved with the Pro Audio project file. If you save a Pro Audio project as a standard MIDI file, however, all tracks are saved without mute, solo, or archive indicators.

Silencing Tracks

When a track is muted, Pro Audio processes the track while playback is in progress so that you can unmute the track without stopping playback. If you have lots of muted tracks, this can place a heavy load on your

3-11

computer. Archived tracks, on the other hand, don't place any load on your computer. Therefore, if there are tracks you want to keep but don't need to play, you should archive them instead. Archived tracks are indicated by the letter A in the Mute button that is displayed in the Track and Console views.

When you mute or unmute a track while playback is in progress, there may be a slight delay before you hear the effect of the change. This is to be expected and does not indicate a hardware or software problem.

To Mute or Unmute Tracks...

• To mute or unmute a track, click the Mute button in the Track or Console view

• To mute or unmute several tracks at once, select the tracks and choose **Track-Mute**, or select the tracks, right-click, and choose **Mute** or use the Solo toolbar or Status bar to unmute all tracks.

To Archive or Unarchive Tracks...

1. Select one or more tracks in the Track view.

2. Choose **Track-Archive**, or right-click and choose **Archive** from the menu to toggle the archive status of the selected tracks or use the Solo toolbar or Status bar to unmute all tracks.

Soloing Tracks

Sometimes you want to hear a single track, or a few tracks at once, without having to mute all the other tracks. You can do this by soloing the tracks you want to hear.

As soon as any track is marked as a solo track, Pro Audio ignores all mute settings and plays *only* the track or tracks that are set to solo. Any number of tracks at one time can be marked as solo. All these tracks will play together. As soon as the solo status of the final solo track is turned off, Pro Audio once again plays back tracks based on their mute settings.

To Solo or Unsolo Tracks...

• To solo or unsolo a track, click the Solo button in the Track or Console view

- To solo or unsolo several tracks at once, select the tracks and choose **Track-Solo**, or select the tracks, right-click, and choose **Solo** or use the Solo toolbar or Status bar.

Changing Track Settings

Each track in a project contains MIDI or audio information and has a variety of settings that determine how the track sounds. By changing these settings, you can change the sound of your project. For audio tracks, you control the volume, the stereo panning, and the output device that is used to produce the sound. For MIDI tracks, you control many additional settings, including the type of instrument sound that is used to play the notes stored in the track.

Here is a summary table of the different track parameters and how they are used. For more information on any setting, see the indicated page of the *User's Guide*. The following parameters apply to all types of tracks:

Setting...	What it means...	See page...
Number	A sequential track number, ranging from 1 to 256, used only for reference	5-3
Name	A name that you assign the track for easy reference	
Source	The input source for the track, used in recording	4-11
Port	The output device through which the track is played; also indicates whether the track contains MIDI or audio data	3-19
Volume	The starting volume level for the track, ranging from 0 (silent) to 127 (maximum volume).	3-23
Patch	The instrument sound that will be used for playback (for MIDI). Specifies the type of material the track contains and makes sure that the most appropriate algorithm is used when time stretching	3-20

Pan	The stereo distribution of the output, ranging from 0 (hard left) to 127 (hard right); a value of 64 indicates sound that is centered left-to-right	3-23
Vel+	The change in velocity (volume) that will be applied to notes in this track on playback; ranges from −127 to +127	3-27

The following parameters apply only to MIDI tracks:

Setting...	What it means...	See page...
Channel	The MIDI channel through which the notes will be played	3-24
Bank	The set of patch names available for the track	3-20
Key+	The number of steps by which the notes in the track are transposed on playback (e.g., 12 to transpose up one octave)	3-26
Size	The total number of MIDI events stored in the track	
Time+	An offset applied to the start time of the events in the track	3-28

Track settings are shown in the Track pane—the left half of the Track view. Here's what the Track pane looks like:

Normal track

Muted track

Archived track

Solo track

You can rearrange and resize the columns of the Track pane as shown in the following:

To do this...	Do this...
Change the size of the Track pane	Drag to the left or right the divider that separates the Track and Clips panes
Resize a column	Move the mouse to the top of the column, and drag the column divider to the right or left
Move a column	Click on the column name, and drag it to the left or right

Changing Values in the Track Pane

You can change the values in the Track pane in a number of ways:

- Move the highlight to the cell you want to change (using the mouse or the arrow keys), and type the new value

- Double-click on the cell, then type the new value

You can also change numeric values as shown in the following:

To do this...	Do this...
Change the value by 1	Press the - or + key on your numeric keypad, or click on the spinner control
Change the value by 10 (for Key+, by 12)	Press the [or] key, or right-click on the spinner control
Enter a new value	Type the new value using the keyboard, and press Enter

You can use the mouse to change values in the Track pane. Click and hold the mouse button on the value you want to change, then move the mouse forward or backward until you reach the value you want. For numeric fields, you can press and hold both mouse buttons to change the value by increments of 10 (12, a full octave, for Key+).

There are a few special shortcuts for setting certain parameters:

Parameter...	Shortcut...
Source	Hold the Shift key, and click in the cell to cycle through the available audio sources
Key+	Right-click the Spin buttons, or press the [(open bracket) and] (close bracket) keys to change the value by 12 (a full octave) instead of 10

You can also edit Track properties in the Track Properties dialog box. To open this dialog box:

*   Move the highlight to the track's Source, Port, Chn, Bank, or Patch column, then press Enter

*   Double-click in the track's Source, Port, Chn, Bank, or Patch column

*   Right click on any column (except Bank and Patch) in the track and choose Track Properties
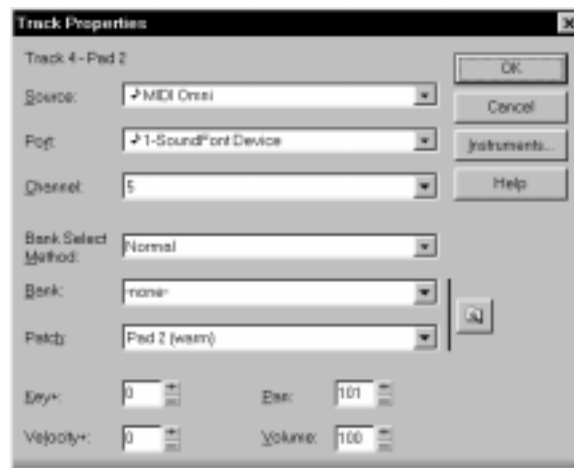
You can change the value of a track parameter for several tracks at once using commands on the ***Track-Property*** menu. For example, to assign a group of tracks to the same output port, select the tracks you want to assign, then choose ***Track-Property-Port***. These menu commands can also be used to change the settings for individual tracks.

All track parameters are saved with a Pro Audio project. However, if you export a project to a standard MIDI file, several of the parameters (Key+, Vel+, Time+, and Chn) are applied to the MIDI data as the file is being exported. Other parameters, including Source, Port, Mute, Solo, and Archive, are lost when you export the project to a MIDI file. For more information, see *Appendix D: MIDI Files*.

The following sections contain more information about many of the parameters in the Track view. For more information on the track source and the track Arming button, see "Preparing to Record" on page 4-9.

Setting Up Output Devices

The port setting for a track determines which piece of hardware will be used to produce the sound stored in your project. In a very simple equipment setup, you might have only a computer equipped with a basic sound card. In this case, you want to play all MIDI and audio output through the sound card on your computer.

If your equipment setup also includes a MIDI keyboard attached to the MIDI port on your sound card, you can choose to route MIDI data directly to the sound card or through the sound card MIDI port to the keyboard. If you choose the former, the music will play from your computer speakers. If you choose the latter, the sound will play from the speaker attached to your keyboard. You can even choose to send some MIDI information to each of these devices so that they both play at once.

You can purchase MIDI interfaces that plug into your parallel or serial port to add MIDI ports to your computer. For more information on complex system configurations, see *Appendix C: Advanced Setup*.

If your computer has several MIDI ports, choose the ones you want to use and put them in a particular order using the ***Options-MIDI Devices*** command. From then on, MIDI Port 1 refers to the first selected MIDI output, MIDI Port 2 to the second selected MIDI output, and so on. The port number is based solely on the order in which the selected ports appear in the MIDI Devices dialog box. As a result, the port numbers

used in Pro Audio may not match the port numbers that appear on your external multiport MIDI device.

MIDI Port 1   MIDI Port 2

These devices are not selected
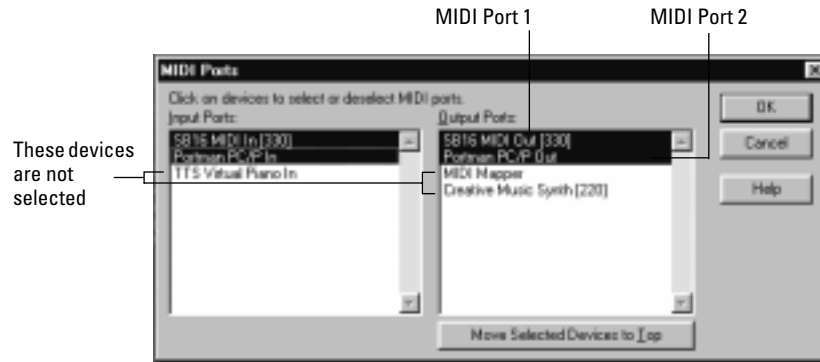
When Pro Audio is installed, a single MIDI output device is selected— the best available MIDI synthesizer that Pro Audio can locate. This is usually an internal synthesizer on your computer's sound card. You may have other devices that sound better, so experiment by selecting different devices in the MIDI Devices dialog box.

Your computer is usually equipped with at least one audio device—your computer sound card. Your setup may have several different audio output devices, or you may have a multichannel sound card that presents itself to your computer as though it were several different devices, one for each stereo pair. In Pro Audio, every audio device represents an output port. You use the port setting to assign each track in a project to the output device you want to use.

While you need to choose the MIDI output devices you want to use before you assign them to tracks, all of your audio devices can be assigned to tracks freely. You do not need to configure them the way you do MIDI devices. If you have a voice modem or speakerphone in your computer, however, you might want to set up Pro Audio so that it won't use those devices. Also, note that some dedicated audio equipment has specific setup requirements. For more information, see Chapter 13, *Improving Audio Performance*.

To Choose MIDI Devices

1.   Choose **Options-MIDI Devices** to display the MIDI Ports dialog box.

2.   Click on any MIDI device in the Output Ports list.

3. Click Move to Top to move the selected devices to the top of the list.

4. When all devices are selected in the order you want, click OK.

The first selected MIDI output device will be assigned to Port 1, the second to Port 2, and so on.

Assigning Tracks to Ports

You assign each track to a MIDI or an audio port using the Port column in the Track view. From then on, material on that track will be sent to the appropriate output device. In the preceding example, you could send tracks 1 through 8 to the MIDI synthesizer on your computer sound card, tracks 9 through 12 to your MIDI keyboard, and tracks 13 through 16 to different audio outputs.

Note:

If you rearrange your MIDI output devices after making port assignments, you may find MIDI information being sent to different instruments than you expect. Also, Pro Audio allows you to define instruments that are associated with certain output ports and channels. If you use this feature, the name of the port will change to reflect the instrument you have chosen. For more information about instrument definitions, see Chapter 10, *Using Instrument Definitions*.

To Assign a Track to a Port...

1.   Move the highlight to the Port column of the track you want to assign.

2.   Press the + or – key until the port you want is displayed.

You can also change the port value in a variety of other ways, as described on page 3-15. To change the port setting for more than one track at a time, select the tracks you want to change and choose ***Track-Property-Port***.

Choosing the Instrument Sound (Bank and Patch)

Electronic keyboards and synthesizers often contain hundreds or thousands of different sounds. Each sound is known as a **patch**. The name comes from the early days of synthesizers, for which you physically rewired (using patch cords) the oscillators and modulators to produce different sounds. Patches are normally organized into groups of 128, called **banks**. Most instruments have between 1 and 8 banks, but MIDI supports up to 16,384 banks of 128 patches each (that's over 2 million patches).

The bank and patch settings in the Track view control the initial bank and patch of a track during playback. Every time Pro Audio starts playback at the beginning of a song, the bank and patch settings for the track are set to these initial values.

Patch
Acoustic Grand Piano
Rhodes Piano
Electric Guitar (clean)
Fretless Bass
Guitar Harmonics
Cello
Pizzicato Strings
Muted Trumpet

Many instruments have descriptive names for their banks and patches. Pro Audio stores these names in an instrument definition. For more information about instrument definitions, see Chapter 10, *Using Instrument Definitions*. If you are using an instrument that supports general MIDI, your patch list will contain the 128 sounds that are defined by the general MIDI specification.

Note to Experts:

Different MIDI instruments use different types of commands to change banks. Cakewalk supports four common methods for changing banks. For information about the bank selection method you should use with your MIDI gear, see the *User's Guide* for your MIDI equipment.

Note that a single MIDI channel can only play one patch at a time on each instrument assigned to that channel. Therefore, if two or more MIDI tracks are set to the same port and channel but have different bank and patch settings, the patch of the highest-numbered track will be used for all the tracks.

In some projects you want the sound played by a track to change while playback is in progress. You can accomplish this using the ***Insert-Bank/ Patch Change*** command. When you start playback in the middle of a song, Pro Audio searches back through the track to find the correct patch to use – either the initial bank and patch or the most recent bank/patch change. Note that the Track view only shows the initial bank and patch, even while a different bank and patch are being played back. The only way to see and edit a bank/patch change is in the Event List view. For more information, see "The Event List View" on page 6-43.

When a track contains audio, Pro Audio interprets the patch as an indicator of the type of audio information contained in the track, such as vocals, drums, or woodwinds. When you do certain types of audio editing (time stretching, for example), Pro Audio uses this information to try to preserve the quality of the audio.

To Assign an Initial Bank and Patch to a Track...

1. Double-click on the Source, Port, Channel, Bank, or Patch column on the track you want to change.

2. In the Track Properties dialog box, choose the desired bank and patch from the drop-down lists.

3. To search for a patch containing specific text, click the Patch Browser button to the right of the drop-down lists, or simply right-click a Bank or Patch cell in the Track view or Console view.

4. Click OK.

Another Way to Assign a Patch to a Track...

1. Move the highlight to the Patch column of the track you want to assign.

2. Press the + or – key until the patch you want is displayed.

You can also change the patch and bank values in a variety of other ways, as described on page 3-15. To change the bank and patch settings for more than one track at a time, select the tracks you want to change and choose **Track-Property-Bank** or **Track-Property-Patch.**

To Insert a Bank/Patch Change...

1. Move the highlight to the track whose bank and patch you want to change.

2. Set the Now time to the time at which you want the change to occur.

3. Choose **Insert-Bank/Patch Change** to display the Bank/Patch Change dialog box.

4. Choose a bank and patch from the lists.

5. Click OK.

Pro Audio inserts a change in bank and patch. When you play back the song, the initial bank and patch shown in the Track view will be used to the point at which the bank/patch change takes place. You can remove a bank/patch change in the Event List view.

Adding Effects

You can add both MIDI and audio effects directly from the Track view. Cakewalk adds these effects in real-time, preserving your track's original data.

Double-click an Effects cell to open the Effects bin dialog. Right-click in the Effects bin dialog to add an effect.

Effects
Echo Delay
FX EQ (Stereo)
FX EQ (Stereo)
FX EQ (Stereo)
FX Reverb (Stere
FX EQ (Stereo)
FX EQ (Stereo)
Echo Delay

Adjusting Volume and Pan

The Volume and Pan settings control the initial volume and pan of a track during playback. Every time Pro Audio starts playback, the Volume and Pan settings for the track are set to these initial levels.

Vol	Pan
127	64
128	64
127	0
95	127
95	45
127	75
115	64
75	127
--	--

In some projects you want the volume or panning of a track to change while playback is in progress. You can accomplish this using the Console, Piano Roll, Event List or StudioWare views. For more information, see Chapter 9, *Mixing and Effects Patching*, Chapter 6, *Editing Events and Controllers*, and Chapter 11, *Working with StudioWare*.

Note to Experts:

Pro Audio processes the volume and pan settings by transmitting MIDI volume and pan events (controllers 7 and 10, respectively) when playback starts. If two or more MIDI tracks are set to the same port and channel but have different volume or pan settings, the settings for the highest-numbered track will prevail.

Note also that not all keyboards and synthesizers respond to these events. Check your instrument's manual for more information.

To Set the Initial Volume and Pan Settings...

1. Move the highlight to the Volume or Pan column of the track you want to change.

2. Press the + or – key until the value you want is displayed. Use the [or] key to increase or decrease the value by 10.

You can also change the pan and volume settings in a variety of other ways, as described on page 3-15. To change the volume or pan settings for more than one track at a time, select the tracks you want to change and choose **Track-Property-Volume** or **Track-Property-Pan**.

Assigning a MIDI Channel (Chn)

MIDI transmits information on 16 channels, numbered 1 through 16. Every MIDI event is assigned to a particular channel. Some MIDI equipment can accept MIDI information on only a single channel. This channel may be preassigned, or you may be able to change it. Other MIDI equipment, including many electronic keyboards and synthesizers, can accept information on several different MIDI channels at once. Usually, these devices use a different instrument sound for each channel.

On playback, the channel number is used to direct the MIDI information to a particular piece of equipment. A single track can contain events on many different MIDI channels.

The Chn parameter in the Track view redirects all events in the track to the specified channel, ignoring the channel number stored with each event. If this parameter is left blank, all events in the track are sent to their original channels.

This parameter does not affect the channel information that is stored with each MIDI event. When the track is displayed in other views, like the Piano Roll or Event List view, you will see the original channel that is stored in the file. You can edit the channel values in those views or use the ***Edit-Interpolate*** command.

To Set the Channel for a Track...

1.   Move the highlight to the Channel (Chn) column of the track you want to change.

2.   Press the + or – key until the channel you want is displayed.

You can also change the channel setting in a variety of other ways, as described on page 3-15. To change the channel assignment for more than one track at a time, select the tracks you want to change and choose ***Track-Channel***.

Adjusting the Key/Transposing a Track (Key+)

Each MIDI note event has a key number, or pitch. On playback, the **key offset** (Key+) parameter transposes all notes in the track by the designated number of half-steps. The value can range from -127 to +127. A value of 12 indicates that notes will be played back one octave higher than they are written.

This parameter does not affect the note number that is stored for each note event. When the clip is displayed in other views, like the Piano Roll, Staff, or Event List view, you will see the original notes as they are stored in the file. To permanently change the pitches, you can edit them individually or use the **_Edit-Transpose_** command.

If the key offset value transposes the key number (MIDI note) outside the allowable MIDI range (0–127), the key number will be transposed to the lowest or highest octave within that range.

You can use the Key+ parameter to assist in preparing scores for instruments whose music is written in something other than "concert" key (such as Bb trumpet). For more information, see "Music Notation for Nonconcert Key Instruments" on page B-16.

When you edit the Key+ parameter, pressing [or] or right-clicking on the spinner control changes the value by 12 instead of by 10. This makes it easy to transpose by octaves.

To Set the Key Offset for a Track...

1. Move the highlight to the Key+ column of the track you want to change.

2. Press the + or – key to change the key by a single semitone. Use the [or] key to change the key by 12 semitones (one octave).

You can also change the key offset in a variety of other ways, as described on page 3-15. To change the key offset for more than one track at a time, select the tracks you want to change and choose ***Track-Property-Key+***.

Adjusting the Note Velocity (Vel+)

Each MIDI note event has a velocity, which represents how fast (or how hard) the key was struck when the track was recorded. On playback, the **velocity offset** parameter adjusts the velocity data for all notes in the track by the designated amount. The value can range from -127 to +127. The effect of changing velocities depends on the synthesizer. Some synthesizers do not respond to velocity information. For others, the effect varies depending on the sound or patch you have chosen. Normally, higher velocities result in louder or brighter-sounding notes.

This parameter does not affect the velocity that is stored for each note event. When the clip is displayed in other views, like the Piano Roll, Staff, or Event List view, you will see the original velocities as they are stored in the file. You can edit the velocity values in those views, or use the ***Edit-Scale Velocity*** or ***Edit-Interpolate*** command.

Velocity is also meaningful for digital audio tracks—those that are assigned to an audio output port. Every audio clip consists of one or more audio events. Each audio event has an associated velocity—a number between 0 and 127—which represents an amount by which the event's volume will be boosted or cut on playback. A velocity of 0 mutes audio

events, a velocity of 127 represents +18 dB, and a velocity of 103 represents +0 dB. The track velocity functions as a master volume for all audio clips in the track.

Velocity is different from volume in that it is an attribute of each event, rather than a controller that affects an entire MIDI channel. Here's an example of where this distinction might be important. Suppose you have several tracks containing different drum parts. All of these parts would probably be assigned to MIDI channel 10 (that's the default channel for percussion in General MIDI). If you change the volume setting for any track that uses channel 10, all the different drum parts—regardless of what track they're in—would be affected. If you change the note velocity for one drum track, it will be the only one whose volume is affected.

To Set the Velocity Offset for a Track...

1.   Move the highlight to the Vel+ column of the track you want to change.

2.   Press the + or – key until you reach the value you want. Use the [or] key to increase or decrease the value by 10.

You can also change the velocity offset in a variety of other ways, as described on page 3-15. To change the velocity offset for more than one track at a time, select the tracks you want to change and choose ***Track-Property-Vel+***.

Adjusting the Time Alignment of a MIDI Track (Time+)

Each event takes place at a known point in the project. On playback, the **time offset** (Time+) parameter adjusts the times for MIDI events in the track by the designated amount. The value can be as small as a single clock tick or as large as you want.

This parameter can be used to make a part play behind the beat or in front of it or to compensate for tracks that sound rushed or late. The time shift can be used to create a chorus or slap-back echo effect by making a copy of a track and then applying a small offset to the copy. You can use larger time offsets to shift a track earlier or later by several beats or measures.

Note that you cannot shift any event earlier than 1:01:000. For example, if the first event in the track starts at 2:01:000, you cannot shift its start time earlier by more than one measure.

This parameter does not affect the time that is stored for each note event. When the clip is displayed in other views, like the Piano Roll, Staff, or Event List view, you will see the original times as they are stored in the file. You can edit the time values in those views or use the *Edit-Slide* command.

To Set the Time Offset for a Track...

1. Move the highlight to the Time+ column of the track you want to change.

2. Press the + or – key until you reach the value you want.

You can also change the time offset in a variety of other ways, as described on page 3-15. To change the time offset for more than one track at a time, select the tracks you want to change and choose *Track-Property-Time+*.

Other MIDI Playback Settings

Two other MIDI settings can affect what happens when you play back your project, as described in the following table:

Option...	How it works...
Zero Controllers When Play Stops	If this option is enabled, Pro Audio zeroes (resets) the pitch wheel, the pedal Controller, and the modulation wheel Controller on all 16 MIDI channels whenever playback is stopped. It also sends a "Zero All Continuous Controllers" MIDI message, which turns off other continuous Controllers on newer synthesizers. If you experience frequent stuck notes when playback stops, try checking this option.

Patch/Controller Searchback Before Play Starts	If this option is enabled, Pro Audio searches for and sends the most recent patch change, wheel, and pedal events on each port and MIDI channel before starting playback. This ensures that all these settings are correct, even if you start playback at an arbitrary point in your project.

To set these options, choose **Options-Project** and click the MIDI Out tab. If you have set up a playback loop, enabling either of these options can cause an audible delay when the loop is restarted.

Video Playback

Pro Audio's **Insert-Video File** command lets you include an *avi, mpeg*, or QuickTime video in your project. This video is shown in real time as your project plays.

The Video view displays the current time (as in the Big Time view) and the video itself. The display in the Video view is synchronized with the Now time, giving you convenient random access to the video stream. This makes it easy to align music and digitized sound to the video.

Commands in the Video view's pop-up menu let you set the time display format, the size and stretch options for the video display, the video start and trim times, and other options. Your project's video and digital audio data can be saved together in a new AVI file with Tools-Export Video to AVI. For more information, see "Preparing Audio for Distribution" on page 9-30.

To Load a Video File Into the Project...

1. Choose **Insert-Video File**, or choose **Insert** from the Video view's pop-up menu.

2. Select a file.

3. Check the Show File Info option to see information about the file.

4. Check the Import Audio Stream option if you want to load the file's audio data.

5. Click Open.

Pro Audio loads the video file and displays it in the Video view. If you choose to import audio data, Pro Audio inserts a new track above the currently selected track, and puts the data in a clip or clips on the new track. If the video includes a stereo stream, you can select **Import Audio Stream** to place the stereo audio into a single track, or you can select **Import Audio Stream** and check **Stereo Split** if you want to place the left and right channels in different tracks.

To Delete the Video From the Project...

1.   Right-click in the Video view and choose **Delete**.

Pro Audio removes the video from the project. Note that imported audio data is not deleted.

To Enable or Disable Video Playback...

1.   Right-click in the Video view and choose **Animate**.

If your computer is not fast enough to play back video efficiently, you can get better performance by temporarily disabling video animation during playback.

To Set the Time Display Format...

Click the time display to cycle between MBT, SMPTE, Frames and None

Or

Right-click in the Video view and choose an option from the **Time Display Format** menu:

To do this...	Do this...
Select a time format	Choose **MBT**, **SMPTE**, **Frames** or **None**
Change font or color	Choose **Font** and select new font characteristics
Turn off the time display	Choose **None**

To Set the Video Display Format...

Right-click in the Video view and choose an option from the **Stretch Options** menu:

To do this...	Do this...
Display the video in its original size	Choose **Original Size**
Stretch the video to fill the Video view	Choose **Stretch to Window**
Stretch the video as much as possible while preserving the original aspect ratio	Choose **Preserve Aspect Ratio**
Make the video display as large as possible, but only enlarge by integral multiples	Choose **Integral Stretch**
Display the video in full screen mode	Choose **Full Screen**

Pro Audio adjusts the video display according to the selected option. The stretch option is used to recalculate the video display size whenever you resize the Video view.

To Set the Background Color...

Right-click in the Video view and choose a color option from the **Background Color** menu.

To Set the Start and Trim Times...

1. Right-click in the Video view and choose Video Properties.

2. Set options as described in the table:

Option...	What it means...
Start Time	The time in the project at which the video file starts to play

Trim-in Time	The offset into the video file at which playback begins
Trim-out Time	The offset into the video file at which playback ends

Pro Audio synchronizes the video to the project according to the specified Start and Trim times.

Note:

The project's video file is saved in the project by reference only; the actual video data remains in the original file. Video data is not saved in bundle files, so it must be backed up on its own.

4 Recording a Performance

You can add sound or music to a Pro Audio project in many different ways. You can record your own material using a MIDI-equipped instrument, use a microphone or another audio input to record digital audio information, or import sound or music data from an existing digital data file.

You can also input new material using your computer keyboard or mouse. For more information on entering music using musical notation, see Chapter 8, *Working with Notation and Lyrics*.

For more information on entering music using the Piano Roll view, see "The Piano Roll View" on page 6-2. For more information on using the Event List view, see "The Event List View" on page 6-43.

In This Chapter

Creating a New Project

You can add music and sound to an existing project or to a new project. Just as in any Windows program, you open an existing project file using the **File-Open** command and create a new project file using the **File-New** command.

When you create a new Pro Audio project, there are some additional parameters you can set to make it easier to work on your project. These include:

- Meter and key signature

- Metronome and tempo settings

- Audio sampling rate

- MIDI timing resolution

Creating a New Project File

Pro Audio includes a set of templates you can use to create a new project. These templates include common types of ensembles, such as rock quartets, jazz trios, and classical full orchestra. When you create a new project using one of these templates, Pro Audio creates a project that has MIDI settings predefined so that one track is set up for each of the instruments in the ensemble. Pro Audio also includes an empty template (called the Normal template), which is completely blank. If you are creating a new project that will contain only audio material (no MIDI material), use the Normal template.

You can create your own template files and use them as the basis for other new projects. For more information, see Chapter 12, *Using Layouts and Templates*.

To Create a New Project...

1. Choose *File-New* to display the New Project File dialog box.
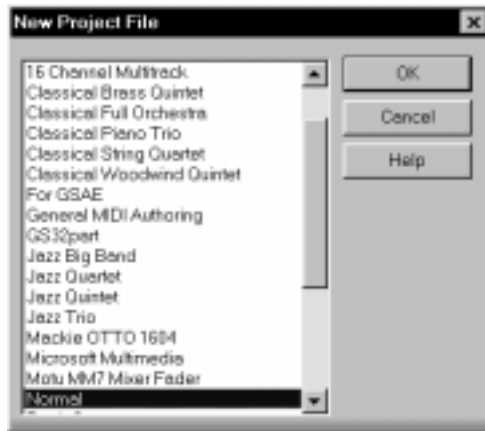
2. Choose a template from the list.

3. Click OK.

Pro Audio creates the new project and displays it in the Track view.

Setting the Time and Key Signatures

By default, a new Pro Audio project is in 4/4 time and the key of C major. You can change these settings to any desired time signature or key. These settings apply to all the tracks in a project. You cannot set different time or key signatures for different tracks.

The time or key signature of a project can change at any measure boundary. To insert changes in the time or key signature, use the *View-Meter/Key* command to display the Meter/Key view, or use the *Insert-Meter/Key Change* command.

If you are creating a new project that will contain only audio material (no MIDI material), you do not need to set the time and key signatures.

The key signature controls how Pro Audio displays notes in the Staff view, the Event view, and elsewhere. The time signature, or **meter**, tells Pro Audio the number of beats per measure and the note value of each beat. Common meters include:

- 2/4 (two beats per measure, each quarter note gets a beat)

- 4/4 (four beats per measure, each quarter note gets a beat)

- 3/4 (three beats per measure, each quarter note gets a beat)

- 6/8 (six beats per measure, each eighth note gets a beat)

The top number of a meter, the number of beats per measure, can be from 1 through 99. The bottom number of a meter is the value of each beat. You can pick from a list of values ranging from a whole note to a thirty-second note.

The meter determines the following:

- Where the metronome accents are placed

- How the Now time is displayed

- How the Staff view is drawn

- How grid lines are displayed in the Piano Roll view

To Set the Meter and Key Signature...

1. Click [icon] to open the Meter/Key view.

2. Select the first (and only) meter/key change in the list.

3. Click [icon] to open the Meter/Key Signature dialog box.
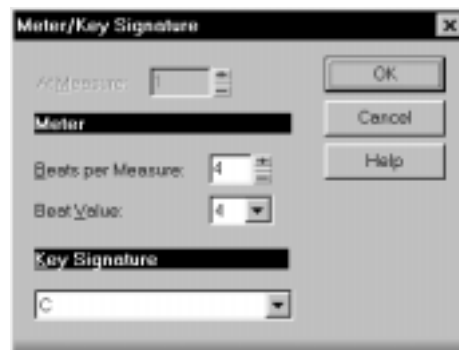
4. Enter the top and bottom meter values in the two boxes.

5. Choose the key signature from the Key Signature list.

6. Click OK.

You can also set the meter and key signature in the Large Transport toolbar display.

Setting the Metronome and Tempo Settings

The metronome counts off each beat in a measure, so you can hear the tempo of your project. You can choose to have the metronome sound during recording, during playback, or both. When you start recording, Pro Audio can play one or more measures of metronome clicks before recording begins. This can help you "get in the groove" before you start performing. These measures are called the **count-in**.

When you create a new project, you should set the metronome to play during the count-in and while recording. If you are adding material to an existing project, you might only need the metronome for the count-in.

You can customize the metronome sound to use your PC speaker or any note on a MIDI instrument. By default, Pro Audio uses a hi-hat cymbal sound from a general MIDI drum kit for the metronome, but you can change this setting to anything you like by changing the MIDI port, MIDI channel, and duration. You can also choose the note and velocity (volume) to use for the first beat of each measure and for all other beats. The metronome settings are stored separately with each project, so you can use different settings for each one.

Most metronome options can be set in the metronome toolbar:
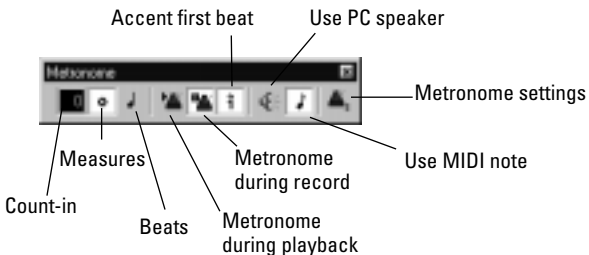
The metronome MIDI note parameters must be set in the Metronome Settings dialog box.

Note:

If you are synchronized to an external clock source, you cannot use the count-in feature. For more information, see Chapter 15, *Synchronizing Your Gear*.

To Set the Tempo and Metronome for a New Project...

1. In the Metronome toolbar, select the Metronome during Recording 📷 and Metronome during Playback 📷 options.

2. Set the count-in to 1 or more if you want to hear a count-in before recording begins. Select Count-in Measures 📷 or Count-in Beats 📷 .

3. Select Use PC Speaker 📷 and/or Use MIDI Metronome 📷 .

4. Arm at least one track.

5. Press R or click 📷 to start recording. The count-in will play, and the Now time will start to advance.

6. Adjust the tempo using the tempo controls in the toolbar until the metronome plays the tempo you want.

7. Press the space bar or click 📷 to stop recording.

8. Press W, or click 📷 to rewind to the beginning of the piece.

Your tempo and metronome settings are now ready. When you save the project file, the metronome and tempo settings will be saved as well.

To Change Your Metronome Settings...

1. Open the Metronome Settings dialog box in one of the following ways:

   • Click Metronome Settings 📷 in the Metronome toolbar.

   • Choose **Options-Project Options** and click the Metronome tab.

2. Change the metronome settings as indicated in the following table:

To do this...	Do this...
Enable the metronome during playback	Check Playback
Enable the metronome during recording	Check Recording
Enable the count-in	Enter the number of measures for the count-in in the Count-in box, and select Measures or Beats

Accent the first beat of each measure	Check Accent First Beat
Use the PC Speaker sound	Check Use PC Speaker
Use a MIDI note as the sound	Check Use MIDI Note and choose the port, channel, and other settings

3. Click OK.

Your metronome settings will be saved with the project file.

To Set the MIDI Metronome Sounds from your MIDI Instrument...

1. Select a track in the Track view that is assigned to the MIDI device you want to use for the metronome sound.

2. Click Metronome Settings 🔺 in the toolbar.

3. Make sure that the port and channel settings match those for the track in the Track view.

4. Click on the Key box in the First Beat or the Other Beats section.

5. Play a note on your MIDI instrument. The note number is entered automatically. The velocity is not updated.

6. Click OK.

Your metronome settings will be saved with the project file.

Setting the Audio Sampling Rate and Bit Depth

Each Pro Audio project has an audio sampling rate and a bit depth that indicates the level of accuracy with which audio data are stored. The same parameters are used for all the digital audio in a project. When you create a new project, if you do not want to use the default setting, you must choose a sample rate before you start recording audio.

Pro Audio lets you choose from five different sampling rates: 11025 Hz, 22050 Hz, 44100 Hz, 48000 Hz, and 96000 Hz. The default is 44100 Hz, the same rate as audio CDs. A higher sampling rate produces better quality sound. However, a higher sampling rate also means that each audio clip takes up more memory and disk space and requires more intensive processing by your computer. If you have an older computer, or a slow hard drive, you might be better off with a lower sampling rate. For more information, see "Improving Performance with Digital Audio" on page 13-11.

By default, the bit depth of audio data is 16 bits. If your sound card supports 18, 20, 22, or 24 bit audio, you can choose to take advantage of these higher resolutions.

If you are creating a new project that will contain only MIDI material (no audio), you do not need to set the audio sampling rate or bit depth. If you import audio from a wave file or another digital audio file, the sampling rate will be set automatically to your default setting.

Note for Experts:

If you are planning to move your project to a Digital Audio Tape (DAT) or to some other media via a digital transfer, set your sampling rate to match the target unit. For example, use 44100Hz for a project that will be mastered to a CD, so that no sample rate conversion is required.

To Set the Sampling Rate for a Project...

1. Choose **Options-Audio** to display the dialog box that is appropriate for your hardware.

2. Select the desired sampling rate from the Default Sampling Rate list.

3. Set the desired bit depth in the Default File Bit Depth box.

4. Click OK.

The sampling rate will be saved with the project file.

Setting the MIDI Timing Resolution

Each Pro Audio project has a setting for the timing resolution, or **timebase**, that indicates the resolution of MIDI data. This resolution is measured in ticks or pulses per quarter note and is often abbreviated as PPQ. The default resolution is 120PPQ, which is accurate enough for most applications. In this timebase, each quarter note is represented by 120 ticks, each eighth note by 60 ticks, each eighth-note triplet by 40 ticks, and so on.

In some projects you may need a different or an even more detailed timebase. For example, if you wanted to use eighth-note septuplets (7 eighth notes per quarter note) and represent them accurately, you would need to have a timebase that is divisible by 7, such as 168PPQ. Pro

Audio uses the timebase you choose for a project to determine the range of tick values in the Now time.

To Set the Timebase for a Project...

1. Choose **Options-Project** and click the Clock tab.

2. Choose the timebase you want from the Ticks per Quarter Note list.

3. Click OK.

The timebase will be saved with the project file.

Preparing to Record

To prepare for recording, you need to do the following:

*   Set the recording mode.

*   Choose your input source(s).

*   Arm one or more tracks for recording.

*   Check your recording levels (audio only).

*   Set the Now time to the point where recording should start.

*   Start recording.

After you record, you can use the *Undo* command to erase the most recently recorded material. You can use the *Redo* command to restore the recording and toggle between *Undo* and *Redo* as many times as you like.

If you are using MIDI Sync or time code sync for the clock source, Pro Audio waits to receive external timing data before it begins recording. For more information see Chapter 15, *Synchronizing Your Gear*.

Recording Modes

Any material you record is stored in a new clip. If you record into several tracks at once, one clip is created in each track. If you record into a track that already contains clips, you can choose one of three **recording modes** to determine what happens to those clips. When you save your project, you also save whatever recording mode you choose together with that project:

Recording mode...	How it works...
Sound on Sound	The new material is merged with any existing material.
	This means that any existing clips on the track are left unchanged and all newly recorded material is stored in new clips. While recording, you will be able to hear material from existing clips.
Overwrite	The new material replaces (overwrites) any existing material.
	This means that portions of existing clips may be "wiped clean" to make room for newly recorded material. While recording, you will not be able to hear material from existing clips.
Auto Punch	Recording only takes place between the punch-in and punch-out times. The new material replaces (overwrites) any existing material.

To Choose a Recording Mode...

- Select a mode from the drop-down list in the Record toolbar.
- Choose *Realtime-Record Options* or click to display the Record Options dialog box, then select the desired mode.

Cakewalk saves your recording options with each project, so you can save a different recording mode with each of your projects.

Choosing a Source

To record into a track, you must choose a source for the music or sound to be recorded. Usually, you choose MIDI Omni to record material from a MIDI instrument or the left or right channel of a digital audio device (such as a sound card) to record audio material, or stereo if you want to record stereo audio in a single track. The source for each track is displayed in the Source column of the Track window and at the bottom of each module in the Console window.
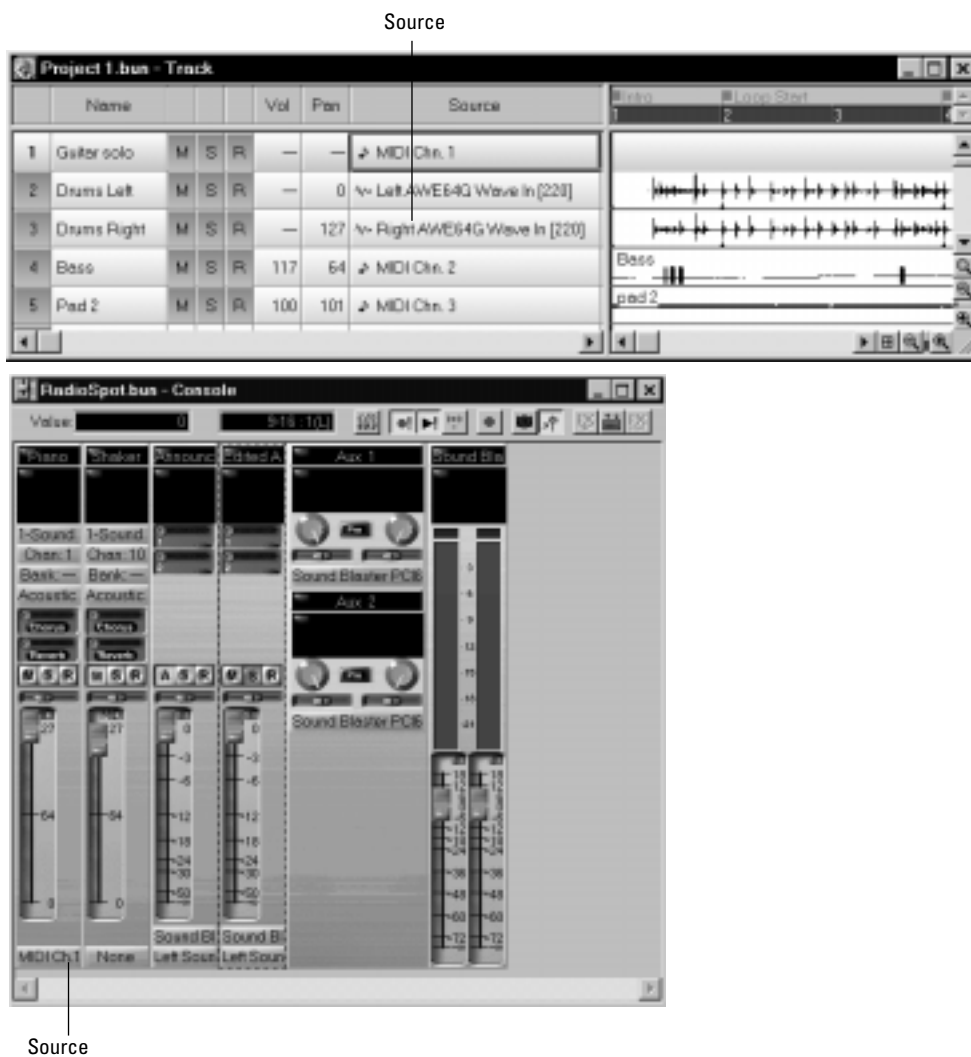
Source

Source

When you choose MIDI Omni as the input source for a track, Pro Audio merges material from all MIDI sources (ports) and instruments. This means you don't have to worry about port, channel, or other MIDI settings. Sometimes, you may want to record different MIDI channels into different tracks. To learn how to do this, see "Recording Channel by Channel" on page 4-27.

While each track can have a different source, it is also possible for several tracks to have the same source. If you record the same material into several different tracks at once, the resulting material will be stored in linked clips. For more information about linked clips, see "Working with Linked Clips" on page 5-21.

To Choose a Source in the Track View...

1. Double-click in the Source column of a track to display the Track Properties dialog box.

2. Choose a source from the Source list, and click OK.

    OR

1. Click in the Source column of the track you want to set.

2. Press the + or – key until you reach the source you want.

To Choose a Source in the Console...

1. Click the Source button and choose a source from the list.

Tip:
If you want to assign all your audio sources to a series of tracks, here's a quick shortcut. Hold the Shift key and click in the Source cell for each track. Pro Audio will assign the audio sources to these tracks in increasing order. The names of the sources depend on your audio hardware. The assignment of sources will wrap to the first audio source when you exceed the number of available audio sources.

Arming Tracks for Recording

Pro Audio lets you record any number of tracks at one time. You indicate the tracks you want to record by **arming** the tracks. You can arm a single track or several tracks at one time. Each track records material received though its own input source.

To Arm a Track for Recording...

• In the Track view, click R .

• In the Console view, click R .

• Select one or more tracks in the Track view, then right-click and choose *Arm* from the menu.

The Track Arm buttons in the Track view and Console view are displayed in red to indicate that the track is armed for recording.

Auto Arming

You must arm tracks in order to record. To safeguard your data, there is no automatic arming of any tracks.

If you want to record MIDI tracks without arming a track, choose *Options-Global*, and select the General tab. Click the Allow MIDI Recording without an Armed Track checkbox.

This feature lets you start recording a new track simply by making it the current track and pressing R or clicking the Record button in the toolbar. Auto-arming makes it possible to inadvertently record over existing material in the current track, however. To prevent this, simply assign a source to each track before recording. If a source is assigned to a track, Pro Audio will not record on that track unless the track has been armed.

Recording Music from a MIDI Instrument

Once you have set your tempo, metronome, and source and armed one or more tracks, you are ready to start recording.

To Record MIDI...

1. Set the Now time to the point in the project where you want to start recording.

2. Click ▣, press R, or choose **Realtime-Record**. If your metronome count-in is turned on, it will play the count-in.

3. Play or perform the material you want to record.

4. Click ▪, press the space bar, or choose **Realtime-Stop** to stop recording.

Pro Audio displays a clip containing the new material in the Track window. To listen to the new material, set the Now time to the start of the clip and press the space bar or click ►. If you're not happy with the recording, use **Undo** to erase the new material.

If you do not see a new clip in Track window, you may have a problem with MIDI input. See *Appendix A: Troubleshooting*, for more information.

Virtual Piano

Even if you don't have a real MIDI instrument, you can still record MIDI in your projects using the Virtual Piano. The Virtual Piano is a utility that lets you use your computer keyboard and mouse to make music. The Virtual Piano looks like this:

When you click the keys with the mouse or play notes using your computer keyboard, the Virtual Piano converts the information to MIDI data and sends it to Pro Audio. For complete information about the Virtual Piano, use the on-line help system.

To Use the Virtual Piano...

1. Choose **Options-MIDI Devices** to display the MIDI Ports dialog box.

2. Make sure that Virtual Piano is highlighted in the Input Ports box.

3. Click OK to close the MIDI Ports dialog box.

4. Choose **Tools-Virtual Piano** to start the Virtual Piano.

5. To read the on-line documentation, choose **Help-Contents**.

Recording Audio

There are a couple of other important considerations when recording audio. First, many popular audio cards that come with personal computers are **half-duplex** sound cards. If you are recording audio with a half-duplex sound card, you won't be able to hear any existing audio while recording additional audio. This is a limitation of the half-duplex sound card—a half-duplex card can record audio or play back audio, but it cannot do both at once.

If you have a half-duplex sound card and you "drop into" overwrite recording on the fly, there may be some slight delay until existing material is muted, due to buffering latency. To enable full-duplex operation on a sound card that supports it, choose **Options-Audio** and click Advanced, and select **Simultaneous Record/Playback**.

Before you record audio, you should check your input levels. If the levels are too low, you may end up with too much hiss and background noise in your recording. If the levels are too high, your recording will be inaccurate or distorted. To check your audio levels, use the audio meters in the Console view. To adjust the input levels, you must use your sound card's software mixer program (or the Windows 95, 98 or NT mixer) or an external hardware mixer for certain sound cards.

The audio meters indicate the volume at which the audio will be recorded, in units called decibels (dB). The meter values range from -90dB (soft) to 0dB (loud). To maximize the dynamic range of your

recording, you want to set the levels as high as possible without exceeding 0dB.

Clipping indicator

Level meter
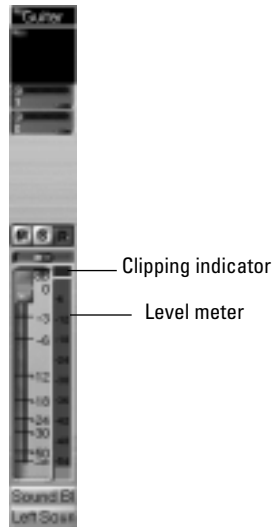
When the audio level exceeds 0dB, some of the audio information is lost. This is known as **overload**. Many sound cards use clipping to deal with an overloaded signal, but clipping can distort the audio signal. As a result, you should avoid letting the meter level exceed 0dB.

Note to Experts:

Because Pro Audio is a digital recorder, a level of 0dB indicates digital zero. Digital distortion will occur at 0dB. You will not get analog compression or warmth from pushing the input levels. If you are transferring data from a DAT or another device, you may want to calibrate the input levels of your sound card with the output levels of other devices in your studio. This will ensure that 0dB on one unit will appear as 0dB in Pro Audio.

To Check the Input Levels...

1. In the Track view, set the sources for the tracks you want to record, and arm the tracks for recording.

2. Choose **View-Console**, or click ![icon] on the Views toolbar to display the Console view. Meters will be displayed for the tracks that are armed.

3. The default meter range is from 0 dB to -60 dB. To change the range, right-click on the meter and choose a new range from the menu.

4. Perform at the loudest level at which you plan to record.

   Watch the meters respond. Increase the input volume as high as possible without ever letting the meters move all the way to 0 dB, even for an instant, or letting the Clipping indicator turn red. If either of these things happen, reduce the input volume just enough to avoid them during the entire performance. Note that some kinds of audio, such as percussive or plucked musical instruments, can produce very short, high-level "transients" when struck or plucked aggressively, which can lead to clipping if the input volume is set too high. Consider the possiblility of these transients when examining the meters and setting your record level.

   Note: If the Clipping indicator is illuminated, click on it to reset.

5. When you are satisfied that your input level is correct, you are ready to record.

Once you have set your sampling rate and input levels, you are ready to start recording. If the meters do not move, check your sound card software's mixer program and make sure that you have the proper source enabled for recording.

When you record audio, Pro Audio stores each audio clip in a separate file. These files have the same format as a wave (*.wav*) file, but they have special names and are stored in a separate directory on your hard disk. Pro Audio automatically manages these audio files for you, making it easier for you to manage your projects. If you want to work with these files directly, or to learn more about how Pro Audio stores audio data, see "Digital Audio Data Management" on page 13-5.

To Record Audio...

1. Set the audio sources for the track(s) you want to record.

2. Arm the tracks for recording.

3. Set the Now time to the point in the project where you want to start recording.

4. Click ⬛, press R, or choose ***Realtime-Record***. If your metronome count-in is turned on, it will play the count-in measure.

5. Play or perform the material you want to record.

6. Click ⬛, press the space bar, or choose ***Realtime-Stop*** to stop recording.

Pro Audio displays a clip containing the new material in the Track window. To listen to the new material, set the Now time to the start of the clip and press the space bar or click ▶. If you're not happy with the recording, use ***Undo*** to erase the new material.

If you do not see a new clip in the Track window, you may have a problem with audio input. See *Appendix A: Troubleshooting* for more information.

Loop Recording

When recording a vocal or an instrumental section, you might want to record several different takes so that you can choose the one you like best. You might even want to record several takes to double a part or merge the best parts of each.

Normally, to record each take you would have to arm a track, start recording, perform the take, and then stop recording. You can record multiple takes more easily using a feature called **loop recording**. Loop recording lets you start recording and record as many takes as you like, all in a single step.

To use loop recording, follow these steps:

•   Enable looping.

•   Set the start and end times of the loop.

•   Start recording by pressing R or clicking ⬛ on the toolbar.

Pro Audio then loops between the start and end time, allowing you to record one take on each pass. Pro Audio creates a clip for each take. You have two choices for where these takes are stored:

- All clips can be stored in a single track, where they are stacked on top of one another.

- Each clip can be stored in a different track. Pro Audio automatically places each take into a new, empty track. No existing tracks are changed in any way.

When you stack takes, using the **Sound on Sound** record mode, you hear all the previous takes as you record each new take. When you store takes in different tracks, each take is automatically muted as you record the next one. You choose the option you want from the Record Options dialog box.

When you finish recording, the *Undo* command erases all your takes in a single step.

To Use Loop Recording...

1. Choose the source for the track(s) you want to record, and arm the track(s) for recording.

2. Set the loop start and end times.

3. Choose *Realtime-Record Options*, or click on the Record toolbar, to display the Record Options dialog box.
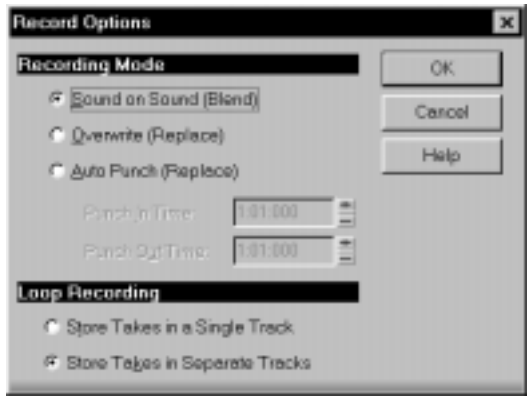
4. Choose to stack all takes in a single track or to store them in separate tracks.

5. Set the Now time to the point in the project where you want to start recording.

6. Click ![record button], press R, or choose **Realtime-Record**. If your metronome count-in is turned on, it will play the count-in measure.

7. Play or perform the material you want to record. At the end of the loop, Pro Audio will return to the start of the loop and you can record the next take.

8. If you want to erase the most recent take while loop recording is underway, choose **Realtime-Reject Loop Take** or press Ctrl-space bar.

9. Click ![stop button], press the space bar, or choose **Realtime-Stop** when you want to stop recording.

The takes are stored in the manner you requested.

Punch Recording

Suppose you are happy with most of a track but want to replace one small section—perhaps as small as a couple of notes. This is where punch recording comes in handy, because it lets you record new material only within a specified range of times.

For example, suppose you recorded a 32-bar keyboard solo but made some mistakes in the 24th and 25th bars. With punch recording, you play the entire solo again, so you make sure you can get the feel you want. However, only the bars you want to correct are actually recorded. That way, you don't have to worry about introducing new mistakes elsewhere in the recording. When you use punch recording, Pro Audio deletes any material between the start and end times of the punch.

To use punch recording, follow these steps:

• Enable punch recording.

• Set the start and end times of the punch.

• Start recording by pressing R or clicking the ![record button] button on the toolbar.

The Recording toolbar shows the punch settings, as shown here:

Step record   Record mode

Record

    9:01:000   17:01:000   Sound On Sour ▼

Click to open the Record
Options dialog box

Punch In   Punch Out   Click here to set
Time   Time   punch times to the
                             selection start and
                             end times
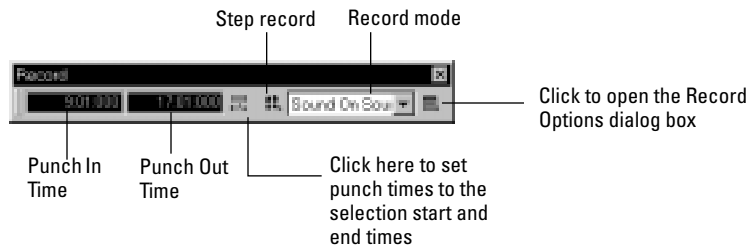
When punch recording is enabled, the punch times are indicated by
special markers in the time ruler:

Punch In   Punch Out
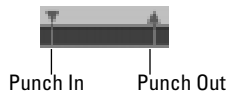
After you punch record, choosing *Undo* both discards any new material
you recorded and restores the original material that had been deleted.

You can also combine loop and punch recording to record several takes of
a punch. Say you are working on that perfect take of a guitar solo and
you need to hear a couple of bars of the song as "pre-roll" before you
punch in. By combining looping with punch, you can have each take
begin before you start to play and still have the solo cut in at the
appropriate instant.

In the example mentioned previously, you could loop from bar 17 to bar
26 but record only bars 24 and 25. Here's what this looks like:

Loop / Auto Shuttle

    17:01:000   26:01:000

Record

    24:01:000   25:04:119   Auto Punch ▼

The loop starts and   The punch starts
ends here   and ends here
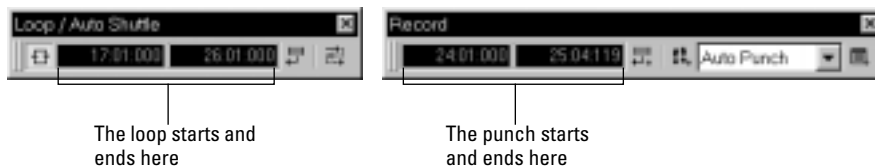
To Punch Record...

1. Choose the source for the track(s) you want to record, and arm the track(s) for recording.

2. Select Auto Punch from the Record Mode drop-down list in the Record toolbar.

3. Set the start and end times in one of the following ways:

    •   Enter the times directly on the toolbar

    •   Select a range of time and click ![icon] on the Record toolbar

    •   Select a range of time, then right-click in the time ruler and choose **Set Punch Points**

4. Set the Now time to a point where you want to start playback.

5. Click ![icon], press R, or choose **Realtime-Record**. If your metronome count-in is turned on, it will play the count-in measures.

6. Play or perform the material you want to record.

7. Click ![icon], press the space bar, or choose **Realtime-Stop** to stop recording.

The material you play during the punch time is recorded in the chosen track, replacing any existing material.

To Use Punch While Looping...

1. Choose the source for the track(s) you want to record, and arm the track(s) for recording.

2. Set the loop start and end times.

3. Set the punch start and end times, as described previously.

4. Choose **Realtime-Record Options**, or click ![icon] on the Record toolbar, to display the Record Options dialog box.

5. Choose to stack all takes in a single track or to store them in separate tracks.

6. Set the Now time to the beginning of the loop.

7. Click ![icon], press R, or choose **Realtime-Record**. If your metronome count-in is turned on, it will play the count-in measures.

8. Play or perform the material you want to record. At the end of the loop, Pro Audio will return to the start of the loop and you can record the next take.

9. If you want to erase the most recent take while loop recording is underway, choose **Realtime-Reject Loop Take** or press Ctrl-space bar.

10. Click ![stop button], press the space bar, or choose **Realtime-Stop** when you want to stop recording.

The takes are stored in the manner you requested.

Step Recording

Sometimes you may want to record material from a MIDI instrument that is too difficult to play. One way to make this easier is to slow the tempo of the piece while you are recording until it is slow enough to play. Step recording is another method that lets you record from a MIDI instrument without having to worry at all about your timing.

To use step recording, you set a step size, such as a quarter note. Then, you simply record one step at a time, taking as much time as you need to play each step. You can also set a note duration that is independent of the step size. If the duration is shorter than the step size, rests will be inserted between each note and the next step. If the duration is longer

provides you with more flexibility. For example, with Auto Advance disabled, you do not even need to play the notes at a single step at the same time! You can play any number of notes one at a time, and they will all be recorded at the same step until you click the Advance button. You can even record notes of different durations at the same step – simply record the notes of one duration, change the duration, and play more notes, without clicking Advance.

You can click Delete to erase the notes you recorded in a single step. If Auto Advance is enabled, the Delete button deletes the notes played at the prior step, and it also backs up a step so you can rerecord the notes at that step. With Auto Advance disabled, the Delete button erases any notes you have recorded at the current step.

To Use Step Recording...

1. Choose the source for the track(s) you want to record.

2. Set the Now time to the point in the project where you want to start recording.

3. Choose **Realtime-Step Record**, or click [icon] in the Record toolbar to display the Step Record dialog box.

4. Follow the instructions in the following table:

To do this...	Do this...
Record the next step	Play the note(s) you want on your MIDI instrument
Erase the most recent step	Click Delete
Skip a step (add rests)	Click Advance without playing any notes
Move forward or backward one step	Click the scroll arrows in the scroll bar
Move forward or backward one measure	Drag the indicator in the scroll bar
Jump to a particular Now time	Enter the measure, beat, and tick number next to the scroll bar
Change the step size	Pick the step size you want from the Step Size list
Change the note duration	Pick the duration you want from the Duration list

Stop recording and save your work	Click Keep or press Enter
Stop recording and discard your work	Click Close or press Esc
Advance to the next step	With Auto Advance disabled, click the Advance button

5.   Click OK.

As always, you can use the *Undo* and *Redo* commands after you have finished recording. Note that these commands erase or restore all the material you recorded while in step record mode.

Step Pattern Recording

The Pattern option lets you define a repeating rhythmic pattern of notes and rests so that you can use step recording more efficiently. For example, suppose your project is in 4/4 time, and one track has a pattern that is two measures long: quarter notes in the first measure and on the first two beats of the second measure, followed by a half-note rest on the last two beats. This pattern has six quarter notes followed by two quarter-note rests.

When you use step recording with Auto Advance, you can play the six quarter notes and Pro Audio will automatically advance to the next step. However, to skip over the rests, you need to click the Advance button two times.

With pattern recording, you define a pattern that indicates where the rests appear in the pattern. Pro Audio will then skip over the rests automatically, so you don't need to click the Advance button at all.

Pro Audio displays patterns as a combination of digits (which represent beats that contain notes) and dots (which represent beats that contain rests). The pattern described previously looks like this:

1 2 3 4 5 6 . .

Here is another example:

1 2 . 4

This pattern automatically skips over every third beat; Pro Audio interprets this pattern as "one, two, rest, four."

Here is one final example based on 4/4 time, with a step size of eighth-note triplets (twelve steps per measure):

1 2 3 4 . 6 7 . 9 0 . 2

No matter how you enter a pattern, Pro Audio display the digits in sequence, with periods replacing digits at each step where a rest would occur. You can create patterns with up to 64 steps.

To Use Pattern-Based Step Recording...

1. Choose the source for the track(s) you want to record.

2. Set the Now time to the point in the project where you want to start recording.

3. Choose **Realtime-Step Record** to display the Step Record dialog box.

4. Click in the Pattern box.

5. Press any number key to indicate a beat at which notes will be played.

6. Press the space bar, period, or the letter R to indicate a beat on which there is a rest.

7. When the pattern is complete, click elsewhere in the dialog box.

8. Step record as before.

From now on, after you record each step, Pro Audio automatically advances past all rests to the next step on which notes will be played. To stop pattern-based step recording, simply delete the pattern from the Pattern box.

Recording Channel by Channel

Most MIDI instruments are capable of sending information on several different channels at once. When you choose MIDI Omni as the input source for a track, Pro Audio records into that one track MIDI data from all the different MIDI devices and channels that are hooked up to your computer. However, you have the option to be more selective, recording material from different MIDI channels into different tracks. You can even group some of the channels or record some channels in several different tracks at once.

Here are some examples of when this feature might be useful:

- There are several performers, each playing a different MIDI instrument. By setting each instrument to transmit MIDI on a different channel, you can record each player's performance into a separate track, even though they are all playing at the same time.

- You are using a MIDI guitar controller and want to record the notes played on each string on a separate track.

- Your electronic keyboard has a built-in auto accompaniment feature that plays a drum part and an accompaniment while you play lead. You want to record each of these three parts into a different track in a Pro Audio project.

- You have a MIDI sequence stored on your synthesizer's built-in sequencer, and you want to record each channel onto a different track.

The Track Sources dialog box is used to set individual MIDI channels or groups of channels as the source for one or more tracks. Once you have set specific channels as the source for a track, you can change back to MIDI Omni or some other source using the + and – keys in the Track view or by using the Track Sources dialog box.

To Assign Channels to Different Tracks...

1. Select one or more tracks by highlighting them in the list. Use the Shift or Ctrl keys to select more than one track.

2. Select *Track-Property-Sources* to display the Track Sources dialog box.

3. Set the source for the selected tracks as follows:

To do this...	Do this...
Leave the source empty	Check the None box
Use MIDI Omni as the source	Check the MIDI Omni box
Use an audio source	Check the Audio box and choose an audio source from the list
Use one or more MIDI channels as the source	Check the MIDI Channels box, and check off the channels you want to include

4. Click OK.

Pro Audio shows new track sources in the Source column of the Track View.

Note for Experts:

You can use external MIDI synchronization to automate the process of loading multichannel sequences from other MIDI devices. For more information, see Chapter 15, *Synchronizing Your Gear*.

Importing Music and Sound

While recording is perhaps the most common way of adding material to a Pro Audio project, there are several other methods you can also use. Pro Audio lets you import music into a project from several different types of digital data files, including MIDI files, audio files in wave (*.wav*) format, and other Pro Audio project files.

Importing Wave (.*wav*) Files

Pro Audio lets you insert digital audio information stored in wave file format into any track of a project. If the wave file you are importing is in stereo, then it can be imported into a single stereo track, a pair of mono tracks or a single mono track.

The sampling rate for a project is set based on your default sampling rate. If the sampling rate from the wave file does not match the sampling rate in your project, then it will be converted to the current project's sampling rate.

To Insert a Wave File...

1. Set the Now time and current track to indicate where the audio should be placed.

2. Choose *Insert-Wave File* to display the Open dialog box.

3. Choose the wave file you want to import. Pro Audio displays information about the file at the bottom of the dialog box.

4. Click Play to listen to the wave file before importing.

5. If the file is stereo and the Stereo Split box option is not checked, a stereo event is inserted in a single track.

6. Click Open.

Pro Audio loads the audio data from the wave file and places it in the selected track at the Now time.

Importing Material from Another Cakewalk Project

You use the *Edit-Copy* and *Edit-Paste* commands to import material from one project to another using the Windows clipboard. The project that contains the material you want to import is the **source project**. The project into which the material is imported is the **target project**.

Normally, if you copy material from several different tracks to the Windows clipboard, the information will be pasted back into separate tracks. You can choose to paste all the material from the clipboard into a single destination track in the target project.

You can also copy material from one project to another by displaying the Track view for both projects side by side, then using drag-and-drop editing.

To Import Material from Another Project...

1. Open the source project, or click in the Track view for that project.

2. In the Track view, select the material you want to import.

3. Choose *Edit-Copy* to display the Copy dialog box.

4. Make sure that Events in Tracks is checked, and click OK.

5. Open the target project, or click in the Track view for that project.

6. Set the Now time and current track to indicate where the material should be placed.

7. Choose *Edit-Paste* to display the Paste dialog box.

8. Check Paste to One Track if you want all material imported into the current track.

9. Click OK.

Pro Audio imports the material and displays it in the Track view.

Importing MIDI Files

You can create a new Pro Audio project from a MIDI file simply by opening the file. Pro Audio takes material from the file and places it into one or more tracks in the Track view. For more information about MIDI files and how Pro Audio works with them, see *Appendix D: MIDI Files*.

To Import Information from a MIDI File into an Existing Project...

1. Open the MIDI file as a new, separate project.

2. Choose *Edit-Select-All.*

3. Choose *Edit-Copy* to display the Copy dialog box.

4. Make sure that Events in Tracks is checked, and click OK.

5. Open the target project, or click in the Track view for that project.

6. Set the Now time and current track to indicate where the material should be placed.

7. Choose **Edit-Paste** to display the Paste dialog box.

8. Check Paste to One Track if you want all material imported into the current track.

9. Click OK.

Pro Audio imports the material and displays it in the Track view.

Saving Your Work

Like most Windows programs, you use the **File-Save** and **File-Save As** commands to save your work. Normally, you save your projects in the standard project file format, with a file extension of .WRK. This file contains all your MIDI data and all your project settings. Any digital audio that is part of your project is stored in separate file, as described in "Digital Audio Data Management" on page 13-5.

Pro Audio also lets you save files in two other formats, as described in the table:

File type...	Extension...	Explanation...
Standard MIDI	*.mid*	Used to transfer MIDI-only songs to other software products that support Standard MIDI files. See *Appendix D: MIDI Files* for more information.
Bundle	*.bun*	A single file that includes all the material in your project: MIDI data, project settings, and audio data. This format is used for projects that contain digital audio, when you want to back up your work or transfer a project to a different computer. See "Backing Up Projects with Digital Audio" on page 13-10 for more information.
Template	*.tpl*	A file that is used as a pattern to create another. Templates make it easy to create and configure new projects. See Chapter 12, *Using Layouts and Templates* for more information.

If you have made changes to a project and then attempt to close the project, either by closing the Track view or by choosing **File-Close**, Pro Audio asks if you want to save the changes you have made. This prevents you from accidentally losing your work. You can tell whether

changes have been made to a project by looking for an asterisk (*) after the project name in the Pro Audio title bar.

Pro Audio has an Auto Save feature that periodically saves your work into a special backup file. You can request automatic backups at fixed time intervals or every time a certain number of changes have been made to the file. When the limit is reached, the file is saved automatically. If your original project is called *myproject.wrk*, the Auto Save version is called *auto save version of myproject.wrk*.

If there is a power failure or if you make a significant mistake, you can recover the last-saved version of your project by opening this file. You should then save your song under a different name by using the ***File-Save As*** command.

To Save a Project...

1.   Choose ***File-Save As*** to display the Save As dialog box.

2.   Choose the type of file you want to save from the Save as Type list.

3.   Enter a file name and click Save.

Pro Audio saves the file.

To Change the Auto Save Settings. . .

1.   Choose ***Options-Global*** and click the General tab.

2.   To enable Auto Save, set either the number of minutes or the number of changes between saves.

3.   To disable Auto Save, set both values to zero.

4.   Click OK.

From now on, your projects are saved automatically according to the settings you entered.

Labeling Your Projects

Pro Audio lets you attach subtitles, composer credits, copyright, and other information to your projects, as shown in the following table:

Title	The title for your song; prints automatically at the top of a Staff view printout.
Subtitle	For a subtitle or dedication; prints directly below the title in a Staff view printout.
Instructions	Use for performance instructions; prints flush left in a Staff view printout.
Author	Put your name here if you are the composer. Prints flush right in a Staff view printout.
Copyright	Copyright information prints flush right, under the author name, in a Staff view printout.
Keywords	Put keywords describing the song here for future reference.
Comments	Free text comments. Type as much as you like. You can enter approximately the same amount of text as you can in Windows *Notepad*.

This information is shown in the File Info window, which is displayed using the *File-Info* command. If the File Info window is open when you save a file, then this window is displayed automatically the next time the file is opened. This is useful if you:

* Share files with others and want them to see special instructions when they open the file

* Want your copyright information to be displayed automatically

If the File Info window is closed when you save the file, it will not be automatically displayed the next time the file is opened.

Although you cannot use *Edit* menu commands while working in the File Info window, standard Windows hot keys like Ctrl-X, Ctrl-C, and

Ctrl-V can be used to cut, copy, and paste text. Ctrl-Z can be used to undo
your last edit.

To Display and Edit Project Information. . .

1.   Choose *File-Info* to display the File Info window.

2.   Edit the information as desired.

3.   If you want the File Info window to display automatically, save
      the file.

4.   Click Stats to see statistics about the contents of the file.

5.   Choose *File-Print Preview* if you want to print the project
      information

6.   Close the File Info window.

File Statistics

The File Statistics dialog box displays the following information about the contents of the project file:

Statistic...	What it means...
Created	The date the project was first saved.
Editing time	The total time you've had the project open, from the time it was created to the last time it was saved. This does not include time spent editing the project since you last saved it. If you want to update this value, save the project.
Revision	Each time you save a file that has been changed, this number is incremented. If you open a project, make no changes, then save it, the revision number is not changed.
Events	The total number of events in the project.
Sample rate	The sample rate for digital audio.
Bit depth	The bit depth of digital audio.

MIDI Input and Echo Controls

Pro Audio gives you fine control over a variety of MIDI settings. You can filter out MIDI input information to eliminate information you don't want to record, and you can control the way Pro Audio echoes MIDI input to any connected output devices.

Input Filtering

Pro Audio lets you filter out specific types of MIDI messages or filter the MIDI input stream channel by channel. Any MIDI information that is filtered out is neither recorded nor echoed to any other MIDI devices.

You can use the message type filter to screen out resource-intensive MIDI messages like key and channel aftertouch. By default, Pro Audio records all types of events except these two.

You can use message-type filtering to record short System Exclusive (Sysx) messages in real-time. These will end up in the track as Sysx data events, which can hold System Exclusive messages up to 255 bytes. Leave the Buffers setting at 128 unless you experience data not being

recorded. For more information about Sysx, see Chapter 14, *Using System Exclusive Data*.

To Filter Event Types. . .

1. Choose *Options-Global* and click the MIDI Filter tab.

2. Check the message types you want recorded.

3. Click OK.

From now on, Pro Audio records only the types of events you have chosen.

To Filter by Channel. . .

1. Choose *Options-Project* and click the MIDI Input tab.

2. Check the channel numbers from which you want to record.

3. Click OK.

Pro Audio records events from the channels you have chosen and excludes events from the other channels.

MIDI Echo

Pro Audio lets you control the echo of MIDI data from your MIDI inputs to your MIDI outputs—that is, from your master keyboard to one or more of your sound modules. This function is known as **MIDI thru** and is configured using the Project Options dialog box.

There are three different echo modes, as shown in the following table:

Mode...	How it works...
None	Disables MIDI echo.
Manual	Enables MIDI echo and lets you manually control the mapping of inputs to outputs, as described in the following table.
Auto (default)	Enables MIDI echo and maps data automatically by following the parameters of the current track. The Auto mode allows you to use the Track view as a list of selectable MIDI echo-mapping destinations.

If you choose the manual echo mode, you can control the routing and processing of MIDI echo data, as shown in the following table:

Setting...	What it means...
Port	The desired destination port. Blank means the port is not mapped.
Channel	The desired destination channel. Blank means that the channel is not mapped.
Key	The desired note transposition, if any.
Velocity	The desired velocity transposition, if any.

To Configure MIDI Echo. . .

1. Choose *Options-Project* and click the MIDI Input tab.

2. Choose the echo mode you want (None, Manual, or Auto) from the Echo Mode list.

3. If you chose the Manual echo mode, configure the mapping the way you want.

4. Click OK.

From now on, Pro Audio echoes MIDI according to these settings.

Local Control

As described on page A-5, you should normally disable the Local Control setting on your master keyboard to prevent notes from being doubled. Notes you play on the keyboard are then transmitted to Pro Audio, echoed to the synthesizer, and played only once.

When Pro Audio starts, it sends a special MIDI message that attempts to disable Local Control automatically. Most modern synthesizers respond to this message. If yours does not, you will need to disable Local Control every time you turn it on for use with Pro Audio.

If your synthesizer does not let you disable Local Control (this is rare), you can use the Local On Port setting in the Project Options dialog box to indicate the number of the output port connected to your synthesizer. Pro Audio will then refrain from sending MIDI echo data to that port. In this configuration, you may need to turn your synthesizer's volume control up and down from time to time to avoid hearing it play along with your other modules. If this situation doesn't apply to you, the Local On Port should be set to 0. Note that the Virtual Piano will not record if the Local On Port is set to any value other than 0.

5 Arranging Tracks and Clips

The Track view makes it easy to arrange your songs and other projects. From one location, you can select, copy, move, and rearrange the parts of your project, using menu commands or drag-and-drop tools. You can add real-time audio and MIDI effects from the Effects column. Markers provide easy-to-use reference points and labels for the different parts of your project, and the snap grid makes it easy to align your clips to the desired time points. Pro Audio also has a variety of tools and commands for changing the tempo of your song.

Arranging

In This Chapter

Arranging Tracks

Pro Audio provides a variety of commands that let you work with the tracks in your project. Here are some of the things you can do:

You can...	Here's why...
Rearrange the tracks in the Track view so that they appear in a different order	This makes it easier to see and work with a subset of tracks, like the rhythm section, or the vocals and vocal backing tracks, or all muted tracks.
Make copies of a track	Copying a track and then adding a time offset or changing the patch is an easy way to double a part. You can also copy and then transpose a track to add harmony.
Erase or delete a track	Tracks and clips that you are no longer using in your project are distracting and takes up space in your project file.

All the commands you use to arrange tracks work on selected tracks. The current track (the one containing the highlight) is always selected. You can select additional tracks as shown in the table:

To do this...	Do this...
Select a track	Click the track number in the Track view. The track is selected, and all other tracks—except the current track—are deselected.
Select several adjacent tracks	Press and hold the left mouse button on the first track in the group, drag the mouse to the last track in the group, and release the mouse button.
Select all tracks	Click in the gray button above the track numbers.
Add or remove a single track from the selection	Hold the Shift key and click the track number to add it to the selection; hold the Ctrl key and click the track number to toggle its selection status.

Changing the Order of Tracks

There are several ways you can change the order of tracks in the Track view:

- Drag a track to a new position in the Track view.

- Use the *Track-Sort* command to rearrange the tracks in order based on the track name, status, or other setting.

- Insert new, blank tracks between existing tracks.

To Drag a Track to a New Position...

1. Position the mouse over the Name column for the track you want to move

2. Press and hold down the mouse button. The cursor changes to an up/down arrow.

3. Drag the track to its new location, and release the mouse button.

Pro Audio rearranges and renumbers the tracks.

You can sort the tracks in a project based on several parameters, in either ascending or descending order:

Sort by...	What happens...
Name	Ascending puts track in alphabetic order, descending puts them in reverse order
Size, port, or channel	Ascending puts them in increasing numeric order, descending puts them in decreasing numeric order
Muted, archived, selected	Ascending puts qualifying tracks at the end, descending puts them at the beginning

No matter how you sort, blank tracks always go to the end of the list.

Note that track numbers are used for reference only. When you re-arrange the order of tracks, they are automatically assigned sequential numbers based on the order in which they are displayed in the Track view.

To Sort the Tracks...

1.   Choose *Track-Sort* to display the Sort Tracks dialog box.

2.   Choose the attribute by which to sort from the Sort By list.

3.   Choose the order in which to sort from the Order list.

4.   Click OK.

Pro Audio sorts the tracks according to the settings you chose.

To Insert a Blank Track...

1.   Move the highlight to any track.

2.   Press the Insert key.

Pro Audio shifts the current track and all other tracks down by one, and inserts a blank, new track at the location of the highlight. You can also insert tracks by right-clicking in the Track pane to access the pop-up menu and selecting the *Insert-Track* command.

Copying Tracks

When you copy a track using the ***Track-Clone*** command, you can choose to copy the track properties, the clips and events in the track, or both. You can also choose the destination track. By default, Pro Audio copies the entire track to the next blank track.

Pro Audio also lets you copy entire blank tracks and individual clips in a track by using the ***Cut***, ***Copy***, and ***Paste*** commands, or by using drag-and-drop editing. For more information, see "Moving and Copying Clips" on page 5-9.

To Copy a Track...

1.   Move the highlight to any track. You can only clone one track at a time.

2.   Choose *Track-Clone* to display the Clone dialog box.

3.   Check the Events or Properties box to indicate which items you want to copy.

4. Enter the destination track number in the To Track box.

5. Click OK.

Erasing Tracks

You can easily delete, or **kill**, an entire track, including all of the track properties and all of its clips and events. Sometimes, you only want to erase, or **wipe**, the contents of a track, leaving the track properties as they are. If you kill or wipe a track by mistake, you can use *Undo* to restore the deleted material.

When you kill or wipe a track, the track information is placed on the Pro Audio clipboard. To remove material from a track and place it on the clipboard, use the *Edit-Cut* command instead.

To Delete Tracks...

1. Select the tracks you want to delete.

2. Choose *Track-Kill*, or right-click on one of the selected tracks and choose *Delete Track*.

Pro Audio deletes the selected tracks.

To Wipe Tracks...

1. Select the tracks you want to wipe.

2. Choose *Track-Wipe*.

Pro Audio deletes all clips and events from the selected tracks, but leaves the track properties intact.

Arranging Clips

The Track view provides many ways for you to rearrange, copy, and paste clips to arrange your music the way you want. The easiest is to select the clips or portions of clips you want to arrange and then drag and drop them wherever you want. You can drag and drop clips in the Track view even while playback is in progress. You can also arrange clips via the clipboard using the *Edit-Cut*, *Edit-Copy*, and *Edit-Paste* commands, which work like those in almost all Windows programs.

Arranging

Displaying Clips

Clips are displayed as rectangles in the Clips pane. Their position and length show you at a glance their starting times and lengths. You can control four aspects of their appearance:

- **Color:** By default, clips containing MIDI and audio information are drawn in different colors, so that you can easily distinguish them. You can change these default colors or customize the color of any individual clip.

- **Name:** You can also assign each clip a descriptive name, which is displayed in the upper-left corner of the clip.

- **Contents:** At your option, clips can be displayed with a graphical representation of the events in the clip. The effect is slightly different for MIDI and audio information, as shown below:

A MIDI clip shows each event; by looking at the clips, you can "see" the notes that are being played

An audio clip shows the actual waveform

Controller or automation data are also displayed
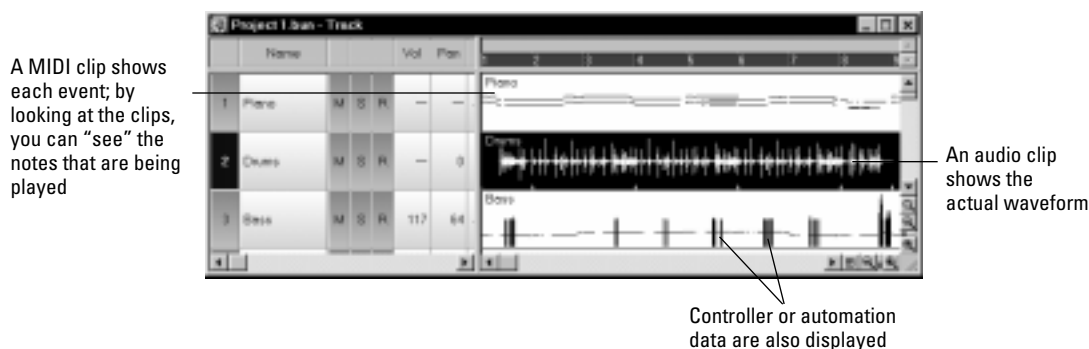
Minimum Clip Width – You can specify a minimum clip size (in ticks) so that even the smallest clips are visible for editing.

To inspect the clip contents more closely, use the zoom tools to increase the size in which clips are displayed. Note that displaying the contents of each clip makes your computer work a little harder. As a result, if your computer has an older, slower CPU you may want to turn off the display of clip contents.

Zoom command keyboard shortcuts:

To do this...	Use this shortcut...
Zoom In	Ctrl-Alt-I
Zoom All the Way In	Ctrl-Alt-Shift-I

Zoom Out	Ctrl-Alt-O
Zoom All the Way Out	Ctrl-Alt-Shift-O
Undo Zoom	Ctrl-Alt-U
Turn On Zoom Lasso (use the Zoom Lasso to select the area to zoom to)	Ctrl-Alt-Z
Turn Off Zoom Lasso	Ctrl-Alt-Z
Display Now Time in Center of Clips Pane	Ctrl-Alt-G

To Display Clip Names and Contents...

1. Right-click in the Clips pane, and choose **View Options** from the menu.

2. Check the Display Clip Names option to show clip names, or leave it unchecked to hide them.

3. Check the Display Clip Contents option to show clip contents, or leave it unchecked to hide them.

4. Click OK.

Pro Audio modifies the clips pane to show the information you want.

To Change Clip Names...

1. Select the clips you want to rename.

2. Right-click on one of the selected clips and choose **Properties**. Pro Audio opens the Clip Properties dialog box.
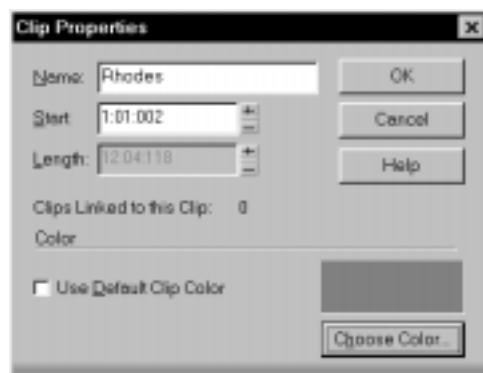
3. Enter a name for the selected clips, and click OK.

Pro Audio renames the selected clips.

To Change Clip Colors...

1. Select the clips whose color you want to change.

2. Right-click on one of the selected clips and choose *Properties*. Pro Audio opens the Clip Properties dialog box.

3. Choose a color as follows:

To do this...	Do this...
Use the default color	Check the Default Color box
Use a custom color	Click the Choose Color button and pick a color from the Color dialog box

4. Click OK.

Pro Audio changes the color of the selected clips.

Selecting Clips

Before you move, copy, edit, or delete clips you need to select them. There are several ways to select whole clips, as shown in the table:

To do this...	Do this...
Select a single clip	Click on the clip in the Track view
Select several clips at once	Drag a rectangle around the clips
Select all the clips in a track	Click on the track number in the Track view
Select a portion of one or more clips	Press and hold the Alt key and drag across the clips
Add clips to the selection	Hold the Shift key and either click on the clips or drag a rectangle around the clips
Add or remove clips from the selection	Hold the Ctrl key and either click on the clips or drag a rectangle around the clips
Add or remove all clips in a track from the selection	Hold the Ctrl key and click on the track number

Moving and Copying Clips

You can copy or move clips using drag-and-drop editing or the ***Cut***, ***Copy***, and ***Paste*** commands. If you copy or move clips into tracks that contain existing material, you need to let Pro Audio know how to combine the two. You have three options:

Option...	How it works...
Blend Old and New	Events in the copied or moved clip are placed into a new clip that overlaps with the existing clip. This is the same effect as sound-on-sound recording.
Replace Old with New	Events in the copied or moved clip are placed into a new clip, and any overlapping events in the existing clip are erased. This is the same effect as overwrite recording.
Slide Over to Make Room	The existing clips are shifted in time to make room for the new clips, so they will not overlap. If you check the Align to Measures option, shifted clips are always aligned to measure boundaries; otherwise, the clips are placed end to end.

When you use the ***Edit-Paste*** command to add information to a track that contains existing material, there is one final option you can choose.

Option...	What it means...
Paste as New Clips	New clips are created containing the events on the clipboard, exactly as described in the preceding table.
Paste into Existing Clips	The events on the clipboard are merged into any existing clips that occupy the same region of time. This means you will never end up with clips that overlap.

Note that if you copy or move clips to new, empty tracks, you don't have to worry about these settings. In this case, the track properties that go with the clips are automatically applied to the new track.

Arranging

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When you use drag-and-drop editing:

• You can set the above options every time you perform an edit, or you can set them once and have the same settings carry over automatically. Check or uncheck the Ask This Every Time box to indicate your preference.

• If you drag to the edge of the Clips pane, it will scroll automatically in the direction you drag.

• If you change your mind while dragging clips, press the Escape key to cancel the operation.

Pro Audio also lets you move and copy clips between projects.

To Move Clips Using Drag and Drop...

1. Select the clips you want to move.

2. Position the mouse over one of the selected clips.

3. Press and hold down the left mouse button. A rectangle is displayed around the selected clips.

4. Drag the clips to their new location, and release the mouse button.

5. If necessary, choose the options you want from the Drag and Drop Options dialog box (use **Options-Global-Drag and Drop** or right-click in the Clips Pane), and click OK.
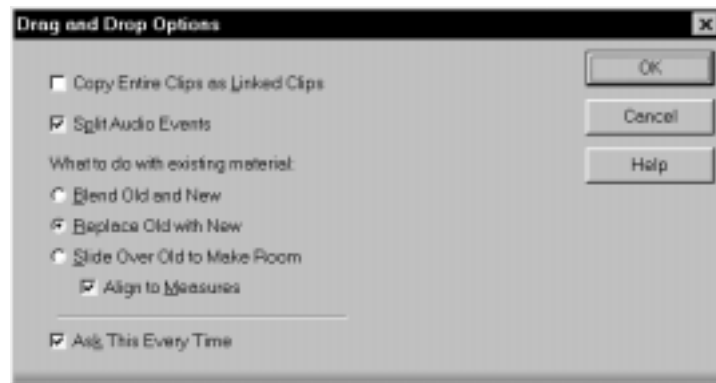
Pro Audio moves the clips to their new location.

To Move Clips Using Cut and Paste...

1. Select the clips you want to move.

2. Choose *Edit-Cut* to display the Cut dialog box.
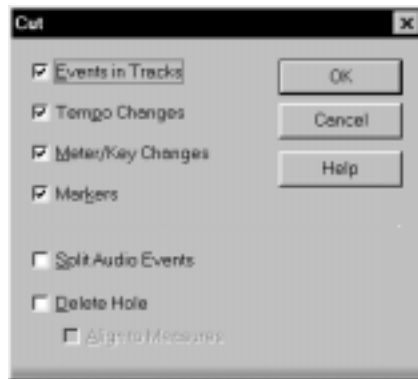
3. Choose the options you want and click OK. Pro Audio cuts the clips from the project and places them on the Windows clipboard.

4. Click in the Track pane to set the current track to be the one where clips should be pasted.

5. Set the Now time to be the time at which the clips should be pasted.

6. Choose *Edit-Paste* to display the Paste dialog box.
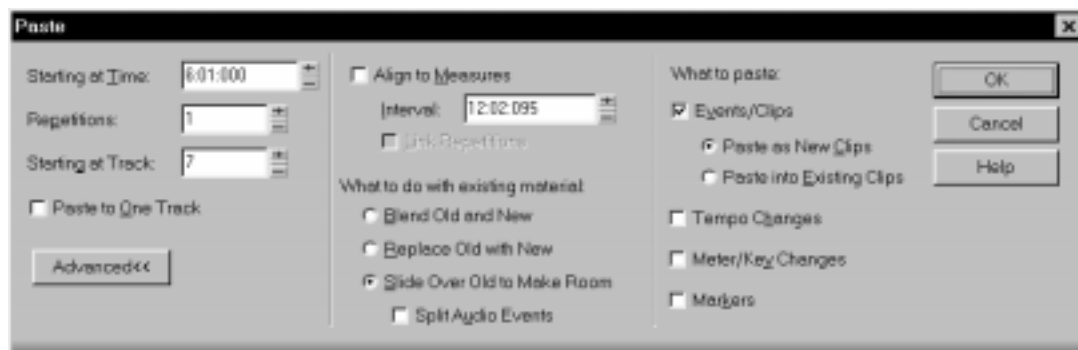
7. Choose the options you want and click OK.

Pro Audio places the clips in their new location.

To Move a Clip to a Specific Start Time...

1.   Select the clip you want to move.

2.   Right-click on the selected clip and choose **Properties**. Pro Audio opens the Clip Properties dialog box.

3.   Enter a new start time, or use the spinners or keyboard to change the start time.

4.   Click OK when you are done.

Pro Audio moves the clip to the start time you chose.

To Copy Clips Using Drag and Drop...

1.   Select the clips you want to copy.

2.   Position the mouse over one of the selected clips.

3.   Press and hold down the Ctrl key.

4.   Press and hold down the left mouse button. A rectangle is displayed around the selected clips.

5.   Drag the clips to their new location, and release the mouse button.

6.   If necessary, choose the options you want from the Drag and Drop Options dialog box, and click OK.

Pro Audio copies the clips to their new location.

To Copy Clips Using Copy and Paste...

1.   Select the clips you want to copy.

2.   Choose **Edit-Copy** to display the Copy dialog box.

3.   Choose the options you want and click OK. Pro Audio copies the clips to the Windows clipboard.

4.   Click in the Track pane to set the current track to be the one where clips should be pasted.

5.   Set the Now time to be the time at which the clips should be pasted.

6.   Choose **Edit-Paste** to display the Paste dialog box.

7.   Choose the options you want and click OK.

Pro Audio copies the clips to their new location.

To Delete Clips...

1. Select the clips you want to delete.

2. Choose **Edit-Delete**, which brings up a dialog box or press the Delete key, which does not.

Pro Audio deletes the selected clips.

Working with Partial Clips

Pro Audio lets you select, copy, move, and delete portions of a project even if they do not match clip boundaries. There are two ways to do this:

• Directly select portions of one or more clips.

• Select a range of times and one or more tracks. Pro Audio automatically selects the portions of clips that are in both the selected time range and the selected tracks.

You can then copy, move, or delete the material the same way you do with whole clips.

When you select portions of a clip, Pro Audio may round off the start and end times of your selection based on the snap grid. For more information, see "Defining and Using the Snap Grid" on page 5-15.

When you move, delete, or copy partial clips, you must choose one other option, as shown in the following table:

Option...	How it works...
Split Audio Events	If this option is checked, audio events will automatically be split into parts as needed when you cut, copy, paste, or move them. If this option is not checked, Pro Audio will not be able to cut, copy, paste, or move the selected partial clip.

To Select a Portion of a Clip...

1. Press and hold the Alt key.

2. Drag the mouse across part of a clip.

Pro Audio highlights the selected portion of the clip. You can edit this portion of the clip using all the normal editing commands.

To Select a Portion of Several Clips...

1. Press and hold the Alt key.

2. Drag the mouse across part of several clips in adjacent tracks.

Pro Audio highlights the selected portions of all the clips. You can edit these portions of clips using all the normal editing commands.

To Select Partial Clips Using Time Ranges and Tracks...

1. Select a range of time in one of the following ways:

    *   Drag the mouse in the time ruler.

    *   Click between two markers to select the time between the markers.

    *   Use the F9 and F10 keys to set the beginning and end selection times.

    *   Select a clip (Pro Audio selects the range of time covered by the clip).

    *   Choose *Edit-Select By Time*, enter the start and end time, and click OK.

2. Select one or more tracks by clicking, Shift-clicking, or Ctrl-clicking on the track numbers in the Track view.

3. To adjust the start and end time of the selection, hold the Shift key while clicking on the time ruler.

The relevant portions of clips in the selected tracks are highlighted. You can edit these portions of clips using all the normal editing commands.

To Clear the Partial Clip Selection...
You can clear the time-restricted selection in any of the following ways:

*   Click in an empty area of the Clips pane to completely clear the selection.

*   Choose *Edit-Select None* or press the Num-5 key (the number 5 on the numeric keypad-Num Lock must be off) to completely clear the selection.

*   Click on a single clip in the Clips pane to clear the time selection and select the clip.

Markers and the Snap Grid

Pro Audio has a collection of features you can use to simplify and speed the work you do arranging your projects. Here are a few of the most important things you can do:

- Show gridlines on measure boundaries in the Track view.

- Define and use a snap grid to make drag-and-drop editing more accurate.

- Create markers to identify and work with key time points in your project.

Showing Gridlines

Displaying gridlines, or vertical rules, in the Clips pane of the Track view makes it easy to see at a glance how clips align with each other, how they align with measure boundaries, and when they start and end.

To Show or Hide Gridlines...

1. Right-click on the Track view and choose **View Options** from the menu.

2. To show gridlines, check the Display Vertical Rules box. To hide gridlines, make sure the Display Vertical Rules box is not checked.

3. Click OK.

Pro Audio displays the Track view as you requested.

Defining and Using the Snap Grid

Pro Audio lets you define a snap grid that makes it easier to arrange clips and select time ranges. To use the snap grid, enable the snap feature and set an interval, such as a whole note, half note, or quarter note. From then on, when you move or copy clips or markers or perform a selection using the time ruler, items will be snapped to the nearest point on the snap grid.

You can also use the grid to move clips **by** a certain interval, rather than snap them **to** the interval. Moving **by** an interval can be useful during drag-and-drop operations, if your events are not exactly aligned with measure or note boundaries.

In addition to choosing a standard note duration for the snap interval, you can also enter a number of clock ticks. For example, at the default timebase of 120 PPQ, a sixteenth note snap interval represents 30 ticks. If you change the timebase, the grid interval will be updated automatically. In the preceding example, if you update the timebase to 240 PPQ, the snap interval will be changed to 60.

The snap grid in each view is independent. For example, you can enable the snap grid in the Track view without enabling it in the Piano Roll, Audio, or Staff views. You can also enable the grid in several different views, with different grid intervals in each one.

To Enable or Disable the Snap Grid...

1.   To enable the snap grid, click the ▦ button.

2.   To disable the snap grid, click the ▦ button once again.

To Change the Snap Options...

1.   Right-click the ▦ button to display the Snap to Grid dialog box.

2.   Choose the note duration you want, or enter a number of ticks.

3.   Select Snap To to align selections and clips to the grid, or Move By to move clips by the grid interval.

4.   Click OK.

All time selections and drag-and-drop editing operations use the new snap grid interval.

Creating and Using Markers

Markers are a way of associating a name with a time point in your project. You use markers to name sections of a song, to mark hit points in a film score, or simply to provide a shortcut for working with any time point in a project. Markers make it easy to:

•   Jump to a specific time point in a project

•   Select a portion of a project

•   Enter a time in any dialog box, by pressing F5 and choosing the marker you want

You can see and work with markers in four ways:

•   They are displayed in the time ruler at the top of the Track, Audio, Staff, and Piano Roll view.

•   The Markers toolbar lets you add markers and jump to specific marker locations.

•   The Markers view displays all markers and lets you add, edit, and delete markers.

•   You can press F11 while playback is in progress to add a marker on the fly.

The time associated with a marker can be expressed in musical time or as a locked SMPTE time. If a marker has a musical time (measures, beats, and ticks), the marker stays at that musical time regardless of changes in tempo. If a marker has a locked SMPTE time (hours, minutes, seconds, and frames), the marker stays at the same time even when the tempo is changed. Locked markers are useful for projects that require you to sync the music or sound with film scores or multimedia presentations. See "To Add a Marker" below.

Pro Audio takes the current snap grid settings into account when you move or copy markers. For example, if the snap grid is set to even measure boundaries, any time you move or copy a marker, the marker will be snapped to the beginning of the nearest measure. You are allowed to have any number of markers at a single time point.

To display the Marker view, choose *View-Markers* or click on the Views toolbar. From the Markers view, you can use the *File-Print* and *File-Print Preview* commands to print a listing of markers.
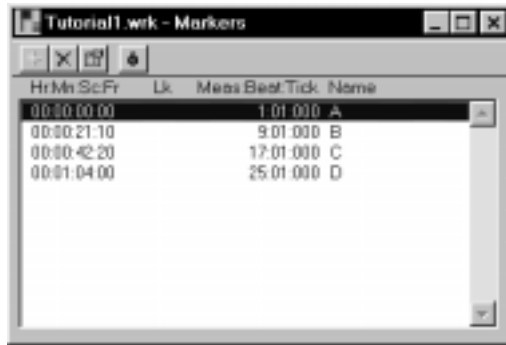
You can add markers while playback is stopped or while playback is in progress (on the fly). When you add a marker while playback is stopped, you can enter a name for the marker and either use the Now time or enter a different time. When you add a marker on the fly, the marker is named automatically and assigned the Now time. Using the Markers view, you can edit the names and times whenever you want.

To Add a Marker...

1. There are six ways to add a new marker:

   - Click in the Markers toolbar.
   - Press F11.
   - Choose *Insert-Marker.*
   - Click in the Markers view.
   - Ctrl-click in the marker section of the time ruler.
   - Right-click in the Time ruler and select *Insert Marker*

   Pro Audio displays the Marker dialog box.

2. Enter a name for the marker in the Name box.

3. The time is set to the Now time. If you want, use the spinners to change the time or type in a new marker time.

4. Check the Locked to SMPTE box if you want to lock the marker to the SMPTE time.

5. Click OK.

Pro Audio adds the marker and displays it in the time ruler, the Markers view, and the Markers toolbar.

To Add a Marker on the Fly...

1. Click ![icon] in the Markers toolbar, or Press F11.

Pro Audio adds a marker at the Now time and displays it in the time ruler, the Markers view, and the Markers toolbar.

To Edit a Marker...

1. Either right-click on the marker in the time ruler, or choose a marker in the Markers view and click ![icon]. Pro Audio displays the Marker dialog box.

2. Change the marker name, time, or other settings as desired.

3. Click OK.

Pro Audio updates the marker in the time ruler and Markers view.

To Copy a Marker...

1. Press and hold the Ctrl key.

2. Drag a marker in the time ruler of the Track, Audio, Staff, or Piano Roll view. Pro Audio displays the Marker dialog box.

3. Enter the desired marker settings and click OK.

Pro Audio copies the marker and displays it in the time ruler and Markers view. You can also cut and paste markers directly from the Markers view.

To Lock or Unlock Several Markers...

1. In the Markers view, select one or more markers. Use the Ctrl and Shift keys if necessary to modify the selection.

2. Select or deselect 🔘.

Pro Audio updates the markers.

To Move a Marker...

Drag the marker in the time ruler.

Pro Audio updates the marker time and shows it at the new location.

To Delete a Marker...

1. Press and hold the left mouse button while pointing to a marker in the time ruler.

2. Press Delete, and release the mouse button.

Pro Audio deletes the marker. You can use *Undo* if you make a mistake.

To Delete Markers from the Markers View...

1. In the Markers view, select one or more markers. Use the Ctrl and Shift keys if necessary to modify the selection.

2. Click ❌ or press Delete.

Pro Audio deletes the selected markers. You can use *Undo* if you make a mistake.

To Jump to a Marker

There are many different ways to jump to a specific marker:

- Choose a marker from the drop-down list in the Markers toolbar to jump to that marker.

- Click the Now time in the toolbar, press F5 to display a list of markers, choose the marker you want, and click OK.

- Press F5 twice to display a list of markers, choose the marker you want, and click OK.

- Click on a marker in the Markers view to set the Now time to that marker.

- Click 🔖 or 🔖 in the Markers toolbar to jump to the next or previous marker.

- Choose *Go-Next Marker* or *Go-Previous Marker* to jump to the next or previous marker.

To Select a Time Range Using Markers

You can select a range of times by clicking in the marker section of the time ruler:

- Click to the left of the first marker to select the time between the start of the project and the first marker.

- Click to the right of the last marker to select the time between the marker and the end of the project.

- Click between two markers to select the time between the markers.

- If looping is enabled, click to the right of the Loop Start marker to select the loop region

- If punch recording is enabled, click to the right of the Punch In marker to select the punch region

Working with Linked Clips

Pro Audio makes it easy to repeat a pattern over and over using a feature called **linked clips**. Linked clips always have the same contents, name, and display color. Any change you make to one of the clips will automatically apply to all of them. Any number of clips may be linked with each other.

To create linked clips, check the linked clips option in the Copy dialog box or the Drag and Drop Options dialog box. Linked clips are displayed with a dotted border, so they are easy to spot. You can also identify linked clips using the Clip Properties dialog box or the *Select All Siblings* command. You can easily unlink linked clips, and then edit them individually. You have two options when unlinking linked clips:

Option...	How it works...
New linked group	The clips you selected will still be linked to each other, but won't be linked to any clips that are not selected
Independent	Every selected clip will be completely independent

Once you have unlinked linked clips, you cannot re-link them except by using *Undo*.

If you attempt to copy only a portion of a linked clip, the copy will not be linked to the original. Copies of a clip can be linked to the original only when you select and copy the entire clip.

To Make Linked Copies of a Clip Using Drag and Drop...

1. Right-click in the Clips pane and choose **Drag & Drop Options** to display the Drag and Drop Options dialog box.

2. Check the option labeled Copy Entire Clips as Linked Clips.

3. Click OK.

4. Select the clips you want to copy.

5. Position the mouse over one of the selected clips.

6. Press and hold down the Ctrl key.

7. Press and hold down the left mouse button. A rectangle is displayed around the selected clips.

8. Drag the clips to their new location, and release the mouse button.

9. If necessary, confirm the options in the Drag and Drop Options dialog box, and click OK.

Pro Audio creates copies of the selected clips that are linked to the originals. Any change you make to one of the clips is applied to all linked clips.

To Make Linked Copies of a Clip Using Copy and Paste...

1. Select the clips you want to copy.

2. Choose **Edit-Copy** to display the Copy dialog box.

3. Make sure you check the option labeled Copy Entire Clips as Linked Clips.

4. Choose other options as desired and click OK. Pro Audio copies the clips to the Windows clipboard.

5. Click in the Track pane to set the current track to be the one where clips should be pasted.

6. Set the Now time to be the time at which the clips should be pasted.

7. Choose *Edit-Paste* to display the Paste dialog box.

8. Choose the options you want and click OK.

Pro Audio creates copies of the selected clips that are linked to the originals. Any change you make to one of the clips is applied to all linked clips. If you make multiple copies by pasting multiple repetitions, all copies of the clip will be linked together.

To Unlink Linked Clips...

1. In the Track view, select the clips you want to unlink.

2. Right-click on any selected clip and choose *Unlink* from the menu. Pro Audio displays the Unlink Clips dialog box.

3. Choose the unlink option you want, and click OK.

Pro Audio unlinks the clips and updates the Track view accordingly. From now on, any changes you make to one of the clips are applied only to remaining linked clips, if any.

To Select the Clips That Are Linked to Another Clip...

1. Select one or more clips in the Track view.

2. Right-click on any selected clip and choose *Select All Siblings* from the menu.

Pro Audio selects any clip that is linked to one of the currently selected clips.

Splitting and Combining Clips

Pro Audio provides several commands that are used to split and combine clips. Specifically, you can:

•   Split a clip into several smaller clips

•   Create a new clip from a selected portion of an existing clip

•   Combine adjacent or overlapping clips into a single, longer clip

The following table summarizes the commands you can use:

To do this...	Use this command...	Notes...
Split clips into parts	*Split*	Works on all selected clips
Create a new clip from part of an existing clip	*Edit-Create Clips*	Erases the selected portion of the existing clip, and moves the material into a new, separate clip
Combine several clips into one	*Combine*	If the selected clips are in separate tracks, the new clip is placed in the first of these tracks

Note:

Combining a stereo and mono clip always produces a stereo clip.

The *Split* command lets you split clips four different ways:

Option...	How it works...
Split at Time	Splits selected clips at a specific point in time. By default, the split occurs at the Now time, but you can choose any time you want.
Split Repeatedly	Splits selected clips at regular intervals, beginning at a specified time, with a specified duration. For example, you could split a long clip into 4-bar clips starting at measure 5.
Split at Markers	Splits selected clips at any marker location. This option is available only if your project has markers.

Split when Silent	Removes "silent" stretches of one measure or more from selected clips. The presence in a measure of any event—including those that make no sound, such as a patch change or lyric event—will cause that measure to be retained.

While the *Split* command works for both MIDI and audio clips, the Split tool in the Audio view provides more precise control, which is often required for audio material. In particular, this other command provides sample accurate editing and snap-to-zero capability.

Note that the *Undo* and *Redo* commands work with all three of these editing commands.

To Split Clips into Smaller Clips...

1.   Select the clips you want to split.

2.   Right-click on any selected clip, and choose *Split* from the menu. Pro Audio shows the Split dialog box.

3.   Choose the Split option you want to use, and enter the settings you want to use.

4.   Click OK.

Pro Audio splits the selected clips according to your instructions.

To Combine Clips...

1.   Select the clips you want to combine.

2.   Right-click on any selected clip, and choose *Combine* from the menu.

Pro Audio combines the selected clips into a single, new clip. If the selected clips were on different tracks, the resulting clip is placed in the first of these tracks.

To Split Material into New, Separate Clips...

1.   Select a portion of one or more existing clips.

2.   Choose *Edit-Create Clips*, or right-click on any selected clip and choose *Create Clips* from the menu.

Pro Audio creates new clips from the selected material.

Adding Effects in the Track View

You can add both MIDI and audio effects directly from the Track view. Cakewalk adds these effects in real-time, preserving your track's original data.

To Add Effects in the Track View...

1. Double-click the Effects column of the track you want to add effects to.

    The FX bin appears.

2. Right-click in the FX bin to display the effects popup menu. Move the cursor over the menu name to display a submenu of effects.

    Cakewalk displays MIDI effects if you are editing a MIDI track, and audio effects for an audio track.

3. Click an effect from the submenu.

    The name of the effect appears in the FX bin. To delete the effect, right-click the effect name and choose Delete from the popup menu.

4. Double-click the effect name to set the effect's parameters, if desired.

5. Repeat steps 2-4 for all the effects you want to add.

6. Click Done.

Play your track and listen to the effect(s).

Changing Tempos

Your project can incorporate all kinds of tempo changes, including step changes from one tempo to another, gradual increases (accelerandos) or decreases (ritardandos), and almost any other type of change you can imagine. The tempo changes you add to your song become part of the project and are saved with the project file.

You can add tempo changes to your project in four ways:

*   Using the Tempo toolbar

*   Using the *Insert-Tempo Change* and *Insert-Series of Tempos* commands

- By drawing tempo changes graphically in the Tempo view

- Inserting tempo changes in the Tempo view's Tempo List pane

The ***Edit-Fit to Time*** and ***Edit-Fit Improvisation*** commands can also be used to introduce tempo changes into your work file. For more information, see "Stretching and Shrinking Events" on page 6-13 and "Fit Improvisation" on page 6-27.

When you change the tempo of a project that contains audio, Pro Audio will, at your option, stretch or shrink the audio wave to fit the new tempo. Otherwise, the MIDI tracks will speed up or slow down while the audio tracks will play at the same speed.

Sometimes you don't want to adjust the speed of your audio. Here are some examples:

- If your project contains background music and a voice-over, you might want to change the tempo of the background music without altering the voice-over.

- If you're trying to modify the speed of some MIDI tracks to match a sampled drum groove, you want to leave the audio unchanged.

When you insert a tempo change using a dialog box, the Stretch Audio checkbox lets you choose whether to stretch or shrink the audio portions of your project. You can also prevent an audio clip from ever being stretched by setting the track patch to be Unstretchable.

You cannot set tempos when the clock source is set to MIDI Sync, because Pro Audio follows the external tempo. For more information, see Chapter 15, *Synchronizing Your Gear*.

Using the Tempo Toolbar

The Tempo toolbar displays the current tempo and lets you change the tempo as shown below:

Click to insert a tempo change

Click to enter a new tempo

Tempo ratio buttons
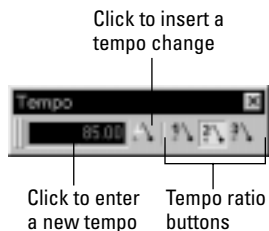
When you enter a new tempo directly in the toolbar, you change the most recent tempo setting in the project.

The tempo ratio buttons temporarily change the speed of playback, without affecting the actual tempo that is stored with your song. During playback, the tempo is multiplied by the current tempo ratio. By default, the three tempo ratios are 0.50 (half speed), 1.00 (normal speed), and 2.00 (double speed). You can change the tempo ratios that are associated with each button.

Note that tempo ratios cannot be used when using any form of synchronization. For more information, see Chapter 15, *Synchronizing Your Gear*.

To Change the Current Tempo in the Tempo Toolbar...

1. Click the current tempo in the Tempo toolbar.

2. Type a new value or use the spinners to change the tempo value.

Pro Audio changes the current tempo to the desired value. If Stretch Audio is enabled, after a Ω-second delay, Pro Audio shrinks or stretches the song's audio events to conform to the new tempo. Lowering the tempo will shrink the audio; increasing the tempo will stretch the audio.

To Set the Tempo Ratio...

You can set the tempo ratio in several ways:

• Click one of the tempo ratio buttons.

• Choose **Realtime-Tempo Ratio 1**, **2**, or **3**.

• Press Ctrl-1, Ctrl-2, or Ctrl-3.

Pro Audio changes the speed of playback.

To Change the Tempo Ratio ...

1. Shift-click one of the tempo ratio buttons to display the Tempo Ratio dialog box.

2.   Enter a new value for the tempo ratio.

3.   Click OK.

From now on, that tempo ratio button uses the ratio you entered.

Using the Tempo Commands

The *Insert-Tempo Change* and *Insert-Series of Tempos* commands
can be used to change the existing tempo of a project or to introduce one
or more tempo changes at various points in a project. You can enter
tempo values directly, introduce smooth increase or decreases in tempo,
or even use your mouse to tap out the tempo you want for some portion
of a project.

To Insert a Tempo Change...

1.   Click ![icon] in the toolbar or choose **Insert-Tempo Change** to display
      the Tempo dialog box.
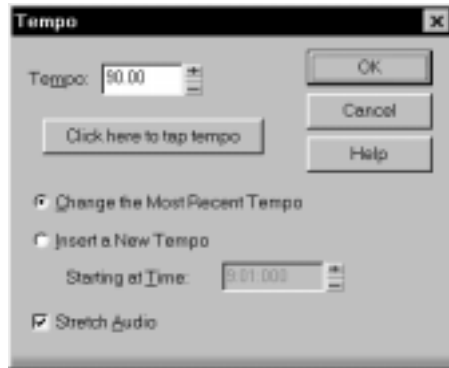
2.   Check the Insert a New Tempo box.

3.   Enter a new tempo in one of the following ways:

      •   Type a value in the Tempo field.

      •   Click the arrows to change the value.

      •   Tap a new tempo in the space indicated in the dialog box.

4.   Enter a starting time for the new tempo.

5.   Check the Stretch Audio option if you want audio to be modified.

6.   Click OK.

Pro Audio inserts a tempo change at the designated time.

To Insert a Series of Tempos...

1. Choose **Insert-Series of Tempos** to display the Insert Series of Tempos dialog box.
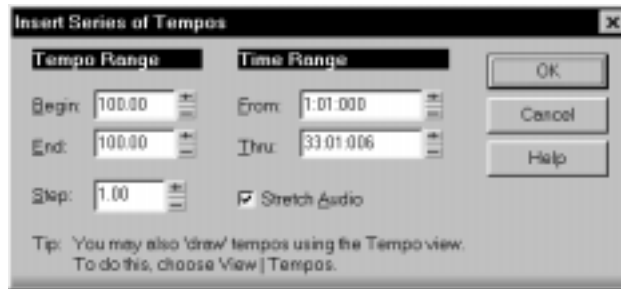
2. Enter a starting tempo, ending tempo, and step size.

3. Enter a starting and ending time for the series of tempo changes.

4. Check the Stretch Audio option if you want audio to be modified.

5. Click OK.

Pro Audio erases any existing tempo changes between the starting and ending time, and inserts a series of tempo changes that change smoothly between the starting and ending time. This command never inserts more than one tempo change on the same clock tick.

To Modify the Most Recent Tempo Change...

1. Choose **Insert-Tempo Change** to display the Tempo dialog box.

2. Check the Change the Most Recent Tempo box.

3. Enter a new tempo in one of the following ways:

    *   Type a value in the Tempo field.

    *   Click the arrows to change the value.

    *   Tap a new tempo in the space indicated in the dialog box.

4. Check the Stretch Audio option if you want audio to be modified.

5. Click OK.

Pro Audio changes the most recent tempo to the new value.

Using the Tempo View

The Tempo view provides both a graphic display of the tempo and a list of all tempo changes in your project. In the graphical display you can use your mouse to draw tempo changes directly onto the graph. In the tempo list, you can insert, edit, and delete individual tempo changes. Choose **View-Tempo** or click ![icon] on the toolbar to display the Tempo view. Click the Tempo List button ![icon] to display or hide the tempo list.

Tempo (beats per minute)

Constant tempo   Accelerando   Diminuendo   Tempo change list
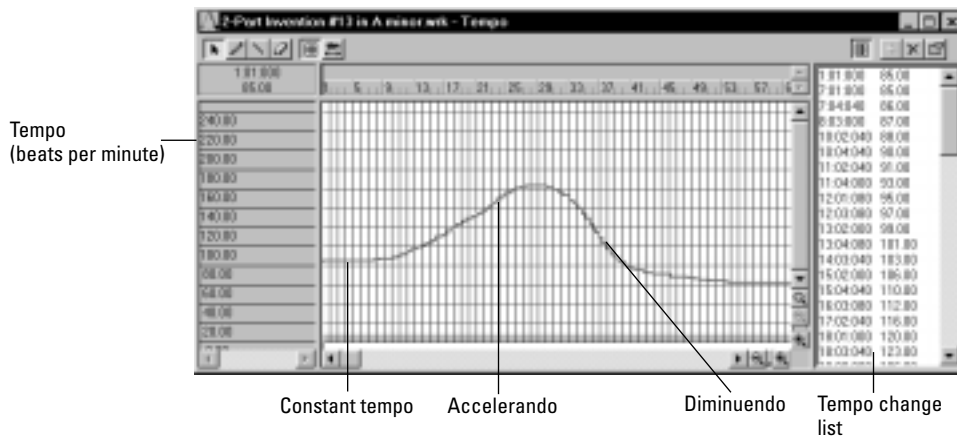
If an entire project has a single tempo, the graph shows a straight horizontal line, and a single tempo in the list.

The ![icon] button in the toolbar determines whether or not audio will be modified. If the button is depressed, audio will be stretched when you introduce tempo changes. If not, audio material will not be affected by tempo changes.

The graph has several tools you can use to add or modify tempo changes:

Tool...	Name...	What it's for...
![Line icon]	Line	Draw a straight line indicating a steady increase or decrease in tempo
![Draw icon]	Draw	Draw a custom curve indicating changes in tempo
![Erase icon]	Erase	Eliminate tempo changes already in place for some portion of a project

If you make a mistake using any of these tools, you can use *Undo* to correct the error. When you use the Draw tool, the speed with which you drag the mouse determines the density of tempo events. To insert a larger number of relatively small tempo changes, move the mouse slowly. To insert a smaller number of relatively large tempo changes, drag the mouse quickly.

The Tempo List Pane has its own tools for editing tempo changes:

Tool...	Name...	What it's for...
	Insert Tempo	Insert a new tempo change
	Delete Tempo	Delete a tempo change
	Tempo Properties	Edit a tempo change

To Insert a Tempo Change in the Graph...

1.   Select the tool or the tool.

2.   Click in the graph at any desired time point and tempo level.

Pro Audio introduces a tempo change at the indicated point.

To Steadily Increase or Decrease the Tempo...

1.   Select the tool.

2.   Drag a line in the graph from the starting time and tempo to the ending time and tempo.

Pro Audio introduces a linear series of tempo changes.

To Draw a Series of Tempo Changes...

1.   Select the tool.

2.   Drag the cursor across the graph, adjusting the tempo level as you move left to right.

Pro Audio introduces a series of tempo changes.

To Erase Tempo Changes...

1. Select the ![pencil] tool.

2. Drag the mouse over the graph to highlight the region you want to erase.

3. Release the mouse button.

Pro Audio deletes all tempo changes in the area you marked. The last tempo setting prior to the erased region is now in effect in that region.

To Insert a Tempo Change in the List...

1. Select any tempo change in the list.

2. Click Insert Tempo ![icon] to open the Tempo dialog box.

3. Set the tempo, time, and other properties.

4. Click OK.

Pro Audio inserts the new tempo into the list.

To Edit a Tempo Change...

1. Select the tempo change to be edited.

2. Click Tempo Properties ![icon] or double-click the tempo change to open the Tempo dialog box.

3. Edit the tempo properties as desired.

4. Click OK.

To Delete a Tempo Change from the List...

1. Select the tempo change to be deleted.

2. Click Delete Tempo ![icon], or press Delete.

Pro Audio deletes the selected tempo change. You cannot delete the first tempo in the list.

Arranging

6 Editing Events and Controllers

Pro Audio lets you edit the events in your songs in dozens of different ways. The Piano Roll view lets you add and edit notes, controllers, and automation data interactively, using a graphic display. Pro Audio's many editing commands can improve the quality of recorded performances, filter out certain types of events, and modify the tempos and dynamics of your songs. The Event List view lets you see and modify every detail of your project. Finally, you can apply a variety of effects and filters to enhance your MIDI data.

Pro Audio has many additional commands and features for working with audio. For more information, see Chapter 7, *Editing Audio*.

Editing Events

In This Chapter

The Piano Roll View

The Piano Roll view displays all notes and other events from one or more tracks in a grid format that looks much like a player piano roll. Notes are displayed as horizontal bars, and drum notes as diamonds. Pitch runs from bottom to top, with the left vertical margin indicating the pitches as piano keys or note names. Time is displayed running left to right with vertical measure and beat boundaries. The Piano Roll view makes it easy to add, edit, and delete notes from a track.

The Piano Roll view consists of the Note pane, the Controllers pane, and the Track List pane.

Note Pane

In this pane you can add, edit, and delete notes from a track or tracks.

Controllers Pane

In this pane you can edit controllers, RPNs, NRPNs, automation, velocity, pitch wheel, and aftertouch data, during playback or recording, in real time. Select the controller you want to edit from the Controller drop-down list at the top of the Piano Roll view. For more information, see "Controllers, RPNs, NRPNs, and Automation Data" on page 6-35.

Track List Pane

The Track List pane is home to a list of all tracks currently displayed in the Piano Roll view. Track numbers and names appear in the Track List pane.

Note pane

Splitter bar

Controllers pane

Track List pane
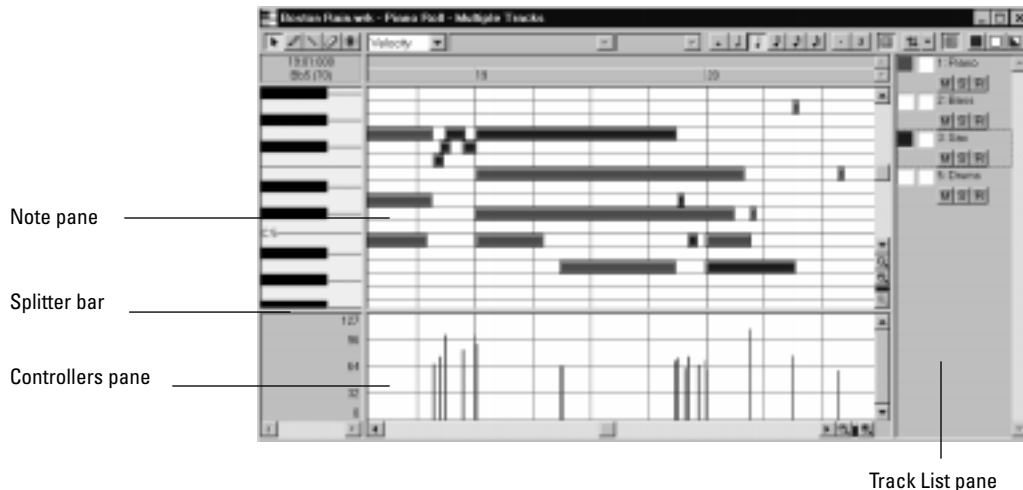
Opening the View

There are several ways to open the Piano Roll view:

- In the Track view, select the track you want to see, then choose **View-Piano Roll**

- In the Track view, right-click on a track and choose **Piano Roll** from the pop-up menu

- Double-click on a MIDI clip in the Clips pane

Each selected track is displayed. You can always switch to a different track or tracks—simply click the [⇅ ▾] button (or press T) and choose the track you want. If you pick a blank track, Pro Audio creates a new track automatically.

The Piano Roll view lets you edit notes and controllers during playback or recording, in real time. This means you can loop over a portion of your project and hear any change you make on the next loop. The Piano Roll view also shows notes on-screen as you record them.

Like the Track view, the Piano Roll view includes zoom tools that let you change the vertical and horizontal scale of the view. The Piano Roll view also has a Snap to Grid [⊞] button. For more information on this feature, see Chapter 5, *Defining and Using the Snap Grid*.

Selecting and Editing Notes

The Piano Roll view is a very convenient place to select, edit, and copy notes within a track or tracks. There are several ways to select notes in the Piano Roll view:

- Click and drag in the time ruler to select notes (and other MIDI events) that start playing within the time range

- Use the Select tool [▸] to select notes

- Click or drag the piano keys to select all notes of the given pitch(es)

You can use Shift-click to add notes to the selection and Ctrl-click to toggle between adding to or removing from the selection.

You can add notes to a clip simply by clicking in the Note pane with the pencil tool. Pro Audio remembers the velocity, duration, and channel of the note that you most recently moved, edited, or deleted, and uses these same characteristics for new notes automatically. You can use the Resolution buttons to set the duration for new notes you enter. You can edit notes freely, using the mouse to change the start time, pitch, or duration. You can also right-click any note to edit the start time, pitch, duration, velocity, and channel of that note. You can move and copy notes

beyond the boundary of the clip in which they are located. When you move the notes, the clip will be extended as needed.

The Piano Roll view also lets you **scrub** the tracks that are currently displayed. The Scrub command lets you drag a vertical bar over the view so that you can hear the notes in the track(s). You can scrub forward or backward at any speed. Scrubbing can be handy when you want to locate a bad note or listen to the effects of changes you have made without playing back at normal speed.

To Select Notes with the Selection Tool...

1. Click to select the Select tool.

2. Select notes as shown in the table:

To do this...	Do this...
Select a single note	Click on the note
Select several notes at once	Drag a rectangle around the notes you want to select
Add to the selection	Hold the Shift key while selecting notes
Toggle the selection	Hold the Ctrl key while selecting notes

Selected notes are highlighted (50% gray mask) in the Piano Roll view, and the time selection is set to the range of note start times.

To Select All Notes of Certain Pitches...

1. Click the piano keys or note names on the left side of the Note pane as shown in the table:

To do this...	Do this...
Select all notes of a single pitch	Click on the piano key or note name
Select all notes of several pitches	Drag across the keys or note names
Add to the selection	Hold the Shift key while clicking on a piano key or note name
Toggle the selection	Hold the Ctrl key while clicking on a piano key or note name

To Edit a Note...

1. Click ![Draw tool icon] to select the Draw tool.

2. Edit notes as described in the table:

To do this...	Do this...
Change the start time	Drag the left edge of the note in either direction. The note duration stays the same, but the start time is shifted.
Change the pitch	Drag the middle of the note up or down.
Change the duration	Drag the right edge of the note in either direction.

If the snap grid is enabled and set to Snap To, the start time of each note is restricted to points on the snap grid, and the length of each note is restricted to an even multiple of the snap increment. For example, if the snap increment is set to a quarter note, you can move notes only to quarter-note boundaries, and you can increase or decrease the duration only by quarter notes. If the snap grid is set to Move By, notes can only be moved by multiples of the snap increment.

To Change Note Velocity or Channel...

1. Right-click a single note to display the Note Properties dialog box.

2. Edit the start time, pitch, duration, velocity, or channel as desired.

3. Click OK when you are done.

Pro Audio updates the note event accordingly. Note that you can also edit note velocity in the Controllers pane. For more information, see "Velocity, Pitch Wheel, and Aftertouch" on page 6-37.

To Move Notes...

1. Click ![Select tool icon] or press S to select the Select tool.

2. Select one or more notes.

3. Drag the selected notes to a new location.

Editing Events

4. If necessary, choose the Drag and Drop options from the Drag and Drop dialog box.

Pro Audio moves the selected notes.

To Copy Notes...

1. Click ![select] or press S to select the Select tool.

2. Select one or more notes.

3. Press and hold the Ctrl key.

4. Drag the selected notes to a new location.

5. If necessary, choose the Drag and Drop options from the Drag and Drop dialog box.

Pro Audio copies the selected notes.

To Add a Note...

1. Click ![draw] or press D to select the Draw tool and select a note duration

2. Press and hold the left mouse button in the Piano Roll view. Pro Audio adds a new note.

3. Drag the note to the desired location.

4. Release the left mouse button.

To Erase a Note...

1. Click ![erase] or press E to select the Erase tool.

2. Click on any note to delete it.

To Erase Several Notes...

1. Click ![erase] or press E to select the Erase tool.

2. Drag the cursor across notes to delete them.

3. Release the mouse button when you are done.

To Select and Erase Notes...

1.   Click ▣ or press S to select the Select tool.

2.   Select one or more notes.

3.   Press Delete to delete the notes.

To Scrub the Song...

1.   Click ◉ or press B to select the Scrub tool.

2.   Press and hold the left mouse button in the Piano Roll view. Pro Audio displays a vertical line and plays any notes that are underneath the line.

3.   Drag the line to the left or right, at any desired speed.

Working with Multiple Tracks in the Piano Roll View

The following is a list of ways to optimize the multiple track functionality in the Piano Roll view.

Selecting Tracks

Use the Pick Tracks combo button to assign tracks to the Layers pane. Click on the left side of the Pick Tracks combo button to open the Pick Tracks dialog box. Click on a track to select it. Hold down the Ctrl key to select additional tracks. Click on the right side of the Pick Tracks combo button to show the Down/Up pop-up menu. Selecting Down moves the track or range of tracks down by one. Selecting Up moves the track or range of tracks up by one. For example, if you have tracks 2, 3 and 7 displayed in the Layers pane and you select Down, the Layers pane displays tracks 1, 2, and 6.

Display

If two tracks share overlapping notes, the notes of the topmost track in the Track List pane appear in the Notes pane. You can move a track up or down by clicking and holding on the track in the Layers pane and moving the track to the desired position.

All tracks ending in the same digit (2, 12, 22, etc.) share the same color. The default colors can be changed using *Options-Colors*.

The Mask Selection button

The Mask Selection button sets whether or not you can edit the notes of a track. When the button appears white, editing is enabled and the track appears in color. When the button appears gray, editing is disabled and the track appears in gray.

The Show/Hide Track Colors button

The Show/Hide Track Colors button controls whether or not a track appears in the Notes pane. The button appears in color when toggled on, white when off.

Percussion, Drum Notes, and Note Names

If you are editing a track that is routed to a percussion instrument, the Piano Roll view automatically configures itself in drum mode. In drum mode, the piano keys are replaced by the names of the various percussion instruments. This means it is easy to change percussion notes from one instrument to another or to select and edit the notes played by a single percussion instrument.

You can also manually reconfigure the view to display in drum mode or to use note names that are defined as part of any instrument definition. For more information about instrument definitions, see Chapter 10, *Using Instrument Definitions*.

To Change to/from Drum Mode...

1. Right-click the left side of the Note pane (where the piano keys or note names are displayed) to display the Note Names and Drum Mode dialog box.

2. To use the note names from the assigned instrument (the default), click Use the Assigned Instrument Settings. Click Configure to change the instrument definitions.

3. To override the default setting, click Use These Settings Instead, and choose the note names and mode you want to work with.

4. To display diamond-shaped notes instead of rectangular boxes, check the Drum Mode box.

5. Click OK when you are done

The Piano Roll view is updated with the settings you request.

Selecting and Editing Events

Pro Audio has many other editing commands that you can use to modify the events that make up your project. Here are some of the things you can do:

• Transpose events, clips, tracks, or an entire project to a different key

• Shift events to an earlier or later time

• Stretch or shrink material to a different length

• Reverse the notes in a clip to create new arrangements

• Modify the note velocities

The following sections describe these editing commands and how to use them. Pro Audio also has some special commands you can use to modify or clean up a performance or to search for or select events that meet certain criteria. For more information, see the following sections of this chapter.

Transposing

The *Edit-Transpose* command transposes the pitches of note events up or down by a fixed number of steps. It does so by changing the MIDI key numbers of note events. Simply enter the number of half-steps—a negative number to transpose down, a positive number to transpose up.

Pro Audio can also perform diatonic transposition, which shifts all the notes up and down the major scale of the current signature by the designated number of steps. For instance, if you specify an amount of +1 and the key signature is C-major, a C becomes a D (up a whole step), an E becomes an F (up a half step), and so on. Diatonic transposition assures you that the transposed notes fit with the original key signature.

As an option, you can choose to transpose selected audio clips along with any selected MIDI clips. Pro Audio uses pitch-shifting (a plug in for changing audio pitch) to perform the transposition. You can transpose audio only a single octave in either direction (-12 to +12), and you cannot transpose audio when you are using diatonic transposition.

To Transpose Selected Events...

1. Select the tracks, clips, or events you want to transpose.

2. Choose **Edit-Transpose** to display the Transpose dialog box.

3. Use the spinners or enter the number of steps to transpose.

4. Check Diatonic Math if you want to transpose along the major scale of the current key.

5. Choose **Transpose Audio** if you want to pitch-shift selected audio clips.

6. Click OK when you are done.

Pro Audio transposes the selected events

Shifting Events in Time

The Track view lets you move entire clips forward or backward in time by using drag and drop editing or by changing the start time of selected clips. The **Edit-Slide** command is slightly more flexible—you can use it to shift individual events and markers (or selected events and markers) either forward or backward in time. This has an effect that is similar to the Time+ parameter in the Track view. However, the **Edit-Slide** command modifies the time stored with each event, while the Time+ parameter simply applies a temporary change during playback.

You can also use the **Edit-Slide** command to move markers located within the selection. If you have selected any locked markers, Pro Audio will ask whether they should slide, too.

To Shift Events in Time...

1. Select the events and/or markers you want to shift.

2. Choose **Edit-Slide** to display the Slide dialog box.

3.   Check the types of event you want to slide (events and/or markers).

4.   Enter the number of measures, ticks, seconds, or frames to slide. Enter a negative number to shift material earlier. Note that you cannot slide any event earlier than 1:01:000. For example, if the current selection starts at 2:01:000, you cannot slide events earlier by more than one measure.

5.   Click OK when you are done.

Pro Audio shifts the selected events and/or markers.

Inserting Measures into a Project

The *Insert-Time/Measures* command lets you insert any number of blank measures, ticks, seconds, or frames into a project. You can insert the blank measures (or other period of time) into all tracks or into one or more selected tracks. If you insert the blank time into the entire project, all events in each track—markers, meter and key settings, and tempo changes—are shifted automatically by default. If you insert the blank time into one or more selected tracks, only the events in those tracks are shifted by default. You can always choose which types of events should be shifted.

To Insert a Single Blank Measure into a Project...

1.   Press the 5 key on the numeric keypad (Num Lock must be off) or select *Edit-Select-None* to make sure that no track or time range is selected.

2.   Set the Now time to the place where you want to insert the measure.

3. Choose **Insert-Time/Measures** to display the Insert Time/
Measures dialog box.
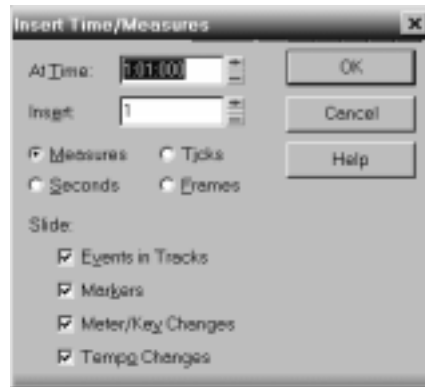
4. Verify that the settings are correct and click OK.

Pro Audio inserts a blank measure at the Now time.

To Insert Blank Time or Measures into a Project...

1. Press the 5 key on the numeric keypad (Num Lock must be off)
or select **Edit-Select-None** to make sure that no track or time
range is selected.

2. Select the range of time you want to insert by dragging in the
time ruler.

3. Choose **Insert-Time/Measures** to display the Insert Time/
Measures dialog box.

4. If necessary, adjust the time at which blank space will be
inserted.

5. If necessary, change the length of time to insert by entering a
number and choosing the units you want from the list.

6. Choose the types of events that should be shifted automatically
from the Slide list.

7. Click OK when you are done.

Pro Audio inserts the desired amount of blank time into the project.

To Insert Blank Time or Measures into Selected Tracks...

1. Select the range of time you want to insert by dragging in the time ruler.

2. Select one or more tracks by clicking on the track numbers.

3. Choose **Insert-Time/Measures** to display the Insert Time/Measures dialog box.

4. If necessary, adjust the time at which blank space will be inserted.

5. If necessary, change the length of time to insert by entering a number and choosing the units you want from the list.

6. Choose the types of events that should be shifted automatically from the Slide list.

7. Click OK when you are done.

Pro Audio inserts the desired amount of blank time into the project.

Stretching and Shrinking Events

The **Edit-Length** and **Edit-Fit to Time** commands can be used to stretch or shrink a portion of a project. **Edit-Length** lets you stretch or shrink the selection by a fixed percentage and makes the adjustment by altering the individual events. A value of 200 percent, for example, stretches the selection to twice its original length, while a value of 50 percent shrinks the selection to half its original length.

Edit-Fit to Time stretches or shrinks the selection so that it ends at a specific time, expressed in either measure:beat:tick (MBT) or hours:minutes:seconds:frames (SMPTE) format. This command gives you a choice of modifying the events or modifying the underlying tempo. This is useful when you want a portion of a project to have an exact length. The start time of the selection does not change, but the end time is altered as necessary to fit the required time interval.

Both of these commands offer the option to stretch audio events along with the MIDI information. Sometimes you don't want to adjust the speed of your audio. Here are some examples:

- If your project contains background music and a voice-over, you might want to change the tempo of the background music without altering the voice-over

- If you're trying to modify the speed of some MIDI tracks to match a sampled drum groove, you want to leave the audio unchanged

- If your audio consists solely of sound effects, you most likely do not want to adjust them

Audio can be stretched or condensed up to a factor of 4 (e.g., it can be shrunk to as little as 25 percent of its original length, or expanded to as much as 400 percent of its original length).

You can also use the *Edit-Length* command to alter only the start times or the durations of notes. For example, changing the durations of notes to 50 percent of their original length can create a staccato effect.

To Stretch or Shrink Using Percentages...

1. Select the events you want to change.

2. Choose *Edit-Length* to display the Length dialog box.
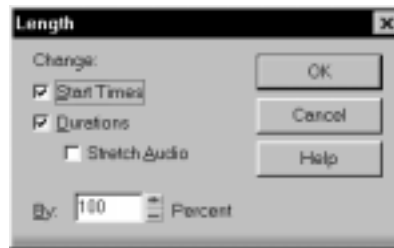
3. Choose to change the Start Times and/or Durations of selected notes by checking the boxes.

4. If you want to stretch selected audio events, check the Stretch Audio box.

5. Use the spinners or type in the desired percent change in length.

6. Click OK when you are done.

Pro Audio modifies the length of selected events.

To Stretch or Shrink to a Specific Length...

1. Select the events you want to change.

2. Choose **Edit-Fit to Time** to display the Fit to Time dialog box.
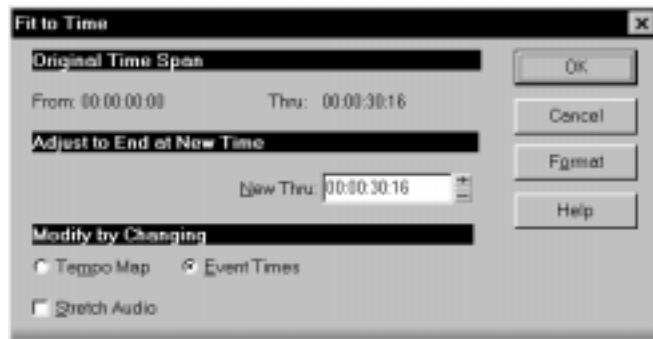
3. Enter the desired end time in the New Thru box. Click Format to switch between MBT and SMPTE format.

4. Choose to change either the underlying tempo map or the actual event times.

5. If you want to stretch selected audio events, check the Stretch Audio box.

6. Click OK when you are done.

Pro Audio modifies the length of selected events or changes the tempo map, as you requested.

Reversing Notes in a Clip

The **Edit-Retrograde** command reverses the order of events in a selection. If one or more clips are selected, then the events within each clip are reversed. If several clips are selected from the same track, then the order of the clips is also reversed. You could use this command, for example, to take a scale or other long run of notes and reverse the order in which they are played. The **Edit-Retrograde** command does not reverse the contents of audio events. It only changes their start times. You can use the **Edit-Audio-Reverse** command to reverse audio events.

To Reverse the Sequence of Notes or Other Events...

1. Select the notes you want to reverse.

2. Choose **Edit-Retrograde**.

Pro Audio reverses the order of the selected events.

Adding Crescendos and Decrescendos

The *Edit-Scale Velocity* command lets you create crescendos and decrescendos on those instruments that respond to MIDI velocity. Most such instruments map changes in velocity to changes in note loudness. Many synthesizer patches alter the timbre of the sound as well, so that higher velocities produce brighter, as well as louder, sounds. Changes in velocity also affect the playback of audio events.

This command lets you set a starting and ending velocity for the entire time range of the selection. Pro Audio scales the velocity of each event to create a smooth linear change in velocity. As an option, you can enter a starting and ending percentage; existing velocity values are modified by the designated percentage.

You can also edit note velocities in the Controllers pane of the Piano Roll view, which lets you draw shapes other than straight line changes. For more information, see "Using the Controllers Pane" on page 6-38.

To Scale Velocities...

1. Select the events whose velocity data you want to change.

2. Choose *Edit-Scale Velocity* to display the Scale Velocity dialog box.

3. Enter the starting and ending velocity values.

4. Check the Percentages box if the values are percentages.

5. Click OK when you are done.

Pro Audio alters the velocity of selected events.

Changing the Timing of a Recording

When you record a performance, there can easily be systematic problems you'd like to correct. For example, the note timing may not have been as accurate as you would like. Or, you may have recorded without using a metronome and strayed from the tempo in one direction or another.

Pro Audio has two types of commands that you can use to modify the timing of a clip. The *Quantize* commands alter the timing of the notes in your recording so that they fit a time grid. The grid can have fixed time intervals or intervals that are based on some existing note pattern. The *Fit to Improvisation* command, on the other hand, sets up a series of tempos that fit the material you have recorded. Here's a summary of when to use each type of command:

Use this command...	To do this...
Quantize	Change the timing of the notes you've recorded to fit with the tempo of a song
Fit to Improvisation	Change the tempos of a song to fit with the performance you've recorded

These two types of commands are discussed in the following sections.

Quantizing

Quantizing is one of the most important editing functions in Pro Audio. You use this feature to correct timing errors you make when recording from a MIDI instrument or to adjust the timing of audio events.

Very few musicians are capable of performing in perfect time. As you play, you are likely to strike some notes slightly before or after the beat or to hold some notes slightly longer than you intended. The *Quantize* commands can help to correct these types of timing mistakes.

Pro Audio has two different quantize commands:

Command...	How it works...
Edit-Quantize	Adjusts the start time and duration of selected notes so that they line up with a fixed size grid
Edit-Groove Quantize	Lays a grid over an existing piece of music (the *groove pattern*), and then adjusts the start time, duration, and velocity of selected notes so that they line up with the grid

These commands have quite a few settings, making them very flexible and powerful. In addition, both of these commands lets you create, save, and re-use presets. This means that once you find the settings you like, you can save them and then apply them to other projects in a consistent way.

Resolution

The **resolution** indicates the spacing of the grid. You can use any value from a whole note down to a thirty-second note triplet. You can also specify resolution in clock ticks. A rule of thumb is to select a resolution that matches the smallest note in the region you are quantizing. If you are quantizing a run of sixteenth notes, use a sixteenth note as the resolution. If you are quantizing a mix of sixteenth and eighth notes, you should still use a sixteenth note. At the default timebase of 120 PPQ, 120 clock ticks is equal to quarter-note resolution.

When you use *Groove Quantize*, Pro Audio creates a grid at the desired resolution on top of the notes in the groove. For example, if the groove contains only quarter notes but you choose sixteenth-note resolution, Pro Audio builds the grid by dividing the space between each quarter note into four equal sections. In places where the groove file contains no notes, Pro Audio builds a fixed grid of the desired resolution.

Offset

Normally, the resolution grid is aligned evenly with the start of measures and beats. As an option, you can shift the grid earlier or later by any desired number of clock ticks. If the resolution is a quarter note and you've set the offset to +3 ticks, then a note that is originally near 1:01:000 would be moved to 1:01:003—three ticks beyond the beat boundary.

Duration

As an option, Pro Audio can adjust the duration of note events so that each note ends one clock tick before the start of the nearest resolution-sized note. This ensures that the notes do not overlap, which can cause problems on some synthesizers. The adjustment may lengthen the duration of some notes and shorten the duration of others.

When you use *Groove Quantize*, the duration adjustment compares the note length to the duration of the sample note in the groove. If no duration information is available, Pro Audio uses the distance to the start of the groove event closest to the end of the note.

Velocity

The velocity adjustment, which is only available with the *Groove Quantize* command, adjusts the note velocity to the velocity of the corresponding notes in the groove.

Strength

The human ear is tuned to the slight "imperfections" we hear from most musicians. If you quantize a song so that all notes are perfectly in position, it may end up sounding mechanical or rigid. To avoid this, Pro Audio lets you adjust the **strength** of the adjustment. A strength of 100

percent indicates that all notes are moved so that they are in perfect time, while a strength of 50 percent means that all notes are moved halfway towards the desired position. This lets you "tighten up" the timing as much as you want, without going too far.

The *Groove Quantize* command also lets you control the strength of duration and velocity adjustments. As you work with this command, you will notice that the note start time has a greater effect than the duration on the rhythmic feel of the track. For this reason, changing the starting times (time strength close to 100 percent) has a more noticeable effect than changing durations (duration strength close to 100 percent). However, there are situations in which you might want to change both to avoid ending up with notes that overlap or with unwanted rests.

Swing

Many songs do not have notes positioned on a perfectly even time grid. For example, songs with a swing feel, though they may be written entirely in eighth notes, are often played more like eighth-note triplets, with the first note extended and the second one shortened. The **swing** option lets you distort the timing grid so each pair of notes is spaced unevenly, giving the quantized material a swing feel.

A swing value of 50 percent (the default) means that the grid points are spaced evenly. A value of 66 percent means that the time between the first and second grid points is twice as long as the time between the second and third points. The figure below illustrates the effect of the swing setting on the timing grid:

Swing = 50%

Swing = 66%

Swing = 33%
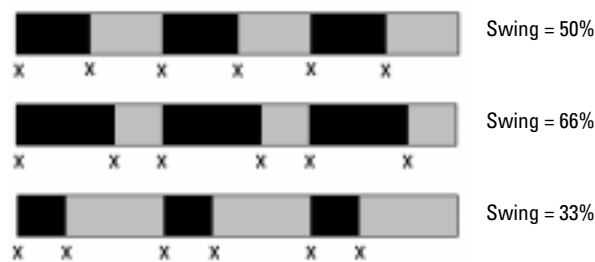
Window

When you quantize some portion of a song, you might not want to adjust notes that are very far from the grid. The **window**, or **sensitivity**, setting lets you choose how close to the resolution grid a note must be located for quantize to move it.

A window of 100 percent includes all notes and guarantees that all notes will be shifted to lie exactly on the grid. The window extends half the resolution distance before and after the quantization point. A window of 50 percent extends only a quarter of the way toward the adjacent quantization points.

When you use **Groove Quantize**, you can also perform adjustments on out-of-window events. There are four options:

Option...	How it works...
Do Not Change	Notes outside the window are not changed.
Quantize to Resolution	Notes outside the window are snapped to a regular grid of the specified resolution.
Move to Nearest	The window or sensitivity setting is ignored—all notes are moved toward the nearest reference event, regardless of how far off the grid they are located.
Scale Time	Pro Audio finds the two closest events before and after the event in question that are within the window sensitivity and adjusts any bracketed out-of-window events so that their relative timing is the same. This option can uniformly speed up, slow down, or shift out-of-window events.

Other Settings

Like many other editing commands, the **Quantize** commands have an option to stretch audio. This option changes the duration of audio events as if they were MIDI notes. If you want, you can also restrict the types of events that are affected by the **Quantize** commands to only notes, lyrics, and audio events. If you choose this option, Pro Audio will not modify other events, like controllers.

To Use the Quantize Command...

1. Select the material you want to quantize using any of the selection tools and commands.

2. Choose **Edit-Quantize** to display the Quantize dialog box.
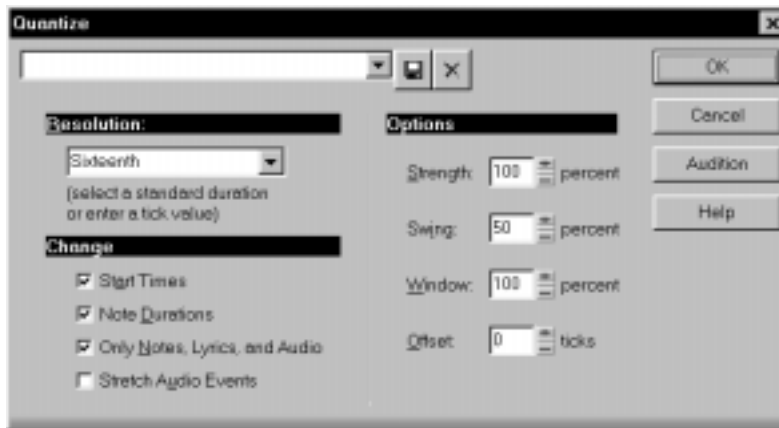
3. Choose one of your own presets from the list, or enter the settings you want according to the table:

Setting...	What to do...
Resolution	Choose a note size or enter the number of clock ticks
Change	Check the event types and characteristics you want to change
Options	Enter values for Strength, Swing, Window, and Offset

4. Click Audition if you want to hear how the quantization will sound; press Stop to stop auditioning the change.

5. Make adjustments as necessary.

6. Click OK when you are done.

Pro Audio quantizes the selected MIDI information and audio events. You can use **Undo** to restore the material to its original state.

Editing Events

To Use the Groove Quantize Command...

1. Select the material you want to quantize using any of the selection tools and commands.

2. Choose **Edit-Groove Quantize** to display the Groove Quantize dialog box.

3. Choose one of your own presets from the list, or enter the settings you want according to the table:

Setting...	What to do...
Groove File	Choose a file containing one or more grooves, or choose to use the Clipboard as the source
Groove Pattern	Choose the pattern you want to use from the groove file
Resolution	Choose a note size or enter the number of clock ticks
Window Sensitivity	Enter the window sensitivity value (percentage)
If Outside Window	Choose what should happen to events outside the window
Only Notes, Lyrics and Audio	Check to prevent MIDI controller, aftertouch, and xRPN data from being adjusted
Stretch Audio	Check to stretch audio clips to adjust their duration

Strength	Use the sliders or enter values for Note strength, Duration strength, and Velocity strength

4.   Click Audition if you want to hear how the quantization will sound; press Stop to stop auditioning the change.

5.   Make adjustments as necessary.

6.   Click OK when you are done.

Pro Audio quantizes the selected MIDI information and audio events. You can use *Undo* to restore the material to its original state.

Defining a Groove

To use the groove quantize feature, you must create or choose a small snippet of music—the groove pattern—for Pro Audio to use as the timing and accent reference. You can use either of the following:

•   A track, clip, or portion of a clip stored on the Windows clipboard

•   A groove stored in a Pro Audio groove file

Any MIDI data that you place onto the Windows clipboard can be used as a groove pattern. With a carefully defined groove pattern, you can give an old song an entirely new feel. If you like the groove pattern you have created, you can save it to a groove file.

Groove files can store one or more groove patterns. Pro Audio supports two types of groove files:

•   DNA™ grooves, which contain only timing information but are compatible with some other MIDI sequencer software products

•   Pro Audio's native groove format, which stores timing, duration, and velocity information and can handle longer patterns and longer gaps between quantization points

You can add groove patterns to these files from the Windows clipboard, edit existing patterns, or delete patterns you do not want to keep. There is no limit to the number of groove patterns that can be stored in a single file. You can organize your grooves into several files or keep them all together in a single file. Groove files have an extension of *.grv*.

A groove pattern can be as short or long as you like. If the groove pattern is shorter than the material to be quantized, the pattern will be repeated as many times as necessary. You can also create a groove template based on an audio clip using the *Edit-Audio-Extract Timing* command.

Editing Events

To Define a New Groove...

1. Select the music that defines the groove using any of the selection tools and commands.

2. Choose **Edit-Copy** to place the music onto the Windows clipboard.

You can now use the **Groove Quantize** command with the clipboard as the "Groove File."

To Save a Groove Pattern...

1. Select the music that defines the groove using any of the selection tools and commands.

2. Choose **Edit-Copy** to place the music onto the Windows clipboard.

3. Choose **Edit-Groove Quantize** to display the Groove Quantize dialog box.

4. Choose the Clipboard as the groove "Groove File."

5. Click the Define button to display the Define Groove dialog box.
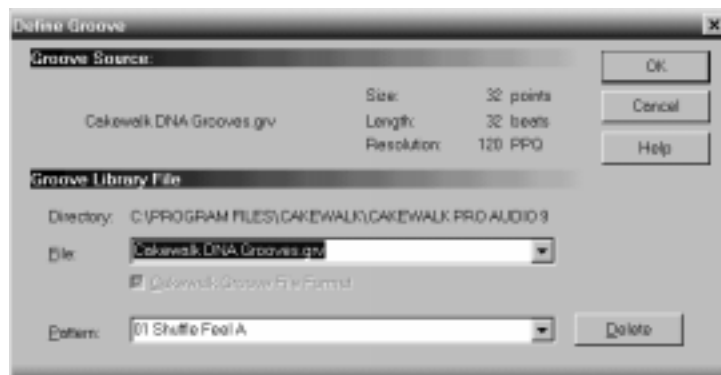
6. Select an existing groove file, or enter the name for a new groove file.

7. Enter a pattern name, or choose an existing pattern to replace.

8. Click OK.

9. If you are replacing a groove, verify that you want to delete the existing version.

10. Click Close when you are done to return to the Groove Quantize dialog box.

Pro Audio stores the groove in the file and chooses the new groove as the current groove source.

To Copy an Existing Groove...

1. Choose **Edit-Groove Quantize** to display the Groove Quantize dialog box.

2. Choose the groove file and groove pattern you want to copy.

3. Click the Define button to display the Define Groove dialog box.

4. Select an existing groove file, or enter the name for a new groove file.

5. Enter a pattern name, or choose an existing pattern to replace.

6. Click OK.

7. If you are replacing a groove, verify that you want to delete the existing version.

8. Click Close when you are done to return to the Groove Quantize dialog box.

Pro Audio stores the groove in the file and chooses the new groove as the current groove source.

To Delete a Groove...

1. Choose **Edit-Groove Quantize** to display the Groove Quantize dialog box.

2. Click the Define button to display the Define Groove dialog box.

3. Select the file containing the groove to delete.

4. Select the pattern name of the groove.

5. Click the Delete button, and confirm that you want to delete the groove pattern.

6. Repeat steps 3 to 5 for each groove you wish to delete.

7. Click Close when you are done to return to the Groove Quantize dialog box.

Groove Quantize Tips

Here are some tips to help you with groove quantizing:

Aligning sloppy tracks with a good one. Select the portion of the "good" track that you want to apply to the "sloppy" tracks and copy it to the Clipboard. Select the portion of the sloppy tracks you want to modify. Choose *Edit-Groove Quantize*, choose the Clipboard as the groove source, and click OK.

Accenting beats in each measure. Create a sample measure containing note events at the desired accent points. Give the notes on the accented beats a greater velocity and the others a lesser velocity. Select the measure, copy it to the Clipboard, and then choose *Edit-Groove Quantize*. Set the velocity strength as high as necessary so that the notes get accented the way you want.

Stealing that feeling. Suppose you have a dry piece that was composed and entered into Pro Audio with a rigid sense of timing (for example, using step recording). You've recorded a bass line that has exactly the off-beat rhythmic dynamic you want for the dry piece. You'd like to force your other tracks to share that feel. Copy the bass track to the Clipboard; from the Groove Quantize dialog box, select the Clipboard as the groove source; choose a resolution value roughly on the order of the duration of the bass notes and a window of 100 percent. Pro Audio aligns the melody note events with the nearest bass notes.

Synchronizing rhythm and solo tracks. If you want to preserve the unique rhythm of each track but want to synchronize them together in time, try a larger resolution value and a smaller window. For example, suppose you have one track with a highly stylized drum beat and another track containing a jazz solo with some very nice runs in it. The drum beats fall primarily on quarter notes, but the solo consists of runs of fast notes that aren't quite sixteenth triplets. Copy the drum track to the Clipboard, and groove quantize using a quarter-note resolution and a window of perhaps 10 percent. Pro Audio aligns the solo notes near the quarter-note drum beats but maintains the feel of the solo during the fast runs of notes in between.

Correcting off-tempo tracks. Suppose you have both rhythm and melody tracks recorded, but the melody was played erratically. First, copy the rhythm track to the Windows clipboard. Then use groove quantize with a whole-note resolution, a window of 25 percent or less, and with the Scale Time option selected. The *Groove Quantize* command will synchronize the melody track with the groove source at roughly measure boundaries, while maintaining the relative timing of the notes in each measure.

Fixing a bad verse. Copy a good verse to the Clipboard. Then change the selected range to cover only the bad verse. Perform a groove quantize using the Clipboard contents as the groove source. The rhythms of the two verses then match.

Working with audio drum loops. Create an audio drum loop. Use *Edit-Audio-Remove Silence* to isolate each beat into its own unique event, and use *Audio-Extract Timing* to create a MIDI groove. Groove quantize the new "exploded" drum loop.

Fit Improvisation

Pro Audio lets you record music from a MIDI controller without requiring that you use a fixed tempo. In fact, if you record without using a metronome, you are very likely to end up with a recording that does not fit onto a fixed tempo grid.

The *Edit-Fit Improvisation* command lets you take a recording like this one and create a tempo map (with measure and beat boundaries) that fits what you played. Your performance is not changed in any way, even though the note start times and durations are adjusted to fit the new tempo map. This is important if you later want to use any of Pro Audio's editing features that depend on a proper tempo map for best results.

To use this command, you must record a reference track containing a single clip that matches your original track or tracks but has only a single note on each beat boundary. You should make sure that the reference track has one event for every single beat, with no extra beats or missing beats. The first beat of the reference track should be at 1:01:000. You can use any editing command to adjust the reference track.

If you want, you can use other types of events as markers on the reference track, such as a sustain pedal. Remember, however, that MIDI sustain pedals generate one event when the pedal is pressed and another when it is released. So if you want to use the sustain pedal for the reference track, keep this in mind. Click down, up, down, up, for one, two, three, four.

Remember that the better the quality of your reference track, the better job the *Fit Improvisation* command can do. You want each of your reference track events to be as close as possible to the beat of the music. Note that some keyboards transmit aftertouch events when you record your reference track. These extra events will prevent *Edit-Fit Improvisation* from working properly. Therefore, you should delete these events before using this command, or filter them out when recording the reference track (using *Options-Global-MIDI*).

To Fit Tempos to an Improvisation...

1.   Record the reference track.

2.   Select the reference track.

3.   If necessary, combine all clips in the reference track into a single clip.

4.   Choose *Edit-Fit Improvisation*.

Pro Audio adds tempo changes as necessary to fit the tempo grid to the reference track. When you're done, you should mute the reference track, since the reference track events are not rescaled.

Note:
If the resulting tempo grid exceeds 250 beats per minute, you will see an error message. If this happens, you can shorten the start times of each event using the *Edit-Length* command, decrease the tempo to compensate for the change, and then try again.

Searching for Events

The events in a project have many different parameters. For example, all MIDI notes have a channel, starting time, pitch, velocity, and duration. Controllers have a controller number and value. Pro Audio makes it simple to find, select, and modify events that have certain values for specific attributes.

Here are some of the things you can do and the commands that you would use to do them:

Action...	Command...
Search through a song to find the first event that has specific attributes, and then search again to find the next such event	*Go-Search*, *Go-Search Next*
Select all the events in a song that have the specified attributes	*Edit-Select by Filter*
Modify an existing selection to keep only those events that have the specified attributes	*Edit-Select by Filter*
Replace all events that meet specified attributes with modified versions of the events	*Edit-Interpolate*

These capabilities can help you find problem spots or errors in a project or make systematic changes to events that have particular attributes. All of these capabilities rely on the use of an **event filter**, which lets you choose the types of events you want to work with and the range of values in which you are interested.

Event Filters

When you select individual clips, or select portions of clips by dragging the time ruler, you automatically select all the events that fall within the designated time range. Sometimes you need finer control over which events are selected. For example, you might want to:

- Select the notes that are played in a certain octave, so you can copy them to another track

- Select and boost the velocity of notes that have a velocity below a certain threshold

- Find the first patch change event on a particular track

- Select and change the duration of all notes that occur on the third beat of any measure

The Event Filter dialog box looks like this:

Check to include this type of event   Enter the range of values for the events you want
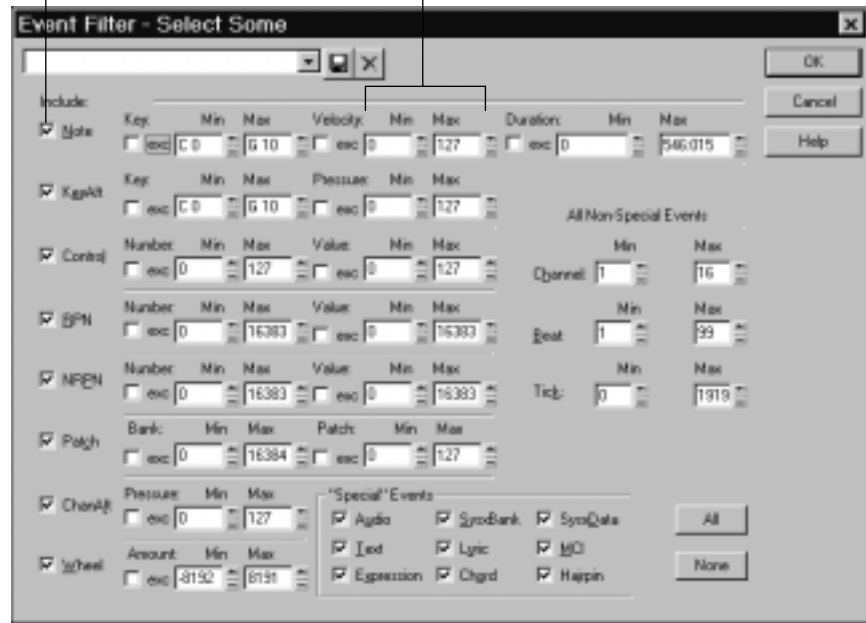
Different types of events have different parameters, as shown in the table:

This event type...	Has these parameters...
Note	Pitch, velocity, and duration
Key Aftertouch	Pitch and pressure value
Controller	Controller number and value
xRPN	xRPN number and value
Patch Change	Bank and patch numbers
Channel Aftertouch	Pressure value
Pitch Wheel	Value

The event filter only accepts events that meet all the specified ranges. This means that a note event must fall within the pitch range, the velocity range, and the duration range in order to be included. The event filter can also be used to accept events that occur in a range of channel numbers, beats, and clock ticks.

You can choose either to *include* or *exclude* the events that meet the specified criteria. To exclude events within the designated range and select the ones outside the designated range, check the **exc** checkbox for that value range.

The event filter can also be used to identify several special event types: audio, System Exclusive events, Lyrics, MCI commands, and a few others. You do not enter a range of values for these special events; Pro Audio finds all events of the types you choose.

The All and None buttons help you set up the event filter the way you want:

Click this button...	To do this...
All	Set the event filter to include all events. You can then modify the value ranges to narrow down your search or uncheck the types of events you want to exclude.
None	Set the event filter to *not* include any events. Starting from a blank slate, you can check off the types of events you want to find or select and enter the desired ranges of values.

In any place in the event filter where you would normally enter a pitch string, you can also enter the pitch by pressing a key on your MIDI keyboard. Also, you can use the question mark in place of the octave number as a wild card. This lets the event filter accept a single note, regardless of the octave. For example, the pitch string C? will match a C in any octave. Use wild card octave numbers only for the minimum range value. The maximum value is not needed, and its value is ignored.

Searching for an Event

The *Go-Search* command is used to find the next event (searching forward from the Now time) that meets the criteria you lay out in an event filter. Once you have found the first such event, you can find the

next event that meets the criteria using the ***Go-Search Again*** command (or by pressing F3).

To Search for an Event...

1. Choose **_Go-Search_** to display the Event Filter dialog box.

2. Set up the event filter to find the events you want.

3. Click OK.

Pro Audio finds the next event that meets the criteria and sets the Now time to the start time of that event. To find the next occurrence, press F3 or choose **Go-Search Again**.

Selecting Events

The ***Edit-Select by Filter*** command is used to refine a selection by applying an event filter to an initial selection. You can use this command any number of times to refine the selection even further. Before using this command, use any of the selection commands and tools to create an initial set of selected event. You can use the ***Edit-Select All*** command to select all events in the current view.

The Track view cannot display individual selected events. As a result, the ***Edit-Select by Filter*** command will not necessarily change the appearance of the Track view. Pro Audio applies the event filter rule, but the change is not visible. However, once you change the selection in any way (for example, by clicking on a track number or by clicking in the time ruler), the effects of the event filter are erased. If you want to use the filter, you must choose ***Edit-Select by Filter*** again and click OK to use the same filter values.

> ### *Note:*
> The shading of a clip in the Track view indicates how many of the events in the clip are selected. If the clip is shown in solid black, all events in the clip are selected. If a portion of a clip is shown in medium gray, all the events in that time range are selected. If the clip is shown in light gray, only some of the events in the shaded time range are selected.

To Select Events Using the Event Filter...

1. First, select an initial set of tracks, clips, or events.

2. Choose **Edit-Select by Filter** to display the Event Filter dialog box.

3. Set up the event filter to find the events you want.

4. Click OK.

Pro Audio searches the currently selected events and weeds out those that do not meet the requirements of the event filter.

Example: Splitting Left-Hand and Right-Hand Parts

Suppose you recorded a keyboard riff on Track 1 but want to split the left and right hands apart into separate tracks so you can edit them separately. Suppose that all the right-hand notes are above C4. Here's how to proceed:

1. Select all of Track 1 by clicking on the track number in the Track view.

2. Choose **Edit-Select by Filter** to display the Event Filter dialog box.

3. Click the None button to clear the dialog box.

4. Check the Note checkbox, and enter a minimum value of C4. The maximum should already be set to C9.

5. Click OK. Pro Audio selects all the notes from C4 up.

6. Choose **Edit-Cut** to move the selected notes to the clipboard.

7. Choose **Edit-Paste** and paste the events to a different track.

Edit-Interpolate

The **Edit-Interpolate** command is an extremely flexible way of manipulating the data parameters of events. It works something like the search-and-replace function in a word processor but with scaling rather than simple replacement.

This command uses two event filters. The first event filter lets you set up your search criteria. The second event filter is used to define the replacement value ranges. When an event satisfies the search criteria, its parameters are scaled between the search ranges and the replacement ranges. This permits transposition, inversion, key

signature changes, and other operations to be accomplished with this one simple command.

In the second Event Filter dialog box, the checkboxes and value ranges for beats and ticks are ignored. Only the replacement value ranges for the selected event types are used.

The *Edit-Interpolate* command understands a wild card octave number in the second event filter to mean, "replace the original note with a different note in the original octave." Using octave wild cards for both the search and replacement event filters lets you, for instance, change all E-flats to E-naturals, preserving the octave of each note.

A few examples will illustrate some of the many uses of the *Edit-Interpolate* command. These examples apply to the note event type, though the command can be used on any type of event.

Parameter...	Search range...	Replacement range...	Effect...
Pitch (key)	From C2 to C4	From C4 to C6	Transposes all notes in the search range up two octaves
Pitch	From E2 to E2	From Eb2 to Eb2	Converts all Es in octave 2 to Eb in the same octave
Pitch	From E? to E?	From Eb? to Eb?	Converts all Es in all octaves to Eb in the same octave
Pitch	From E? to E?	From Eb5 to Eb5	Converts all Es to Eb in octave 5
Pitch	From C1 to C8	From C8 to C1	Inverts all the notes in the specified range
Velocity	From 0 to 127	From 80 to 127	Compresses the velocity values into a narrower range
Velocity	From 0 to 127	From 127 to 0	Inverts the velocity values (makes loud notes soft, and soft notes loud)

Duration	From 0:01:00 to 0:02:000	From 0:01:000 to 0:01:000	Converts all notes that are between a quarter note and half note in length, and makes them all quarter notes
Channel	From 1 to 1	From 2 to 2	Changes all events on MIDI channel 1 to MIDI channel 2
Channel	From 1 to 16	From 4 to 4	Reassigns all events to MIDI channel 4

Controllers, RPNs, NRPNs, and Automation Data

Pro Audio projects contain a lot more information than the notes and digital audio files that are at the heart of your work. Controllers, RPNs, and NRPNs (xRPNs, for short) are special types of events used by MIDI software and hardware to control the details of how MIDI music is played. Automation data are used to adjust volume, pan, and other parameters of MIDI and audio tracks on the fly while playback is in progress.

Pro Audio lets you enter or edit controller, xRPN, and automation data in several ways:

- Using the Controllers pane in the Piano Roll view

- Using the *Insert-Series of Controllers* command

- Using the automation features of the Console view and StudioWare panels

- Event by event in the Event List view

Editing these data in the Controllers pane gives you the most flexibility. You can examine the controllers in graphical form and edit them even while recording or playback is in progress. This means you can loop over a portion of your project and hear any change you make on the next loop.

For more information on automation, see Chapter 9, *Mixing and Effects Patching*, and Chapter 11, *Working with StudioWare*. For more information about the Event List view, see the next section of this chapter, "The Event List View" on page 6-43.

Controllers

Controllers are the pedals, knobs, and wheels on your electronic instrument that you use to change the sound while you're playing. For example, a sustain pedal and a modulation wheel are two controllers commonly found on keyboards.

Controllers let you control the detail and character of your music. Say you're playing a guitar sound on your synthesizer, but it sounds lifeless and dull. That's partly because a guitar player doesn't just play notes one after another—he often bends or slides on the strings to put emotion into his playing. You can use controllers in the same way, creating bends, volume swells, and other effects that make sounds more realistic and more fun to listen to.

Your computer can work the controllers on your electronic instrument by sending MIDI Controller messages. The MIDI specification allows for 128 different types of controllers, many of which are used for standard purposes. For example, controller 7 is normally used for volume events, and controller 10 is normally used for pan. Every controller can take on a value ranging from 0 to 127.

The Piano Roll toolbar contains several drop-down lists that let you choose the controller you want to see and edit. The contents of these lists depend on the port and channel settings and on the instrument assigned to that port and channel. Different instruments use controllers in different ways. Pro Audio lets you use instrument definitions to define the names that go with each controller number. For more information on instrument definitions, see Chapter 10, *Using Instrument Definitions*.

Note:

Pro Audio has automatic searchback for all continuous controller data to ensure that the correct controller values are in effect regardless of where you start playback. Suppose you start playback halfway through a song. Pro Audio searches back from that point to find any earlier controller values that should still apply.

RPNs and NRPNs

RPNs (Registered Parameter Numbers) and NRPNs (Non-Registered Parameter Numbers) are similar to controllers, except that both the parameter number and data value can be any number between 0 and 16,383.

When RPNs and NRPNs are transmitted via MIDI or stored in a standard MIDI file, they are converted into four separate controller messages. Pro Audio detects incoming xRPN messages from MIDI inputs or files and reassembles them into a single RPN or NRPN event. This provides the convenience of single RPN or NRPN events in Pro Audio plus compatibility with existing files, equipment, and software. The following table shows the controller numbers Pro Audio uses for RPN and NRPN events:

Message...	Parameter number MSB Controller...	Parameter number LSB Controller...	Data value MSB Controller...	Data value LSB Controller...
RPN	101	100	6	38
NRPN	99	98	6	38

Automation Data

Both the Console view and the StudioWare view allow you to record automation data that define changes in volume and pan throughout a project. The automation data can include step changes recorded using the snapshot button or continuous changes recorded while using the knobs, faders, and buttons.

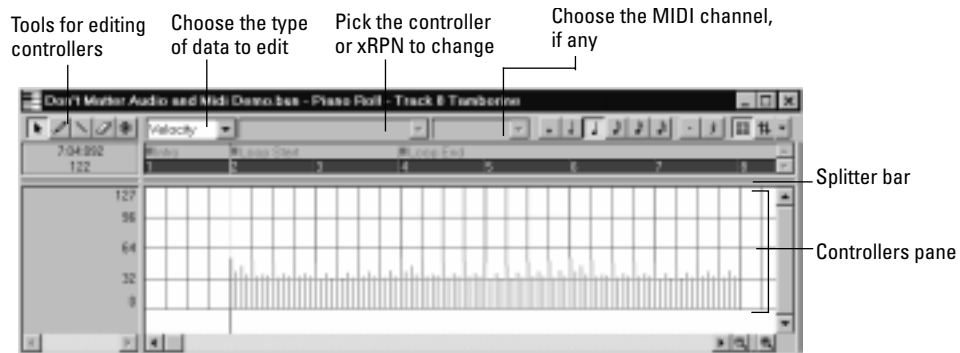### Velocity, Pitch Wheel, and Aftertouch

Pro Audio lets you display and edit several other types of data the same way you do controller data. These data include:

- MIDI note velocities

- MIDI pitch wheel or pitch-bend messages

- MIDI channel aftertouch (ChanAft) values

- MIDI key aftertouch (KeyAft) values

Remember that note velocity is an attribute of each note and not a completely separate event. You cannot add or remove velocity events in the Controllers pane, but you can use the line and draw tools to adjust the velocity values for existing notes. You can also edit velocities with the *Edit-Scale Velocities* command. For more information, see "Adding Crescendos and Decrescendos" on page 6-16. You can edit individual note velocities in the Note Properties dialog box, described in "Changing Note Properties" on page 8-12.

Using the Controllers Pane

The Controllers pane is the most powerful and flexible way to edit controller, RPN, NRPN, automation, velocity, pitch wheel, and aftertouch data. The Controllers pane is the lower half of the Piano Roll view.

Tools for editing controllers — Choose the type of data to edit — Pick the controller or xRPN to change — Choose the MIDI channel, if any

Splitter bar

Controllers pane

The Controllers pane looks like a graph; the horizontal axis represents time, and the vertical axis represents the event values. Each event appears as a single vertical line, and the height of this line shows the value of the event. The Controllers pane shows events for all the clips in a track or multiple tracks. You can only see one type of controller at a time, and you must select All Channels from the Channel drop-down list to view more than a single MIDI channel. The exception is velocity data, which are not channel specific. You can zoom in and out on the Controllers pane using the zoom and unzoom buttons on the toolbar. To zoom all the way in or out in a single step, hold the Shift key while you click on the tool.

Selection methods in the Controllers pane are similar to those in other views. Here is a summary:

- Click on a controller to select it

- Shift-click to add other controllers to the selection

- Ctrl-click to toggle the selection state of a controller

- Drag a rectangle around several controllers to select them

- Click and drag in the time ruler to select all controllers in a time range

- Click between two markers to select the controllers that lie between the markers

The Controllers pane has several tools you can use to add or modify events. The following tools apply only to the track that is selected in the Track List pane:

Tool...	Name...	What it's for...
![Select tool icon]	Select	Select controller events, so you can delete them
![Line tool icon]	Line	Draw a straight line indicating a steady increase or decrease in controller value
![Draw tool icon]	Draw	Draw a custom curve indicating changes in controller value. Draw a straight line by holding down the Shift key while using the Draw tool.
![Erase tool icon]	Erase	Erase controller changes already in place

Note that you can also add controllers using the **_Insert-Series of Controllers_** command. If you make a mistake using any of these tools or commands, you can use **_Undo_** to correct the error.

When you use the Draw tool, the speed with which you drag the mouse determines the density of controller events. To insert a larger number of controller events with relatively small changes in value, move the mouse slowly. To insert a smaller number of controller events with relatively large changes in value, drag the mouse quickly.

Creating a change that sounds smooth does not always require making the value change by one on each tick. Bigger jumps may sound very gradual if the tempo is fast. Also, many devices round off the controller values. For example, many instruments respond to volume controller values of 100 and 101 with exactly the same loudness. Using too high a density of controller events can backfire by making the computer work so hard during playback that it is unable to keep up. This will usually cause hiccups or poor timing during playback.

Note:

Pro Audio includes a CAL program (THIN CONTROLLER DATA.CAL) you can use to reduce the density of controller events in a track.

To Display Controller, RPN, NRPN, Velocity, Pitch-Bend, or Aftertouch Data...

1. Select the track whose controller or xRPN data you want to see by clicking on the track number in the Track view.

2. Choose **View-Piano Roll** to display the Piano Roll view.

3. Drag the horizontal splitter bar so that the Controllers pane is visible.

4. Choose the data you want to see according to the table:

To see this...	Do this...
Controller data	Choose Control from the first drop-down list in the toolbar, and then choose the controller and channel from the second and third drop-down lists
RPN or NRPN data	Choose RPN or NRPN from the first drop-down list in the toolbar, choose which RPN or NRPN you want from the second drop-down list, and choose the channel from the third drop-down list
Velocity data	Choose Velocity from the first drop-down list
Pitch-bend data	Choose Wheel from the first drop-down list, and the MIDI channel from the third drop-down list
Aftertouch data	Choose ChanAft from the first drop-down list, and the MIDI channel from the third drop-down list

Pro Audio displays the data in the controllers pane.

To Display Automation Data...

1. In the Console view, right-click a control to display the pop-up menu.

2. Choose **Edit Automation Data**.

Pro Audio opens a new Controllers pane and configures it to display automation data for the control.

To Insert a Controller Value...

1. Choose the data type, controller or xRPN number, and channel (if applicable) from the lists in the toolbar.

2. Select the ![tool] tool or the ![tool] tool.

3. Click in the Controllers pane view at any desired time point and value.

Pro Audio adds a controller at the indicated point.

To Draw a Linear Series of Controllers...

1. Choose the data type, controller or xRPN number, and channel (if applicable) from the lists in the toolbar.

2. Select the ![tool] tool.

3. Drag a line in the Controllers pane from the starting time and value to the ending time and value.

Pro Audio adds a series of controllers and erases any existing controller values in the same time interval.

To Draw a Series of Controller Value Changes...

1. Choose the data type, controller or xRPN number, and channel (if applicable) from the lists in the toolbar.

2. Select the ![tool] tool.

3. Drag the cursor across the Controllers pane, adjusting the value as you move left to right.
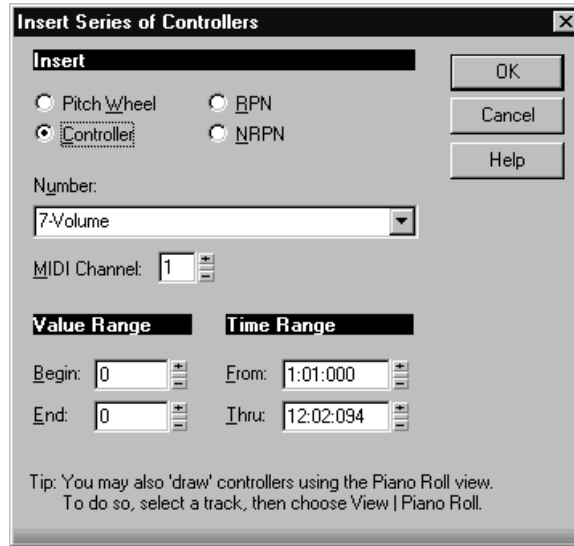
Pro Audio adds a series of controllers and erases any existing controller values in the same time interval.

Tip:
When using the ![tool] tool, you can press and hold the Shift key to draw a straight line.

To Insert a Series of Controllers...

1. Choose *Insert-Series of Controllers* to display the Insert Series of Controllers dialog box.

2. Choose the controller type from the Insert list.

3. Choose the controller number or type from the Number list.

4. Use the spinners or enter the desired MIDI channel.

5. Enter a starting and ending value in the Begin and End boxes.

6. Enter a starting and ending time in the From and Thru boxes.

7. Click OK when you are done.

Pro Audio inserts a series of controller events with values that change smoothly over time from the starting to the ending value indicated in the dialog box. This command never inserts more than one event on the same clock tick. If any controllers of the type you have selected already exist in the time region, Pro Audio deletes these before inserting the new ones.

To Remove or Erase Controllers...

1. Choose the data type, controller or xRPN number, and channel (if applicable) from the lists in the toolbar.

2. Select the 🖊 tool.

3. Drag the mouse over the desired region to highlight the region you want to erase.

4. Release the mouse button when you have highlighted the desired region.

Pro Audio deletes all controllers of the selected type. (Note that you cannot delete velocity events in the Controllers pane. You must delete the notes that have those velocities.)

The Event List View

The Event List view shows events in a list format. You can insert, delete, or modify any kind of event, including notes, pitch-wheel data, velocity, MIDI controllers, patch changes, wave files, lyrics, text strings, MCI commands, System Exclusive meta-events, and more.

There are three ways to open the Event List view:

•   Select one or more tracks and choose *View-Event List*

•   Select one or more tracks and click ▦ in the Views toolbar

•   Right-click a track in the Track view and choose *Event List* from the pop-up menu
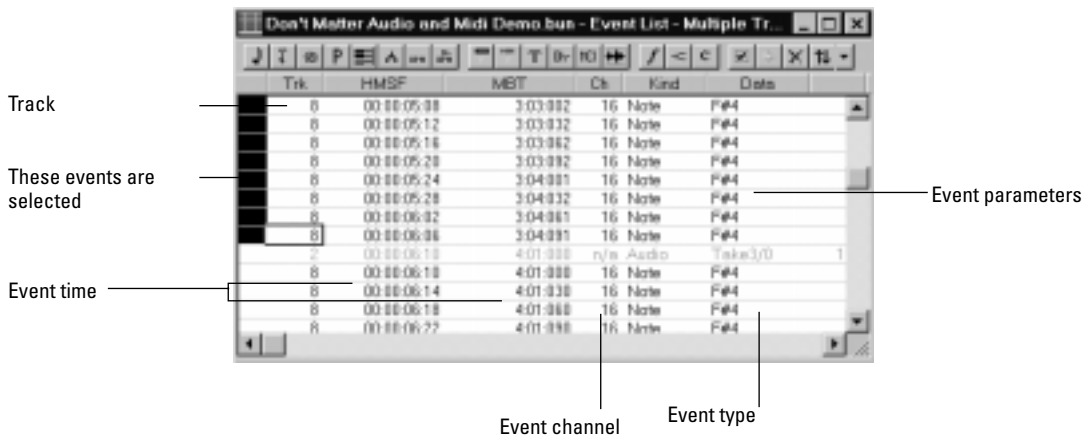
The events in the selected tracks are listed one per line, from top to bottom. As you move the highlight through the event list, Pro Audio updates the Now marker (time display). During playback, the event list scrolls to display the events at the current time. The current event is centered in the Event List during playback, and the highlight is on the

correct event when playback stops. Any time you change the Now time, the event list is updated and the highlight is moved to the event that will be played next.

When the Event List view includes more than one track, events are mixed together in chronological order. For example, if you select tracks 1 and 3 when you open the Event List view, you see a single list of intermingled events from tracks 1 and 3. You can have any number of Event List views, each containing any number of tracks, open at the same time. You can change the tracks shown in the Event List view by clicking the ▦ ▾ button and choosing the tracks you want.

Event List Overview

Each line of the Event List view shows a single event along with all of its parameters. There are many different types of events. All share the following parameters:

• The time of the event, displayed in SMPTE (hours:minutes:seconds:frames) format

• The time of the event, displayed in MBT (measures:beats:ticks) format

• The event type, or **kind** of event

The remaining parameters vary by event type. Here is a summary listing of the parameters that apply to each type of event.

Short name...	Type of event...	Parameters...
Note	MIDI note	Pitch (MIDI key number), velocity (0-127), duration (beats:ticks or simply ticks), MIDI channel (1-16)
KeyAft	MIDI key aftertouch	Pitch (MIDI key number), pressure amount (0-127), MIDI channel (1-16)
Control	MIDI controller change	Controller number (0-127), controller value (0-127), MIDI channel (1-16)
Patch	MIDI patch change	Bank select method, bank number, number or name of the patch, MIDI channel (1-16)
ChanAft	MIDI channel aftertouch	Pressure amount (0-127), MIDI channel (1-16)
Wheel	MIDI pitch wheel position	Wheel position (-8192 to 8191, where the center is 0)

RPN	Registered Parameter Number	Parameter number (0-16383), parameter value (0-16383), MIDI channel (1-16)
NRPN	Non-registered Parameter Number	Parameter number (0-16383), parameter value (0-16383), MIDI channel (1-16)
Sysx Bank	System Exclusive data bank	Sysx bank number (0-255)
Sysx Data	System Exclusive data message	Sysx message up to 255 bytes long
Text	Text	Text
Lyric	Lyric	Text (a single word or syllable)
MCIcmd	Windows Media Control Interface (MCI) command	MCI command text
Wave Audio	Digital audio wave	Name, velocity (0-127), and number of samples
Expression	Staff view expression marking	Text of expression mark
Hairpin	Staff view dynamics marking	Direction (crescendo or diminuendo) and duration
Chord	Staff view chord symbol	The name of the chord

Here are some notes about events and their parameters:

- The Channel parameter in the Track view can force an event to play on a different MIDI channel than the one shown in the event list.

- Pedal marks entered in the Staff view are displayed in the Event List view as controller events (64).

- Many keyboards do not support key aftertouch and channel aftertouch. Consult the *User's Guide* for your keyboard for more information.

- When you double-click the value of a patch event, Pro Audio displays the Bank/Patch Change dialog box. For more information about bank and patch changes, "To Insert a Bank/Patch Change…" on page 3-22.

- See Chapter 14, *Using System Exclusive Data*, for more information about System Exclusive banks.

- See Chapter 7, *Editing Audio*, for more information about audio events.

Additional information about note events and MCIcmd events appears later in this chapter.

Event List Display Filter

You can configure the Event List view to display different event types, as described in the following table:

To do this...	Do this...
Display events of a certain type	Select the event type in the toolbar, in the Event List view pop-up menu, or in the Event Manager.
Open the Event Manager	Choose **Event Manager** from the pop-up menu, or click ⊡.

Editing Events and Event Parameters

The Event List view lets you add, delete, or change events one by one. You can also print the list of events or audition the events one at a time to see how they sound.

You can change the parameters of any event by moving the rectangular highlight to the cell you want to change and doing one of the following:

- Type a new value and then press Enter

- Press the - and + keys on the numeric keypad to decrease or increase values by a small amount

- Press the [and] keys to decrease or increase values by a larger amount

- Click and hold the mouse button, and then drag the mouse up or down to change the value by a small amount

- Click and hold both mouse buttons, and then drag the mouse up or down to change the value by a larger amount

- Double-click a cell, and then enter or choose a new value

If you change the time of an event, it may also change its position in the event list. The Event List view follows that event to its new location.

If you try to change the event type (kind of event), Pro Audio lets you choose the kind of event you want from a dialog box. When you change one kind of MIDI event into another kind of MIDI event, Pro Audio preserves the parameters as fully as possible.

To Insert a New Event...

1. Move the highlight to the point at which you want to insert an event.

2. Press Insert, or click [ ]. Pro Audio makes a copy of the highlighted event.

3. Edit the event kind as necessary.

4. Edit the event time and other parameter values as required.

If the Event List is initially empty, pressing the Insert key creates a default note event.

To Delete an Event...

1. Move the highlight to the event you want to delete.

2. Press Delete, or click [ ].

Pro Audio deletes the event.

To Delete Several Events...

1. Select the events you want to delete by clicking in the first column of the Event List view.

2. Choose *Edit-Cut*.

Pro Audio deletes the selected events.

To Print the Event List...

1. Choose *File-Print Preview* to display a preview of the printed event listing.

2. Click the Zoom button (or just click the page) to zoom in and out, and use the Page Up and Page Down keys to review the pages.

3. Click Print to print the event list, or click Close to close the Preview window without printing.

To Play Events Step by Step...

1. Using the keyboard, hold the Shift key and press the space bar to play the currently highlighted event. If the event is a note event, it plays until you release the space bar.

2. When you release the space bar, the highlight moves to the next event.

3. Continue pressing the space bar to play events one by one.

4. To edit the last event you heard, release the Shift key.

The highlight moves back to the last event you heard, so you can make changes. You can also audition a single event using the mouse. Ctrl-click on an event to play the event. If the event is a note or wave event, it plays until you release the mouse button.

Additional Event Information

Note Events

There are three values parameters for note events:

*   A pitch, which represents the MIDI key number as a note and an octave. Pitch may also be indicated by a note name, if there is an assigned instrument definition that uses a note name list.

*   A velocity (0–127), which is how fast the key is struck. Some keyboards don't transmit or receive velocity messages.

*   A duration, which is how long the note lasts. This amount is shown in beats:ticks format. (If the note lasts less then one beat, then only the number of ticks is shown.)

Note names may also represent percussion instruments, and lists of such note names are sometimes associated with a particular percussion patch. The note C3, for example, may really be "kick drum." If a patch is associated with a percussion note name list, the name of the percussion instrument appears in Event List view rather than a note and an octave from the piano keyboard.

Pro Audio uses the following notation to display flats and sharps in this and other views:

Character...	Meaning...
b	flat
#	sharp

Character...	Meaning...
"	double flat
x	double sharp

MCIcmd Events

Media Control Interface (MCI) commands are special events that let you control other multimedia hardware and software (e.g., CD-ROM drives, laserdiscs, sound cards, animations, video) during playback. MCI commands are part of the multimedia extensions in Windows. MCIcmd events have one parameter—the command line text of the MCI command. Here are some examples:

This command...	Does this...
PLAY C:\TRAIN.WAV	Plays the wave file TRAIN.WAV
PLAY D:\VIDEOS\VACATION.AVI	Plays the video file VACATION.AVI from the VIDEOS folder
SET CDAUDIO TIME FORMAT TMSF PLAY CDAUDIO 3	Plays a specific track from the CD drive
STOP CDAUDIO	Stops the CD from playing

While MCI commands can be used to play wave files, these files are played at their normal speed and are not necessarily synchronized with MIDI or other audio data. By contrast, wave audio events are played in lock-step synchronization with MIDI and other audio data.

For complete documentation of Windows MCI commands, search for MCI on the Microsoft World Wide Web site (www.microsoft.com).

MIDI Effects

Pro Audio provides the ability to use plug-in MIDI effects. Using plug-in effects is similar to using the MIDI processing commands described earlier in the chapter. The overall procedure is as follows:

• Select the MIDI data to be affected.

• Choose the effect you want from the **Edit-MIDI Effects** menu or from the pop-up menu's **MIDI Effects** menu.

- Set effect parameters (or select a preset if you've made one for this purpose).

- Click Audition to preview the music with the effect applied.

- Click OK to apply the effect to the selected MIDI data.

If you're not happy with the result, choose ***Edit-Undo*** before doing any additional work.

MIDI effects can be applied to whole or partial clips. For example, you can apply an echo to just one note.

MIDI effects can also be applied to MIDI tracks in real time (during playback) in the Console view. Unlike any of the processing described so far, using effects in real time is nondestructive. This means that the MIDI data itself is not modified. See "Mixing and Effects Patching" on page 9-1 for more information on real-time effects.

Note:

Offline effects may cause your MIDI events to grow in size. For example, when you apply echo, the clip may need to grow to accommodate the tail end of the echo.

Presets

The MIDI effects dialog boxes support the use of presets. Presets are a way to store dialog box settings so that you can apply the exact same processing or effect again in the future. The following table tells you how to use presets:

To do this...	Do this...
Save the current settings as a preset	Enter a preset name and click the Save button
Use a preset	Select the preset from the dropdown list
Delete a preset	Select the preset, then click the Delete button

Quantizing

The *Quantize* command moves events to (or towards) an evenly-spaced timing grid. The Quantize effect is similar to the *Edit-Quantize* command. For more information, see "Quantizing" on page 6-17.

The quantize effect parameters are as follows:

Parameter/Option...	Meaning...
Start Times	Quantize event start times.
Durations	Quantize event durations.
Resolution	The spacing of the grid used for quantization.
Tuplet	Specify the resolution as a tuplet note, for example 5 notes in the time of 4.
Strength (%)	The strength of the adjustments. 100% indicates perfect quantization; otherwise, the command moves the notes only part way towards the desired position.
Swing (%)	The distortion of timing used to produce a swing feel. A value of 50% indicates a straight rendition; negative and positive values produce distortion of the timing grid.For more information about swing, see "Swing" on page 6-19.
Window (%)	The sensitivity of quantization. A value of 100% causes all notes to be quantized. Lower values cause the effect not to quantize notes that are far from the timing grid.
Offset (Ticks)	The offset of the quantization grid from the start of measure boundaries. A value of 0 indicates perfect alignment. Values less than 0 shift the grid points earlier; values greater than 0 shift the grid later.
Randomize	Causes a random time offset to be added to or subtracted from each new event time. You must also specify the maximum offset, as a percentage of the quantization resolution.

To Quantize MIDI Data...

1. Select the data to be affected.

2. Choose **MIDI Effects-Quantize** from the **Edit** menu or from the pop-up menu to open the Quantize dialog box.

3. Set the quantization parameters, as described in the table above.

4. Click OK.

Pro Audio applies the specified quantization to the selected data.

Adding Echo/Delay

The **Echo Delay** command creates a series of repeating echoes of each note. The echo notes can decrease or increase in velocity, and can be transposed from the original by regular intervals.

The parameters used to specify the echo/delay effect are as follows:

Parameter/Option...	Meaning...
Decay (%)	The reduction in velocity with each echo. A value greater than 100% indicates an increase in velocity.
No. Echoes	The number of echo notes for each original note. If the velocity reaches 0 before the specified number of echoes, the effect generates no more echo notes.
Delay	The delay between successive echo notes.
Delay Units	The units used to specify the delay. You may specify delay in ticks, in milliseconds, or as a note duration.
Tap	The delay you specify by tapping the control with the mouse.
Swing (%)	The distortion of timing used to produce a swing feel to the echo. A value of 0% indicates a straight rendition; negative and positive values produce distortion of the timing grid. For more information about swing, see "Swing" on page 6-19.
Transpose (Steps)	The number of steps to transpose each echo note from the previous. You can specify a Diatonic or Chromatic scale.

To Apply Echo/Delay to MIDI Data...

1.   Select the data to be affected.

2.   Choose **MIDI Effects-Echo Delay** from the **Edit** menu or from the
      pop-up menu to open the Echo Delay dialog box.

3.   Set the echo/delay parameters, as described in the table above.

4.   Click OK.

Pro Audio applies the specified echo effect to the selected data.

Filtering Events

The **Event Filter** command lets you remove events from the MIDI data,
keeping or passing through only those events that you specify. The Event
Filter effect works almost identically to the event filter used by the **Edit-
Select by Filter** command. For more information, see "Event Filters" on
page 6-29.

To Apply an Event Filter to MIDI Data...

1.   Select the data to be affected.

2.   Choose **MIDI Effects-Event Filter** from the **Edit** menu or from the
      pop-up menu to open the Event Filter dialog box.

3.   Set the event filter parameters.

4.   Click OK.

Pro Audio applies the specified event filter to the selected data,
removing all those events that do not meet the filter criteria.

Adding Arpeggio

The **Arpeggiator** command applies an arpeggio to its input and plays it
back in real time. You can make it arpeggiate with a swing feel, or
straight and staccato or legato, vary its speed and direction, and specify
its range.

The parameters used to specify the arpeggiator effect are as follows:

Parameter/Option...	Meaning...
Swing (%)	The distortion of timing used to produce a swing feel. A value of 0% indicates a straight rendition; negative and positive values produce distortion of the timing grid. For more information about swing, see "Swing" on page 6-19.
Rate	The delay between successive notes.
Units	The units used to specify the delay. You may specify delay in ticks, in milliseconds, or as a note duration.
Legato (%)	The smoothness of the notes of the arpeggio. 1 percent plays each notes and releases it instantly. 99 percent plays each note up to the start of the next note.
Path	The direction of the arpeggio. Options are *Up, Up* (arpeggios go up), *Up, Down* (arpeggios go up, then down), *Down, Down* (arpeggios go down), *Down, Up* (arpeggios go down, then up).
Play thru	The disposition of the notes you play to specify the arpeggio. Checked plays the original notes. Unchecked filters out the original notes.
Specify output range	The range over which the arpeggio plays. Checked specifies that the arpeggiator repeats notes at each octave over the entire specified range. Unchecked specifies that the arpeggiator includes only the notes you actually play.
Lowest note	The MIDI number of the lowest note of the arpeggio. Numbers run from 0 to 127.
Span (Notes)	The number of half-steps in the range. Numbers run from 12 to 127.
Use chord control	The chord you specify. Checked specifies that the arpeggiator infers the chord from the notes played in the range. It identifies the chord in the Chord recognized box and uses it to play arpeggios for notes outside the range.
Lowest note	The MIDI number of the lowest note the arpeggiator is to use for chord recognition. Numbers run from 0 to 126.
Span (Notes)	The number of half-steps in the range. Numbers run from 1 to 127.
Chord recognized	The chord the Arpeggiator recognizes and plays.

To Apply the Arpeggiator to MIDI Data...

1. Select the data to be affected.

2. Choose **MIDI Effects-Arpeggiator** from the **Edit** menu or from the pop-up menu to open the Echo Delay dialog box.

3. Set the arpeggiator parameters, as described in the table above.

4. Click OK.

Pro Audio applies the specified arpeggio effect to the selected data.

Analyzing Chords

The **Chord Analyzer** command analyzes chords. You select the notes to be analyzed in one of Cakewalk's windows, then open the Chord analyzer and press the Audition button. The chord appears on the MIDI display and the staff, and its name with possible alternatives appears in the Chords recognized box.

You can play the notes on your MIDI input device and have the Chord Analyzer identify the chords in real time. You do not have to set to playback.

You can open the Chord Analyzer in the console, press Playback and have the Chord Analyzer identify the chords in real time

The Chord Analyzer has a single parameter:

Parameter/Option...	Meaning...
Examine every x (MIDI ticks)	The frequency with which the Chord Analyzer samples the chord. Lower numbers (smaller intervals) are more accurate, but require more computation.

To Analyze a Chord...

1. Select the notes to be analyzed.

2. Choose **MIDI Effects-Chord Analyzer** from the **Edit** menu or from the pop-up menu to open the Transpose dialog box.

3. Click the Audition key.

Pro Audio displays the chord and its name.

To clear the display, press the Clear button.

Changing Velocities

The *Velocity* command lets you adjust velocities of MIDI notes. You can set velocity values, set scale values, add specific or random offsets, create smooth transitions, and limit the velocity range.

The velocity effect options are as follows:

Parameter/Option...	Meaning...
Set all velocities to X	Sets all velocities to the specified value.
Change velocities by X	Adds a specified increment to all velocities.
Scale velocities to X% of their current value	Multiplies all velocities by a constant factor.
Change gradually from X to Y	Creates a smooth velocity change across the selection.
Change gradually from X% to Y%	Scales velocities by a gradually changing factor.
Limit range from X to Y	Brings all velocities into the specified range.
Randomize by +/- X	Adds or subtracts a random offset from each velocity. You must also specify the maximum offset. You can select this option in addition to one of the previous options.
Tendency	The tendency of the random offset to be lower or higher, on a scale from -10 to 10.

To Change Note Velocities...

1. Select the data to be affected.

2. Choose *MIDI Effects-Velocity* from the *Edit* menu or from the pop-up menu to open the Velocity dialog box.

3. Select options as described in the table above.

4. Click OK.

Pro Audio changes note velocities according to the specified options.

Transposing MIDI Notes

The *Edit-MIDI Effects-Cakewalk FX-Transpose* command is a flexible transposition feature. You can perform simple chromatic or diatonic transpositions, transpose from one key to another, or define your own custom transposition.

The transpose options are as follows:

Parameter/Option...	Meaning...
Interval	Specifies chromatic transposition Transposes notes by the specified number of steps.
Diatonic	Specifies diatonic transposition. Transposes notes by the specified number of scale steps within the specified scale.
Key/Scale	Specifies transposition from one scale and key to another.
Custom Map	Specifies custom transposition as defined by the map.
Offset	For Interval transposition, the number of steps for the transposition.
	For Diatonic Transposition, the number of scale degrees for the transposition.
	For Key/Scale transposition, a number of octaves added to each note after transposition.
Key	For Diatonic transposition, the key in which the transposition is made.
From, To	For Key/Scale transposition, the starting and ending key and scale.
Transposition Map	A table of pitch mappings for the specified transposition. You can select to show the pitches as note names or as note numbers. For Diatonic and Key/Scale transpositions, pitches not in the starting (from) key are indented.
	To Change a pitch mapping, click on a From pitch and select a To pitch with the pop-up slider. If you change a pitch mapping, the transposition type is automatically set to Custom Map.
Constrain to Scale	For Diatonic and Key/Scale transpositions, forces all non-scale notes to be transposed to the nearest appropriate scale tone.

To Transpose MIDI Data...

1. Select the data to be affected.

2. Choose **MIDI Effects-Cakewalk FX-Transpose** from the **Edit**
    menu or from the pop-up menu to open the Transpose dialog
    box.

3. Set the transposition options as described in the table above.

4. Click OK.

Pro Audio transposes the selected data according to the options you
specified.

7

Editing Audio

The Audio view lets you edit and arrange audio events. You can perform basic tasks such as cut, copy, paste, and move; apply simple audio processing such as volume change, fades, and equalization; and use sophisticated audio effects such as stereo chorus and reverb. The Audio view lets you see your audio events on a timeline, arranged by track, to help you visualize the organization of your project's audio data.

The Audio view is similar in appearance to the Clips pane of the Track view, and many of the same selection and editing techniques apply. An important difference is that the Track view shows audio clips, which may contain one or more events, while the Audio view shows each event individually.

Most of the audio processing commands and audio effects described in this chapter can be used from the Track and Event List views as well, by selecting one or more audio clips or events, then choosing the desired command from the ***Edit-Audio*** or ***Edit-Audio Effects*** menu. Plug-in effects can also be applied to audio data nondestructively, in real time, in the Console view. For more information, see Chapter 9, *Mixing and Effects Patching*.

In This Chapter

Editing Audio

Digital Audio Fundamentals

Digital audio is a numeric representation of sound; it is sound stored as numbers. In order to understand what the numbers mean, you need to start with the basic principles of **acoustics**, the science of sound.

Basic Acoustics

Sound is produced when molecules in the air are disturbed by some type of motion produced by a vibrating object. This object, which might be a guitar string, human vocal cord, or a garbage can, is set into motion because energy is applied to it. The guitar string is struck by a pick or finger, while the garbage can is hit perhaps by a hammer, but the basic result is the same: they both begin to vibrate. The rate and amount of vibration is critical to our perception of the sound. If it is not fast enough or strong enough, we won't hear it. But if the vibration occurs at least twenty times a second and the molecules in the air are moved enough, then we will hear sound.

Example—A Guitar String

To understand the process better, let's take a closer look at a guitar string.

When a finger picks a guitar string, the entire string starts to move back and forth at a certain rate. This rate is called the **frequency** of the vibration. Because a single back and forth motion is called a **cycle**, we use a measure of frequency called **cycles per second**, or **cps**. This measure is also known as **Hertz**, abbreviated **Hz**. Often the frequency of vibration of an object is very fast, so we can also express the frequency in thousands of cycles per second, or **kilohertz** (abbreviated **kHz**).
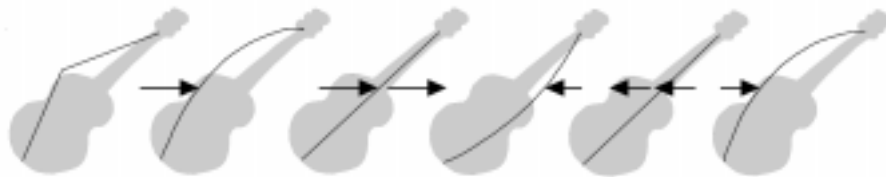
The actual distance the string moves is called its **displacement**. This is proportional to how hard the string is plucked. A greater displacement

results in a louder sound. The displacement of the string changes as the string vibrates, as shown here:
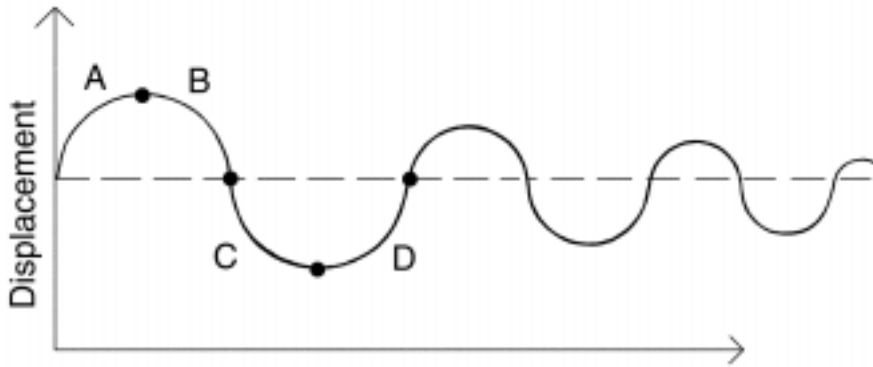

The segment marked "A" represents the string as it is pulled back by the pick; "B" shows it moving back towards its resting point, "C" represents the string moving through the resting point and onward to its outer limit; then "D" has it moving back towards the point of rest. This pattern repeats continuously until the friction of the molecules in the air gradually slows the string to a stop. As the string vibrates, it causes the molecules of air around it to vibrate as well. The vibrations are passed along through the air as **sound waves**. When the vibrations enter your ear, they make your eardrum vibrate, and you hear a sound. Likewise, if the vibrating air hits a microphone, it causes the microphone to vibrate and send out electrical signals.

In order for us humans to hear the sound, the frequency of the vibration must be at least 20 Hz. The highest frequency sound we can hear is theoretically 20 kHz, but, in reality, it's probably closer to 15 or 17 kHz. Other animals, and microphones, have different hearing ranges.

If the simple back-and-forth motion of the string was the only phenomenon involved in creating a sound, then all stringed instruments would probably sound much the same. We know this is not true, of course; the laws of physics are not quite so simple. In fact, the string vibrates not only at its entire length, but at one-half its length, one-third, one-fourth, one-fifth, and so on. These additional vibrations (**overtones**) occur at a rate faster than the rate of the original vibration (the **fundamental frequency**), but are usually weaker in strength. Our ear doesn't hear each frequency of vibration individually, however. If it if did, we would hear a multinote chord every time a single string were

played. Rather, all these vibrations are added together to form a complex or composite sound that our ear perceives as a single tone.

Fundamental
frequency (1f)
100% amplitude

2x fundamental
(2f)

3x fundamental
(3f)

4x fundamental
(4f)

5x fundamental
(5f)
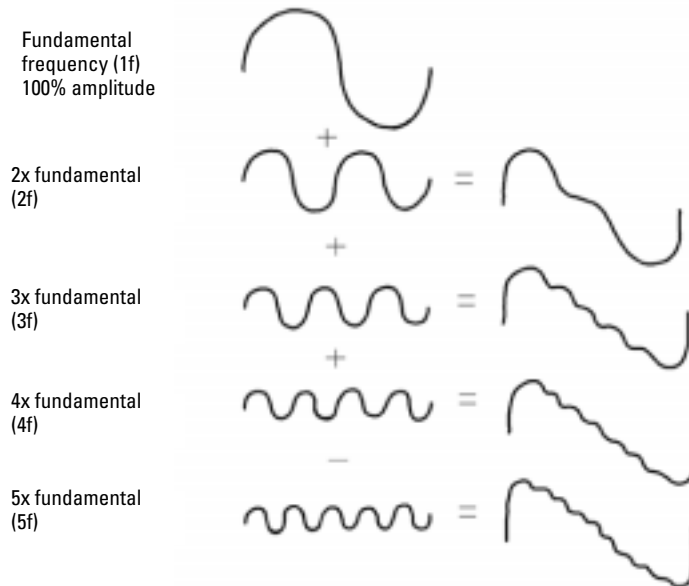
This composite waveform still doesn't account for the uniqueness of the sound of different instruments. For example, stringed instruments usually have a resonator. In the case of the guitar, the resonator is the big block of hollow wood to which the string is attached (the guitar body). This has a major impact on the sound we perceive when a guitar is played because it enhances or amplifies some of the vibrations produced by the string and diminishes or attenuates others. The ultimate effect of all the vibrations occurring simultaneously, being altered by the resonator, adds up to the sound we know as guitar.

Waveforms

A sound wave can be represented in many different ways: as a mathematical formula, as a series of numbers, or graphically as a **waveform**. A waveform displays the size, or **amplitude**, of the

vibration as a function of time. For example, the waveform of the sound of the plucked guitar string might look like this:
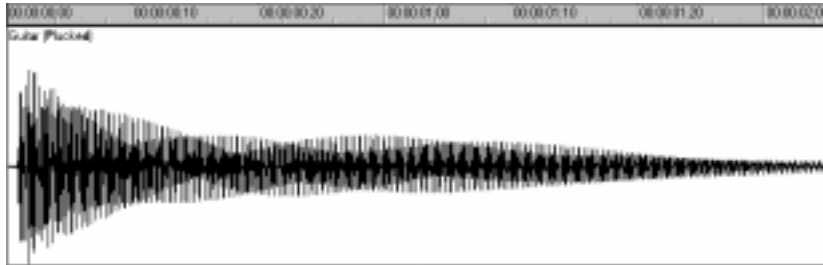
The waveform of a trumpet blast might look like this:
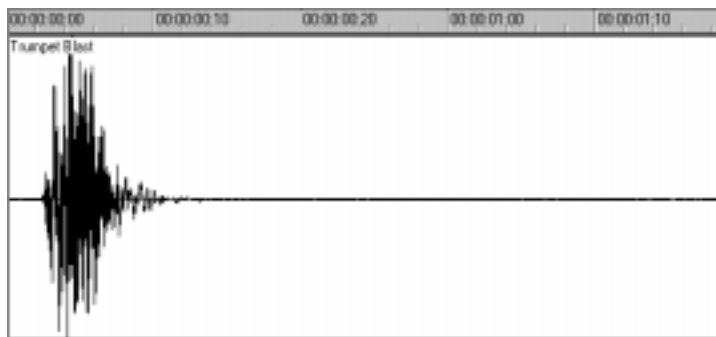
And the waveform of a spoken word might look like this:
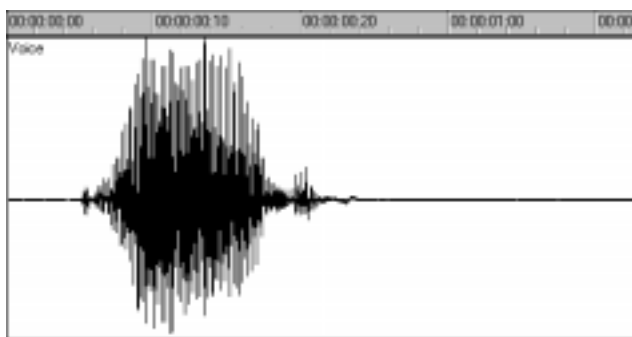
The three waveforms shown above are quite different from one another, both in appearance and sound. Each has its own characteristic shape, or

envelope, and each has its own complex combination of frequency components, which can change across the duration of the sound.

The center line of a waveform is the zero line; it corresponds to the rest position (displacement of 0) of the original vibrating object. (A waveform for perfect silence would be a horizontal line at zero.) Back and forth motions of the vibrating object translate to upward (positive) and downward (negative) excursions of waveform amplitude. For example, a close-up of a portion of the guitar waveform might look like this:
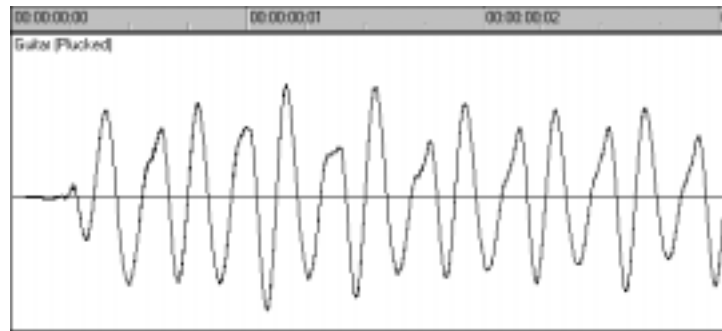
The waveform crosses the zero line twice during each complete vibration. These **zero-crossings** are important in digital audio processing; they are good places to cut waveforms apart and splice them together. If waveforms are cut or spliced at other locations, clicks and pops can occur. The maximum amplitude of the waveform in each vibration is also important: it determines the strength of the vibration, and thus the loudness of the sound.

Recording a Sound

To record digital audio, your computer monitors the electrical signal generated by a microphone (or some other electroacoustical device). Because the signal is caused by a sound, the signal strength varies in direct proportion to the sound's waveform. The computer measures and saves the strength of the electrical signal from the microphone, thus recording the waveform.

There are two important aspects of this measuring process. First is the **sampling rate**, the rate at which the computer saves measurements of the signal strength. It is a known fact of physics that you must measure, or **sample**, the signal at a rate at least twice that of the highest frequency you wish to capture. For example, suppose you want to record a moderately high note on a violin—say the A whose fundamental frequency is 440 Hz and all overtones up to five times the fundamental. The highest frequency you want to capture is 2,200 Hz, so you need to

measure the electrical signal from the microphone at least 4,400 times per second.

Since humans can hear frequencies well above 10 kHz, most sound cards and digital recording systems are capable of sampling at much higher rates than that. Typical sampling rates used by modern musicians and audio engineers are 22 kHz, 44.1 kHz, and 48 kHz. The 44.1 kHz rate is called **CD-quality**, since it is the rate used by audio compact discs.

The other important aspect of the measuring process is the **sampling resolution**. The sampling resolution determines how accurately the amplitude of each sample is measured. At present, the music industry has settled on a system that provides 65,536 different values to assign to the amplitude of a waveform at any given instant. Thus, each sample saved by your computer requires 2 bytes (16 bits) to store, since it takes 2 bytes to store a number from –32,768 to 32,767. The scaling of the electrical input signal level to amplitude value is determined by your audio hardware and by the position of your input level control.

What if the amplitude of the sampled signal gets too high, such that a 16-bit number is not large enough to represent it? What typically happens is that the signal is **clipped**, cut off at the maximum value.

Here is what a clipped waveform might look like:
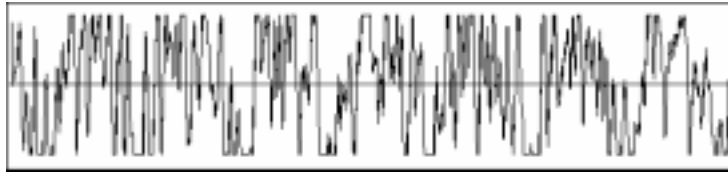
Clipping is not usually desirable and may have unpleasant audible effects. Sudden irregularities in the waveform of any type can cause clicks, pops, and distortion of the original sound.

The Decibel Scale

In acoustics, the decibel (dB) scale is a scale for measuring the relative loudness of two sounds. For example, environmental noise is often measured as follows:

$$L = 20 \log (p/p_0)$$

where L is the sound pressure level (in dB), p is the sound pressure amplitude, and p_0 is a reference amplitude of 20 micropascals (less than one billionth of atmospheric pressure). On this scale, a barely audible sound ($p = p_0$) has a sound pressure level of 0 dB, normal conversation ($p = 1,000*p_0$) is at a level of around 60 dB, and a jet engine at close range ($p = 1,000,000*p_0$) is at a level of around 120 dB.

Similar decibel scales are used in other branches of science and engineering to measure electrical power levels and other signal levels, always with respect to some reference level.

In Pro Audio, decibels are used in several places:

- To scale the amplitude of the waveform (*3dB Louder* and *3dB Quieter* commands)

- To indicate volume levels of audio tracks in the Console view

- To indicate the effects of filters and equalizers

The reference level (0 dB) usually corresponds to the current loudness of the sound. A positive change in decibels makes the sound louder; a negative change makes the sound quieter.

Audio Events

If you have read from the beginning of the chapter, you should have a good idea of what is contained in a Pro Audio audio event. An audio event contains a long series of numbers, or samples, representing the fluctuating amplitude of a waveform. Audio events are typically quite large, hundreds of kilobytes to many megabytes in size. By comparison, a MIDI event takes only a few bytes to store.

The Audio view lets you see your audio waveforms in great detail; you can zoom in until you see the individual samples. To change the display, right-click the track number to the far left in the Audio view. Pro Audio can display the amplitude of the waveform as a percentage in the range −100% to +100%, as dB, or as actual sample values.

You should also now be aware of some things to watch out for when editing your audio data. First, if you cut audio events apart or splice them together, you should do so at zero-crossings in the waveform, in order to avoid sudden changes in amplitude that may cause clicks and pops. Second, you should beware of clipping. Clipping of the audio

waveform can occur if you record a signal at too high a record level, or if you apply audio processing or effects that increase the waveform amplitude too much. If you accidentally cause the waveform to clip, you should undo the command and try again with different parameters.

Clipping can also occur in other situations, for example, if you try to play or mix several loud audio tracks together, the aggregate signal strength may at times exceed the clipping limit, and the output signal will be distorted. To correct the problem, you can reduce the velocity parameter of loud audio events or reduce the track volume in the Console view.

Managing Audio Data

Because of the great size of audio events, Pro Audio uses an intelligent scheme for storing audio events on disk to conserve disk space and minimize the time it takes to load and save data. Audio data is not stored directly in your project file, but rather in separate files in a special directory. For more information, see "Digital Audio Data Management" on page 13-5.

You can also export your project's MIDI and audio data in RealAudio format; see "Mixing Down and Distributing Audio" on page 9-29 for more information.

The Audio View

The Audio view displays audio events on a timeline, arranged by track.
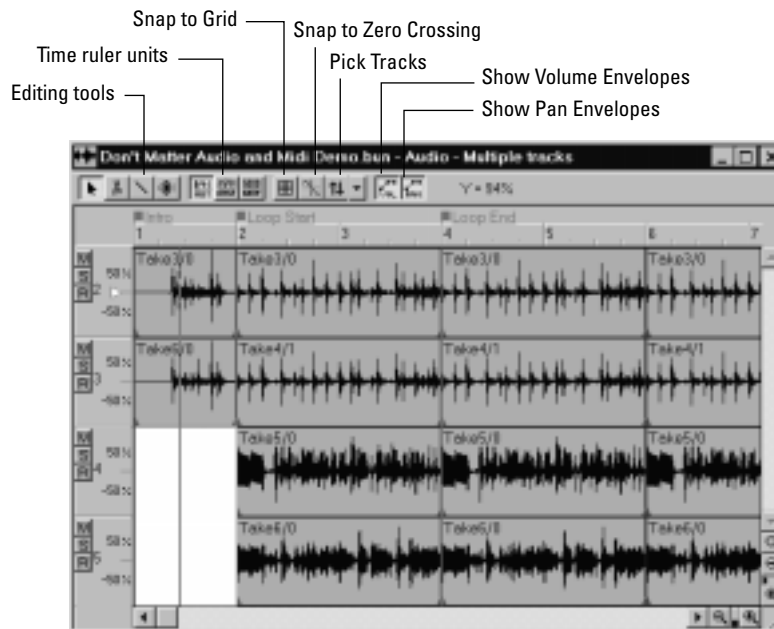
There are five ways to open the Audio view:

- In the Track view, select the tracks you want to see, then click the Audio View button ⊞

- In the Track view, select the tracks you want to see, then choose *View-Audio*

- Right-click an audio clip in the Track view and choose *Audio* from the menu

- Double-click on an audio clip in the Clips pane

- Double-click an audio event in the Event List view

You can always change the tracks that are displayed: click the Pick Tracks button ⇅▾ and select the tracks you want.

The Audio view lets you edit, delete, copy, and move events during playback or recording, in real time. This means you can loop over a portion of your project and hear any change you make on the next loop.

Like many other views, the Audio view includes zoom tools that let you change the vertical and horizontal scale of the view. When multiple tracks are displayed, a white arrow in the track number column indicates which track is centered when zooming vertically. You can use the Page Up and Page Down keys to move this arrow between tracks.

Snap-to Options

The Audio view has two snap-to features. First, like other views, the Audio view has a Snap to Grid button ▦. For more information on this feature, see "Defining and Using the Snap Grid" on page 5-15.

The Audio view also has a Snap to Zero Crossing button ▨. This feature snaps selection times to the nearest zero-point crossing in the audio waveform. By cutting, pasting, and looping audio events at zero crossings, you minimize the audio glitches that occur when a waveform starts or ends, or when one waveform is spliced to another.

The current X and Y coordinates of the mouse pointer are displayed to the right of the tools. The X coordinate is shown in the current ruler units, rounded to the nearest snap unit. The Y coordinate can be a percentage, the current waveform amplitude in dB, or samples.

Ruler Units

Like the rulers in other views, the Audio view ruler can display time in measures, beats, and ticks (MBT) or in hours, minutes, seconds, and frames (SMPTE). The Audio view can also display the ruler in samples, the number of digital audio samples since the beginning of the project, based on the sampling rate of the project's digital audio data.

You can choose the units you want by clicking one of the three Time Ruler Units buttons, or cycle among the three options by double-clicking the time ruler.

Amplitude Units

You can display the waveform amplitude scale, located at the left of each track, in dB, in sample units, or as a percentage ranging from –100% to 100%. To set the scale units, right-click the track number column and choose a unit from the pop-up menu.

Basic Audio Editing

The Audio view lets you perform basic editing tasks such as cut, copy, paste, delete, drag-and-drop, split, and combine. You can apply simple linear fades and swells graphically with the Draw tool, or you can set complex envelopes for volume and pan. The Scrub tool lets you audition portions of audio by dragging the mouse.

Use the Selection tool ⬚ to make selections. Selection methods in the Audio view are similar to those in other views. Here is a summary:

To do this...	Do this...
Select a single event	Click the event
Select several events at once	Drag a rectangle around them
Select part of an event	Press Alt and drag over a portion of one or more events
Add events to the selection	Press Shift and either click the events or drag a rectangle around the events
Add or remove events from the selection	Press Ctrl and either click the events or drag a rectangle around the events
Add or remove events in a track from the selection	Click the track number
Select events in a time range	Drag in the time ruler
Select events between two markers	Click between the markers
Remove all selections	Click in an empty area outside of any event

Editing Event Properties

Audio events have four properties that you can change: a name, a time, an anchor, and a velocity.

The name of an event is used in the Audio view and Event List view. You can assign any name to help you remember the contents of the event.

The time and the anchor determine when the sample is played. The time is the time of the anchor, relative to the start of the project. The anchor is a reference point within the event that you use for aligning the event. By default, the anchor is at the starting point of the event (sample 0), but you can move it anywhere within the event. The anchor time is used as the event time when you move the event (with drag-and-drop, copy/paste, quantize, etc.) and obeys the snap setting. A red triangle along the bottom border of the event indicates the anchor.

The term **velocity** is borrowed from MIDI, where it indicates the speed with which a key was struck, and thus its loudness. Pro Audio assigns a velocity to each audio event as a means of letting you control and adjust its volume. The velocity of an audio event is a number between 0 and

127, with a velocity of 103 corresponding to the natural loudness of the waveform. Higher velocities increase the volume, lower values decrease the volume. The default relationship between velocity and volume (in decibels) is as follows:

dB = 103(Velocity) $\times$ .75

Changing the event velocity does not change the audio waveform data. Rather, Pro Audio uses the velocity as a scaling factor during playback.

To Change an Audio Event's Name...

1. Position the pointer over the left portion of the name (the pointer changes to an I-beam), then click.

2. Type a new name and press Enter. Press Esc if you want to cancel the change.

    OR

1. Right-click the audio event and choose **Event Properties**.
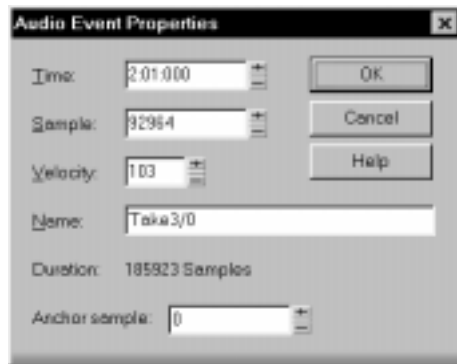
2. Type a new name in the Name box.

3. Click OK.

The Audio view displays the new event name in the upper left corner of the event.

To Change the Velocity of an Event...

1.   Right-click the audio event and choose **Event Properties**.

2.   Enter a new velocity in the Velocity box.

3.   Click OK.

Pro Audio will use the new velocity to determine the audio event volume during playback.

To Change an Event's Time...

1.   Right-click an audio event and choose **Event Properties**.

2.   Enter a new starting time in either the Time box (MBT) or the Sample box (samples since the start of the project).

3.   Click OK.

The Audio view displays the event at the new starting time.

To Move the Anchor...

1.   Click the anchor and drag the mouse right or left

     OR

1.   Right-click an audio event and choose **Event Properties**.

2.   Enter the sample of the anchor in the Anchor Sample box (samples since the start of the audio event).

3.   Click OK.

When you drag the anchor, the event moves and the anchor remains stationary in time. You cannot move the anchor outside of the event, nor can you move the anchor such that the event would start before the start of the project.

Setting Volume and Pan Envelopes

Each audio event can have its own volume and pan envelope. An envelope indicates how the value of a parameter changes over time. For example, you may want the volume of an audio event to rise slowly, reach a plateau, then fade quickly. Or, you may want the pan to swing wildly between right and left. The volume and pan envelopes let you do these things, without changing the sample data.

Audio event envelopes appear non-destructively as a series of line segments indicating the pan or volume value at each point in the event.

To make alignment of envelopes with audio data easier, the envelope is superimposed on the audio event in the Audio view, as shown here:

To set up a volume or pan envelope, you must:

• Create an envelope

• Create intermediate points

• Drag points and line segments to shape the envelope as desired

These operations are described in the following table:

To do this...	Do this...
Create a new envelope	Right-click the event and choose **Envelope-Create Volume** or **Envelope-Create Pan**
Delete an envelope	Right-click the event and choose **Envelope-Delete Volume** or **Envelope-Delete Pan**, or right-click the envelope and choose **Delete Envelope**
Show or hide envelopes	Click Show Volume Envelopes [icon] or Show Pan Envelopes [icon]
Add a new envelope node	Double-click on an envelope line segment, or right-click the envelope and choose **Add Node**

Move an envelope node	Click the point and drag it to a new location. Shift-dragging constrains the move horizontally. Control-dragging constrains it vertically
Move an envelope segment	Click the segment and drag it to a new location
Delete all envelope nodes	Right-click the envelope and choose **Clear All**

Moving, Copying, and Deleting Audio Events

Events can be cut, copied, pasted, and deleted with *Edit* menu commands, or moved and copied with drag-and-drop techniques. These work the same in the Audio view as they do in the Clips pane of the Track view. For more information, see "Arranging Tracks and Clips" on page 5-1 for details.

Splitting Audio Events

You can split long audio events into shorter ones. This lets you extract and rearrange individual sounds, adjust timing and alignment, and apply effects selectively. Audio events can be split with the Scissors tool or with the *Split* command

To Split Events with the Scissors Tool...

1. Click the Scissors tool ✂.

2. Split events according to the table:

To do this...	Do this...
Split an event into two events	Click on the event at the time you want to split it
Split an event at two points at once	Click the event at the first time, then drag a rectangle to the second time

When you use the Scissors, Pro Audio adjusts split times to the nearest snap-to unit.

To Split Events with the Split Command...

1.   Select the events to be split in the Audio view.

2.   Right-click one of the selected events and choose **Split** from the menu.

3.   Enter the split point in the specified units, or press F5 to pick a marker.

Pro Audio splits the audio event at the time you specified. Each new event has the same name and velocity as the original event.

Combining Audio Events

Individual audio events in the same track can be combined into a single event with the **Combine** command.

When you combine events that overlap, you have two choices as to what happens to the overlapping audio:

Option...	Meaning...
Polyphonic	Overlapping events are mixed together
Monophonic	An overlapping event cuts off the one before it

If you combine several events that do not overlap and have identical velocities, the new event has the same velocity as the original events. If you combine events that overlap or that have different velocities, the relative volumes of the events are preserved when they are combined and the new audio event is assigned a velocity of 103 (unity gain.)

Note that the **Combine** command in the Audio view is different from the **Combine** command in the Track view.

Editing Audio

To Combine Events...

1. Select the events to be combined in the Audio view.

2. Choose ***Edit-Audio-Combine***, or right-click one of the events and choose ***Combine*** from the menu.

3. If any of the events overlap, Pro Audio displays the Combine Audio Events dialog box. Select an option and click OK.

The events are combined into a single event. Overlapping events are combined in the manner you specified. Empty space between events is filled with silence in the new event.

Applying Fades with the Draw Tool

A fade is a gradual increase or decrease in volume. An increase in volume is a "fade-in" or "crescendo"; a decrease in volume is a "fade-out" or "decrescendo." In the Audio view, the Draw tool lets you draw a linear envelope around a waveform, in order to apply a fade to an audio event.

You can apply more complex fades and crossfades to audio events with the ***Fade/Envelope*** and ***Crossfade*** commands, respectively. See the "Advanced Audio Processing" on page 7-25 for details. You can also apply fades and crossfades in the Console view. See "Mixing and Effects Patching" on page 9-1.

The following pictures show fade and swell envelopes in the midst of being drawn:
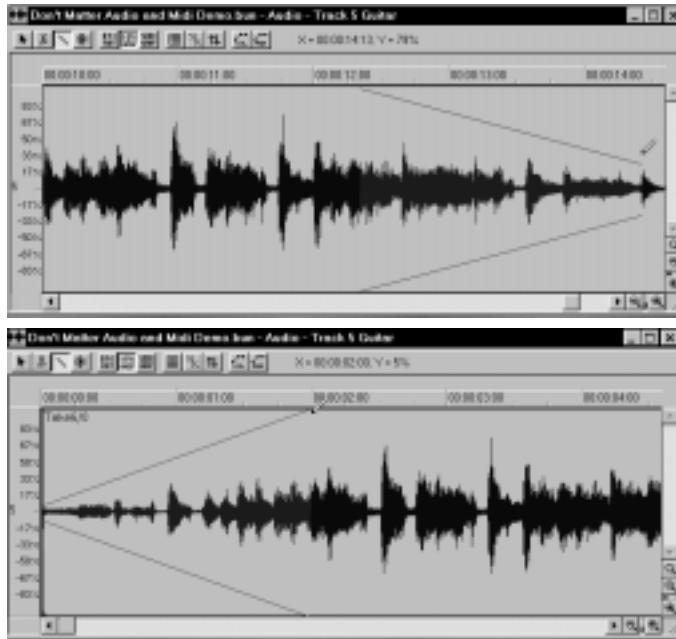
The height of the envelope at each point determines the multiplicative factor that will be applied to the waveform at that point. The zero-crossing line of the waveform corresponds to an envelope height of 0 percent, the maximum amplitude line corresponds to 100 percent. In the first picture, for example, the envelope starts at 100 percent at the left, and fades to 0 percent (silence) at the right. In the second picture, the envelope starts at 0 percent, and swells to 100 percent.

To Apply a Fade or Swell...

1. Click the Draw tool ◥.

2. Click in an event at the starting point of the fade or swell.

3. Drag toward the right to the end of the fade or swell. You'll see two mirror-image horizontal lines that indicate the shape of the envelope.

4. Drag up or down to change the slope of the envelope. The waveform changes to show you the effect of the envelope.

5.   Release the mouse button to apply the envelope.

Press Shift when making your initial click, or while dragging, to snap to the nearest 25% increment. Press Esc while dragging to cancel the operation. You can click on the track number and drag the mouse up or down to change the volume of the entire track.

Tip:
If you drag back over the starting time at a different volume level, the starting volume is changed to the new one.

Scrubbing

You can use the Scrub tool to locate or audition a particular sound or passage as you drag the mouse. You can scrub a single event, or scrub all events displayed in the view.

To Audition Audio with the Scrub Tool...

1.   Click the Scrub tool 🔲.

2.   Click and drag the pointer over audio events.

Tip:
To hear the events in all displayed tracks, drag with the Scrub tool in the horizontal ruler.

Basic Audio Processing

Audio processing commands let you modify audio data according to some rule or algorithm. The rule can be as simple as reversing the audio data or multiplying it by a certain factor, or as complex as performing a Fourier analysis and selectively amplifying or attenuating sounds at certain frequencies. Among the basic audio processing commands are

ones to increase and decrease volume, to reverse the data, and to perform equalization.

Audio processing commands can work on both whole and partial events. For example, suppose you want to make certain words in a vocal passage softer. You can select the portion of the audio event containing those words, then apply the *3db Quieter* command one or more times.

You should listen to the results of your work after each audio processing command. If you don't like what you hear, you can use *Edit-Undo* to restore your audio data to its previous state.

Many of the dialog boxes associated with Pro Audio's audio processing and effects commands have two important features: Audition and Presets.

The Audition button is used to audition the processed audio data. When you click Audition, Pro Audio processes the first few seconds of your data, then plays it repeatedly until you click Stop. This helps you to get an idea of whether the settings in the dialog box are producing the desired effect.

The audition duration is three seconds by default. You can change this value by choosing *Options-Global*, selecting the **General** tab and changing Audition Commands for ( ) Seconds.

Presets are a way to store dialog box settings so that you can apply the exact same processing or effect again in the future. The following table tells you how to use presets in the effects dialog boxes.

To do this...	Do this...
Save the current settings as a preset	Enter a preset name and click the Save button 🖫
Use a preset	Select the preset from the dropdown list
Delete a preset	Select the preset, then click the Delete button ☒

Many audio processing and effects presets are supplied with Pro Audio. For a list, see *Appendix F: Presets*.

Increasing or Decreasing Volume

Pro Audio provides three commands to boost or cut the volume of audio data. The *3dB Louder* and *3dB Quieter* commands are used to increase or decrease the volume by three decibels, respectively. For more information on the decibel scale, see "The Decibel Scale" on page 7-7. You can apply these commands several times in succession to get a larger boost or decrease. The *Normalize* command "normalizes" the audio data: it boosts the volume until the maximum amplitude is reached somewhere in the data. By normalizing the data, you achieve the maximum possible volume without distortion or clipping. In addition, you can use the Draw tool to adjust the volume of all audio events on a track in a single step.

Like all the audio processing commands, these commands work by modifying the waveform data. You can achieve volume changes nondestructively by changing the event velocity or the volume envelope.

When increasing or decreasing the volume of audio events, you should consider the following points:

- *Normalize* and *3dB Louder* raise the noise floor; that is, while they increase the volume of the signal, they also amplify the noise it contains. (This is true when you raise the volume by other means, too.)

- *3dB Louder*, if applied to a signal that is already fairly loud, may cause the waveform to exceed the maximum amplitude and clip.

- *Normalize*, by raising the waveform amplitude to the maximum, puts the signal in danger of being clipped if you subsequently apply a command or effect that boosts the signal slightly. If this occurs, you may have to back up and apply *3dB Quieter* to the normalized signal before the other processing.

- Each application of *3dB Quieter* erodes the signal structure slightly; you cannot repeatedly apply *3dB Quieter*, then use *3dB Louder*. to return to the original waveform.

- Due to the nature and limitations of digital audio, the sum of all audio signals played together (including the effects of event velocity) cannot exceed the waveform amplitude limit. Even though no individual event is clipped, the combination may cause distortion.

If the selection contains any loud signals, *Normalize* may not seem to have any effect. This is because the volume increase is determined by the loudest audio in the selection. If an audio event contains segments

that are too quiet and others that are loud, you should probably split off the quiet segments into separate events and then normalize those.

To Boost Audio Volume by Three Decibels...

1. Select the audio data to be affected.

2. Choose **Edit-Audio-3dB Louder**, or right-click and choose **3dB Louder** from the menu.

Pro Audio increases the volume of the selected audio by 3 dB.

To Decrease Audio Volume by Three Decibels...

1. Select the audio data to be affected.

2. Choose **Edit-Audio-3dB Quieter**, or right-click and choose **3dB Quieter** from the menu.

Pro Audio decreases the volume of the selected audio by 3 dB.

To Normalize Audio Data...

1. Select the audio data to be affected.

2. Choose **Edit-Audio-Normalize**, or right-click and choose **Normalize** from the menu.

Pro Audio increases the volume of the selected audio to the maximum it can reach without clipping.

To Adjust the Volume of Audio Events...

1. Click ◥ to choose the Line tool.

2. Click the track number in the Audio view.

3. Drag the mouse up or down to adjust the volume.

Reversing Audio Data

By reversing audio data, you can make it play backwards. You may wish to do this to obtain unusual sounds for special effects.

The **Reverse** command does not reverse the musical position of audio data. Use the **Edit-Retrograde** command to invert the order of events in time.

To Reverse Audio Data...

1.   Select the audio data to be affected.

2.   Choose **Edit-Audio-Reverse**, or right-click and choose **Reverse** from the menu.

Pro Audio reverses the selected audio data.

Equalizing Audio Data

Equalization lets you boost or decrease the volume of sounds at different frequencies. For example, you can boost the bass, cut high-frequency hiss, or brighten mid-range vocals.

Pro Audio provides a graphic equalizer that lets you boost or decrease the volume of audio events in ten frequency bands. The width of each band doubles as you go from low to high frequencies; thus, the centers of the bands are each an octave apart.

Boosting the audio signal too much may result in clipping or distortion. If this occurs, you may need to undo the command, then decrease the volume one or more times with the **3dB Quieter** command before equalization.

To Equalize Audio Data...

1.   Select the audio data to be modified.

2.   Choose **Edit-Audio-Graphic EQ**, or right-click and choose **Graphic EQ** from the menu, to open the Graphic EQ dialog box.

3.   Choose a preset, or adjust the sliders to the desired equalization.
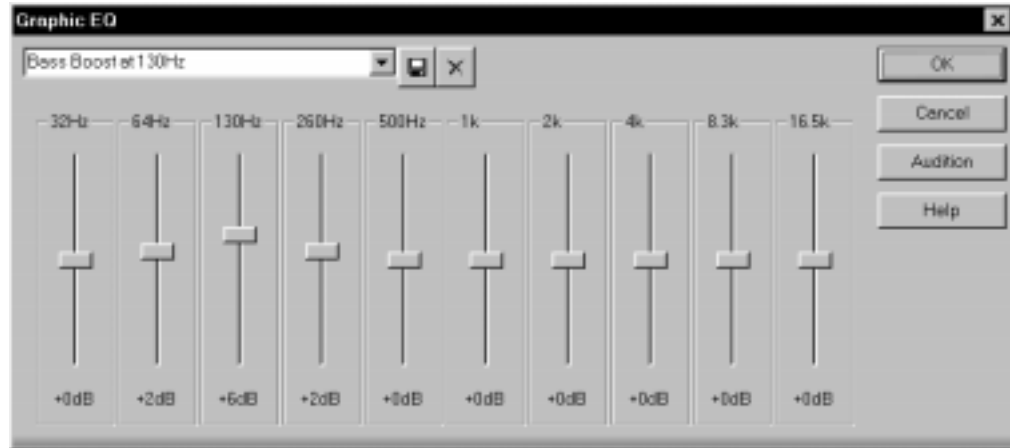
4.   Click Audition to hear a preview of the first three seconds of the selected audio with the equalization applied.

5.   Click OK when the settings are the way you want.

Pro Audio applies the specified equalization to the selected audio.

Advanced Audio Processing

Pro Audio provides a number of advanced audio processing commands for power users. Among these are commands to remove silent sections of audio from the data, to extract timing information, to detect pitch, and to apply parametric equalization, fades/envelopes, and crossfades.

Removing Silence

The *Remove Silence* command detects sections of audio that fall below a given loudness threshold, and replaces those sections with absolute silence. *Remove Silence* gives you the option of actually deleting the silent sections from the selected audio events, splitting long audio events into a greater number of shorter audio events.

Pro Audio treats passages of absolute silence intelligently. It doesn't store stretches of silence on disk, and thereby conserves disk space. During a passage of absolute silence, Pro Audio sends no signal to the digital output port; this results in cleaner audio playback. *Remove Silence* is great for cleaning up your final audio mix, because it can mute all audio tracks in which the live performers were "laying out."

Using **Remove Silence** to split long audio events into smaller ones opens a variety of creative possibilities. For example, suppose you've found an awesome 4-bar drum loop, but it's at the wrong tempo for the song you're working on. With **Remove Silence**, you can separate each beat into its own event, and then rework the loop into your song beat-by-beat.

The parameters in the Remove Silence dialog box are used to specify exactly what you mean by silence. More precisely, **Remove Silence** employs what is called a digital noise gate. The gate is a type of filter, it passes data through, or stops it from passing through, according to certain criteria. Parameters in the dialog box specify the conditions under which the gate is opened and under which it closes again. The digital noise gate parameters are described in the following table.

Parameter...	Meaning...
Open Level (dB)	The loudness threshold for opening the noise gate. The gate officially opens when loudness rises above this level, although it can open earlier because of the Attack Time.
Close Level (dB)	The loudness threshold for closing the noise gate. The gate officially closes when loudness falls below this level, although it can stay open later because of the Release Time.
Attack Time (ms)	The amount of time before the Open Level is reached that the gate actually opens. Opening the gate before the Open Level is reached lets you include the attack part of the sound. This can be very useful for vocals; without an attack time, the beginnings of words might be clipped.
Hold Time (ms)	The minimum time for the gate to stay open. Hold Time is useful when you've set high open and close levels, for example, when your source signal is very loud. Noise gates set this way tend to react to repeated percussive passages (such as drum rolls) by repeatedly opening and closing; this can sound unpleasant. By setting a hold time, you can ensure that the gate stays open long enough during percussive passages.
Release Time (ms)	The amount of time after the Close Level is reached that the gate actually closes. This lets the tail end of sounds pass through without being clipped.

Granularity (ms)	The time increment over which the audio signal is tested for opening or closing the gate. Higher values mean that audio signals must stay loud longer before the gate opens. If the Granularity time is short, then even quick, loud bursts of sound can open the gate.

To Remove Silence...

1. Select the audio data to be affected.

2. Choose **Edit-Audio-Remove Silence**, or right-click and choose **Remove Silence** from the menu, to open the Remove Silence dialog box.

3. Set the digital noise gate parameters as described in the table above.

4. Check the Split Events box to delete the silent sections of audio.

5. Click OK to remove silence from the selected data.

Pro Audio processes the audio as directed.

Extracting Timing

The **Extract Timing** command creates MIDI notes and (optionally) tempo changes based on rhythmic peaks in audio.

The **Extract Timing** command first analyzes the audio for pulses, sudden percussive changes in volume. Then, from each pulse's position and intensity, **Extract Timing** synthesizes new timing information in the form of note events or tempo changes.

This command offers exciting ways to get your MIDI data to groove along with audio rhythm tracks. For example, using **Extract Timing** you can:

- Generate MIDI notes that play along with a rhythm, retaining all the accents in the rhythm track

- Create templates for the **Edit-Groove Quantize** command, so that your MIDI tracks play with the same feel as your audio rhythm track

- Adjust the tempo and feel of an existing sequence to match that of a new rhythm track

- Record a new MIDI sequence on top of an audio rhythm track and let the audio track determine the tempo map for the song

Extract Timing works in two steps: Pulse Analysis and Timing Synthesis. In the first step, the selected audio is scanned for sudden percussive attacks. You must adjust the Pulse Analysis parameters, then click Audition to see the results and decide if the pulses are satisfactory. The Pulse Analysis parameters are as follows:

Parameter/Option...	Meaning...
Trigger Level (dB)	The loudness of audio needed to trigger a new pulse.
Minimum Length (ms)	The minimum allowable amount of time between pulses. If you are working with dynamic source material, and **Extract Timing** seems to generate clusters of pulses that seem incorrect, you should experiment with increasing the value of this parameter.
Find a Steady Rhythm	Tells Pro Audio to look for a steady rhythm among all the pulses it finds. For example, if you're analyzing a drum track that consists of a steady beat on the snare and kick-drum, but which also has some syncopated accents, you can use this option to ignore the syncopation and retain only the backbeat.

In the second step, you set the Timing Synthesis parameters to determine how the pulses are converted to musically meaningful data. The Timing Synthesis parameters are as follows:

Parameter/Option...	Meaning...
Insert Tempo Changes	Tells Pro Audio to insert tempo changes in the appropriate places in your song to ensure that the sequence plays in time with the rhythm track. Remember to also set the Expected Pulse Duration, because it defines the metronome markings for all tempo changes.
Expected Pulse Duration	The musical time value for each pulse that was found. For example, if you're analyzing a drum beat that has steady eighth notes on the high-hat, you should set this value to Eighth for the correct tempo changes to be inserted.
Convert Pulses to MIDI Note	Tells Pro Audio to create a MIDI note event for each pulse that was found. The Note Velocities parameter lets you choose which velocity will be used
Note Velocities	The velocity of generated MIDI notes. You can either select Vary With Pulse Level to adjust velocity to the dynamic structure of the original source material, or select Set All To Same Value to assign each inserted MIDI note a specified velocity.

When using **_Extract Timing_**, keep in mind the following:

- It knows nothing about the musical context of the audio

- It does not know, and cannot figure out, the approximate tempo of the audio, the feel, or the time signature

It only knows how to listen for sudden changes in volume. You must guide it with your own knowledge about the music.

To Extract Timing from Audio Data...

1. Select the audio data to be analyzed.

2. Choose **Edit-Audio-Extract Timing**, or right-click in the Audio view and choose **Extract Timing** from the menu, to open the Extract Timing dialog box.
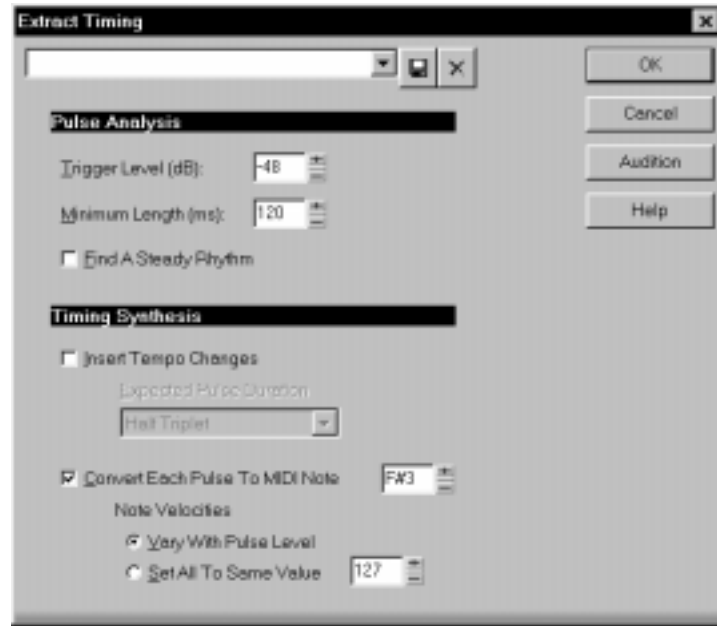
3. Set the Pulse Analysis parameters as described in the table above.

4. Click Audition to get visual feedback in the Audio view, so you can be sure the pulses are aligned to your liking. If not, re-adjust the parameters and try again.

5. Set the Timing Synthesis parameters as described in the table above.

6. Click OK.

The generated events are automatically placed on the Clipboard. You can paste them to a new track, or use them directly in another command (such as **Groove Quantize**).

Here are some examples of ways to use the **Extract Timing** command.

To Generate MIDI Notes that Play Along with an Audio Rhythm Track...

1. Select the audio events containing the rhythm track.

2. Choose **Edit-Audio-Extract Timing** and adjust the pulse analysis parameters.

3. Once you're satisfied with the result, check the Convert Pulses to MIDI box, uncheck the Insert Tempo Changes box, and click OK.

4. Paste the generated events to a new track.

The new MIDI events will play in time with the rhythm. You can convert these notes into, for example, a bass line or a percussion track.

To Create a Template for Groove Quantize from an Audio Rhythm Track...

1. Select the audio events containing the rhythm track.

2. Choose the **Edit-Audio-Extract Timing** and adjust the pulse analysis parameters.

3. Once you're satisfied with the result, check the Convert Pulses to MIDI box, uncheck the Insert Tempo Changes box, and click OK.

The MIDI events on the clipboard can be used as a groove source for the **Groove Quantize** command. For more information about this command, see "Quantizing" on page 6-17.

To Synchronize a Sequence to an Audio Rhythm Track...

1. Select the audio events containing the rhythm track.

2. Choose **Edit-Audio-Extract Timing**, check Find A Steady Rhythm, and adjust your pulse analysis parameters.

3. Uncheck Convert Pulses to MIDI, and check Insert Tempo Changes. Set Expected Pulse Duration to the rhythmic unit of each pulse.

4. Click OK.

The tempo of your song is changed to match the tempo of the audio track.

Detecting Pitch

The *Pitch Detection* command is an audio-to-MIDI converter; it creates MIDI note and pitch-wheel events from audio events. The audio must be *monophonic*; that is, there can only be one sound or instrument playing at a time. Pitch detection does not work well on events containing harmonies or multiple sounds at once, or on spoken words or sung consonants.

You must set a few parameters to assist Pro Audio in detecting pitch and creating appropriate MIDI events. You may need to experiment with these parameters in order to achieve the best possible conversion. The parameters for pitch detection are as follows:

Parameter...	Meaning...
Pitch Range	The range of notes you expect to find in the selected audio material.
Threshold (%)	A percentage value indicating how strongly-pitched each grain of audio must be before it is considered to have pitch. Lowering the threshold will allow less strongly-pitched material to be accepted as notes. For example, if you're converting a fretless bass part to MIDI, you should probably set a very low threshold.
Minimum Duration	How long a pitched segment of audio must be before it will produce a MIDI note. Increasing the duration may help reduce the number of glitches.
Bend Range	How far a note can be bent in semitones. For example, a Bend Range of 1 or 2 might work well for a guitar part with heavy vibrato. The Bend Range value should also match the range set on your synthesizer's pitch wheel.
Bend Spacing	How frequently pitch wheel events may be added, in ticks.
Destination Track	The track on which Pro Audio should place the resulting MIDI events.

To Generate MIDI Notes from Audio Data...

1. Select the audio data to be analyzed.

2. Choose **Edit-Audio-Pitch Detection**, or right-click and choose **Pitch Detection** from the menu, to open the Pitch Detection dialog box.
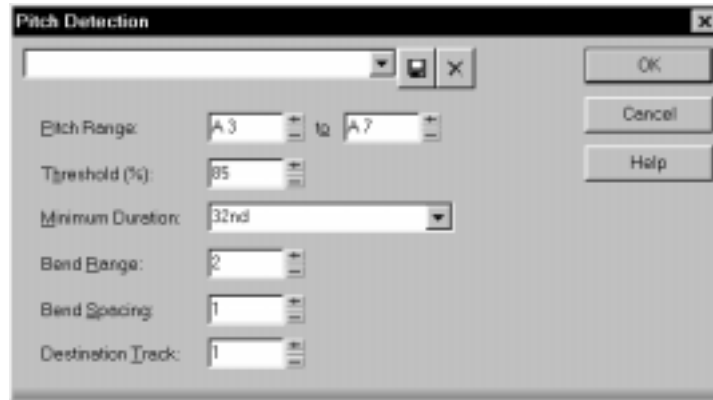
3. Set the Pitch Detection parameters as described in the table above.

4. Click OK.

The generated MIDI events are placed in the destination track you specified.

Parametric Equalization

The **Parametric EQ** command lets you apply a high-pass, low-pass, band-pass, or band-stop filter to your audio data. You must specify the filter type and parameters as follows:

Parameter/Option...	Meaning...
High pass	Removes frequencies that are below the cutoff F1.
Low pass	Removes frequencies that are above the cutoff F1.
Band pass (Peak)	Removes frequencies that lie outside the range F1-F2.
Band stop (Notch)	Removes frequencies that lie within the range F1-F2.
F1 (Hz)	First frequency cutoff.
F2 (Hz)	Second frequency cutoff.

Quality	The sharpness the frequency cutoff, that is, how far outside the cutoff range a frequency must be for its gain to be fully reduced. Higher Quality values are sharper.
Cut (dB)	The maximum amount of gain reduction to apply to stopped frequencies.
Gain (dB)	The overall level for the filtered audio. Setting the gain too high may result in clipping or distortion.

Note:

For band filters, setting F1 and F2 close together may cause distortion or ringing.

To Apply the Parametric Equalizer to Audio Data...

1. Select the audio data to be affected.

2. Choose **Edit-Audio-Parametric EQ**, or right-click and choose **Parametric EQ** from the menu, to open the Parametric EQ dialog box.
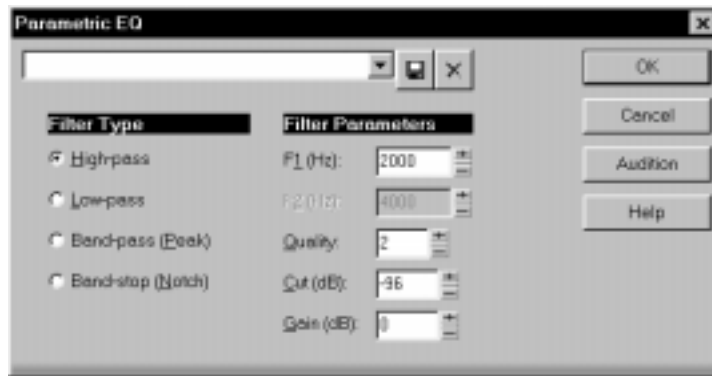
3. Set the filter type and parameters as described in the table above.

4. Click OK.

Pro Audio applies the specified filter to the selected data.

Fades and Crossfades

Pro Audio provides several commands for applying gradual volume changes to audio data. The first command, ***Fade/Envelope***, lets you fade in or fade out, and lets you choose an envelope, a curve that governs the rate of the fade. The starting envelope can be linear (straight line), exponential, or inverse exponential. You can change the shape of the envelope before applying the fade.

The envelope in the Fade/Envelope dialog box is made of one or more connected line segments (the linear curves are a single segment, the exponential curves consist of nine segments each). Although the endpoints of the curve are fixed, you can move the intermediate points, and create new intermediate points, to change the shape of the curve.

To do this...	Do this...
Move a point	Click and drag it to a new location
Insert a new point	Click on the line between existing points
Remove a point	Drag it onto the next point
Restart from the original curve	Click Reset

The second command, ***Crossfade***, lets you create a smooth transition from one audio event to another, by fading two overlapping audio events simultaneously (one fades out, the other fades in). As with ***Fade/Envelope***, you can choose from three different starting curves and change the shape of the curve.

In the Audio view, fades can also be applied graphically with the Draw Line tool. For more information, see "Basic Audio Editing" on page 7-11.

To Apply a Fade to Audio Data...

1. Select the audio data to be affected.

2. Choose ***Edit-Audio-Fade/Envelope***, or right-click in the Audio view and choose ***Fade/Envelope*** from the menu, to open the Fade/Envelope dialog box.

3. Select an envelope from the dropdown list.
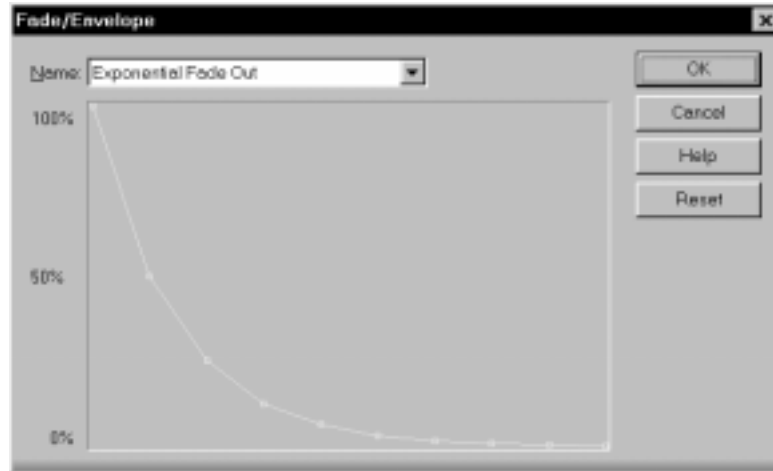
4. If desired, manipulate the curve as described in the table above.

5. Click OK.

Pro Audio applies the fade to the selected audio data.

To Crossfade Two Overlapping Events...

1. Select two overlapping audio events. They need not be on the same track, but they must overlap in time for the command to have any effect.

2. Choose *Edit-Audio-Crossfade*, or right-click and choose *Crossfade* from the menu, to open the Crossfade dialog box.

3. Select an envelope from the dropdown list.
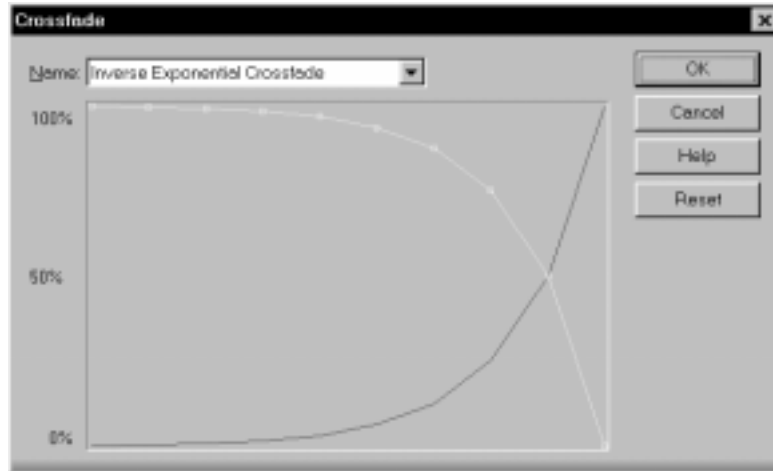
4. If desired, manipulate the curve as described in the table above.
   You can manipulate only the curve pertaining to the first of the
   two overlapping events; the second curve is automatically
   adjusted so that the two curves constantly add up to 100%.

5. Click OK.

Pro Audio applies the two fades to the selected data.

Audio Effects

Pro Audio provides the ability to use plug-in audio effects using
Microsoft's DirectX technology. Some audio plug-in effects are supplied
with Pro Audio. Others can be purchased from third-party software
manufacturers, and appear automatically in Pro Audio's menus once
they are installed on your system. This section describes the effects that
are included with Pro Audio.

Using plug-in effects is similar to using the audio processing commands
described above. The overall procedure is as follows:

- Select the audio data to be affected.

- Choose the effect you want from the *Edit-Audio Effects* menu.

- Set effect parameters (or select a preset).

- Click Audition to preview the audio with the effect applied.

- Click the Bypass button to turn off the effect temporarily, so you can Audition the signal both with and without the effect.

- Click OK to apply the effect to the selected audio data.

If you're not happy with the result, choose the **Edit-Undo** command before doing any additional audio processing. Note that the Bypass button is available in all Cakewalk Audio FX effects, but may not be available in third-party effects.

Audio effects can be applied to whole or partial events. For example, you can apply reverb to a single word in a vocal event, or apply a delay to one guitar note.

You can apply audio effects, like MIDI effects, to audio tracks in real time (during playback) in the Console view. Unlike any of the audio processing discussed so far, using effects in real time is nondestructive. This means that the audio event data itself is not modified, and no new audio files are created. See "Mixing and Effects Patching" on page 9-1, for more information on real-time effects.

Note:

Off-line effects may cause your audio events to grow in size. For example, when you apply reverb, your event may need to grow to accommodate the tail end of an echo.

Mixing Audio Effects

The dialog box for each plug-in effect has a Mixing tab that provides three options for processing the data.

Option...	Meaning...
Process In-Place, Mono to Mono	Audio is processed event-by-event, in mono format. The processed output of the plug-in replaces the original event's data, in-place. (If the plug-in produces only stereo output, Pro Audio automatically converts the audio to mono.)
	This option is best for effects like Time/Pitch Stretching and Parametric Equalization.

Process In-Place, Creating Stereo Output Tracks	Audio is fed into the plug-in, event-by-event, in mono format. A new stereo track is inserted beneath the selected track, and the stereo output of the plug-in is placed into this stereo track. (If the plug-in produces only mono output, Pro Audio automatically converts it to stereo.)
	If you check Keep Original Data, Pro Audio won't delete the original audio data. This lets you create stereo wet only tracks for finer mixing control. If you leave Keep Original Data unchecked, the processed data will replace the original audio events.
Create a Send Submix	All selected audio tracks are mixed down into a stereo submix. This stereo submix is fed into the plug-in, in stereo. The stereo output of the plug-in is placed into a new stereo track at the destination you choose.
	If you check Keep Original Data, Pro Audio won't delete the original audio data. If you leave it unchecked, the processed data will replace the original audio events.

Adding Parametric Equalization

The *Cakewalk FX Parametric EQ* command lets you apply a complex filter to your audio data. The complex filter is a combination of up to three simple filters, each defined individually.

Parameters for each filter are described in the following table:

Parameter/Option...	Meaning...
Low-pass	Removes frequencies above the center frequency
Band-pass	Removes frequencies near the center frequency
High-pass	Removes frequencies below the center frequency
Gain	The amount of increase or decrease in gain, in dB
Center Frequency	The center or cutoff frequency for the filter
Q	The quality, or sharpness, of the filter

While you are setting up the filters in the Cakewalk FX Parametric EQ dialog box, you will see a graphic representation of the composite filter, like this:
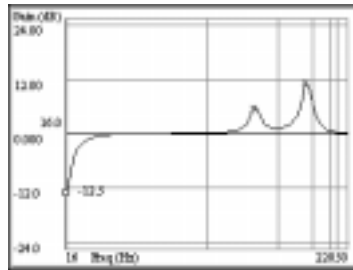
The horizontal axis shows increasing frequency; the vertical axis shows the gain or attenuation at each frequency. If the curve is above the horizontal center line, parts of the signal at that frequency will be boosted; if the curve is below the center line, the signal will be attenuated.

Parametric equalization is useful in many different circumstances. For example, you can use it to boost low frequencies or high frequencies, to attenuate 60-cycle hum or high-frequency noise, or to boost a particular instrument sound for use in other Pro Audio commands.

To Apply the Parametric Equalizer to Audio Data...

1. Select the audio data to be affected.

2. Choose **Audio Effects-Cakewalk FX-Parametric EQ** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Parametric EQ dialog box.

3. Set options for the first filter, as described in the table above.

4. Change Current Filter to 2 and set parameters for the second filter. Repeat for the third filter.

5. Click OK.

Pro Audio applies the composite filter to the selected data.

Adding Chorus

The **Cakewalk FX Chorus** command fattens the audio to make one instrument sound like many. When many people sing together, for example, each of their voices is slightly out of tune and off the beat.

Therefore, detuning and delaying the signal makes many instruments sound richer, including guitars, vocals, and strings.

The Chorus effect has the ability to act on a stereo track or a stereo pair, a pair of consecutive tracks, one of which is panned hard left (0), the other of which is panned hard right (127). The feedback signal can be crossed between the tracks to create a richer stereo effect.

The parameters used to specify the chorus effect are as follows:

Parameter/Option...	Meaning...
Dry Mix (%)	The relative volume of the original, unprocessed signal passed to the output.
Wet Mix (%)	The relative volume of the processed signal passed to the output.
Left Delay	The time between signal repeats on the left channel.
Right Delay	The time between signal repeats on the right channel.
Link	Links a pair of controls so that they move as a group.
Left Feedback (%)	The amount of the processed signal on the left channel fed back through the effect. A higher value will thicken the chorusing.
Right Feedback (%)	The amount of the processed signal on the right channel fed back through the effect.
Cross Feedback (%)	The amount of the processed signal on each channel fed back through the effect on the other channel.
LFO Depth	The depth of the LFO (low-frequency oscillator). Depth controls the amount of detuning. Setting this very high will result in an obviously out-of-tune sound. A lower setting creates subtle chorusing.
LFO Rate (Hz)	The frequency of the LFO.
Triangular/Sinusoidal	The shape of the LFO.

To Apply Chorusing to Audio Data...

1. Select the audio data to be affected. Select a stereo pair for stereo chorusing.

2. Choose **Audio Effects-Cakewalk FX-Chorus** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Chorus dialog box.

3. Set the chorus parameters, as described in the table above.

4. Click OK.

Pro Audio applies the specified chorus effect to the selected data.

Applying Delay and Echo

The **Cakewalk FX Delay** command creates a series of repeating signals from the original signal. You can create a single echo on the original signal, or a series of echoes up to five seconds apart.

Parameters for the Delay effect are identical to those for the Chorus effect. The difference is that with Chorus the delay parameters can range from 0 to 80 ms, whereas with Delay the delay parameters can range from 0 to 5000 ms. As with Chorus, Delay can act on a stereo pair of tracks.

To Apply Delay to Audio Data...

1. Select the audio data to be affected. Select a stereo pair for stereo delay.

2. Choose **Audio Effects-Cakewalk FX-Delay** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Delay dialog box.

3. Set the parameters in the dialog, as described in the table in the "Adding Chorus" section above.

4. Click OK.

Pro Audio applies the specified delay effect to the selected data.

Adding Flanging

The **Cakewalk FX Flanger** command mixes the original signal with a slightly delayed version of the signal, so that the two are out of phase. This creates a spacey, ethereal sound.

Parameters for the Flanger effect are identical to those for the Chorus and Delay effects. However, with the Flanger, the maximum value for the Delay parameter is 20 ms.

To Apply Flanging to Audio Data...

1. Select the audio data to be affected. Select a stereo pair for stereo flanging.

2. Choose **Audio Effects-Cakewalk FX-Flanger** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Flanger dialog box.

3. Set the parameters in the dialog, as described in the table in the "Adding Chorus" section above.

4. Click OK.

Pro Audio applies the specified flanging effect to the selected data.

Applying Reverb

The **Cakewalk FX Reverb** command adds many small echoes to a signal to create the illusion of spaciousness. By changing the parameters, you can simulate a stage, a hall, an arena, or a variety of other room types. The reverb parameters are as follows:

Parameter/Option...	Meaning...
Dry Mix (%)	The volume of the original, unprocessed signal passed to the output.
Wet Mix (%)	The volume of the processed signal passed to the output.
Link	Links the dry/wet mix controls so that they always add to 100 percent.
Decay (s)	The decay time of the echoes. Increasing this value makes the room sound larger.
Sparse Echo / Dense Echo / No Echo	The density of early reflections. Early reflections are the first echoes you hear in a room and help recreate the sound of large spaces like churches and concert halls. Sparse reflections will sound more like echoes, while dense reflections will create a thicker reverb.
LP Filter	Frequency cutoff for the low-pass filter. Select Active to enable the filter.
HP Filter	Frequency cutoff for the high-pass filter. Select Active to enable the filter.

To Apply Reverb to Audio Data...

1. Select the audio data to be affected. Select a stereo pair for stereo reverb.

2. Choose **Audio Effects-Cakewalk FX-Reverb** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Reverb dialog box.

3. Set the reverb parameters, as described in the table above.

4. Click OK.

Pro Audio applies the reverb effect to the selected data.

Shifting Pitch

The **Cakewalk FX Pitch Shifter** raises or lowers the pitch of an audio signal, while leaving the duration of the audio event unchanged. The pitch shift parameters are as follows:

Parameter/Option...	Meaning...
Pitch	The amount by which the pitch is changed, in semitones
Dry Mix (%)	The volume of the original, unprocessed signal passed to the output
Wet Mix (%)	The volume of the processed signal passed to the output
Feedback Mix (%)	The amount of pitch-shifted signal that is fed into a delay line
Delay Time (ms)	The length of the delay in milliseconds
Mod. Depth (ms)	The amount the delay time will vary

To Apply Pitch Shift to Audio Data...

1. Select the audio data to be affected.

2. Choose **Audio Effects-Cakewalk FX-Pitch Shifter** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Pitch Shifter dialog box.

3. Set the pitch shift parameters, as described in the table above.

4. Click OK.

Pro Audio applies the pitch shift to the selected data.

This is a fast pitch shifter that uses minimal computation time. The **Cakewalk FX Time/Pitch Stretch** command, described below, can produce higher quality output, but requires a lot more computational time.

Stretching Time and Pitch

The **Cakewalk FX Time/Pitch Stretch** command lengthens or shortens audio data, and raises or lowers pitch. Time and pitch can be stretched independently. You can use this effect to stretch or compress audio while preserving pitch, or to change pitch while preserving duration, or both. The time/pitch stretch parameters are as follows:

Parameter/Option...	Meaning...
Time (%)	The new length of the audio event, as a percentage of the length of the original event.
Pitch	The amount by which the pitch is changed, in semitones.
Source Material	The type of audio data. Selecting an option sets recommended values for the Block Rate, Overlap Ratio, Crossfade Ratio, Accuracy, and Algorithm parameters.
Block Rate (Hz)	Used to calculate the size of the data "blocks" processed by Time/Pitch Stretch. Lower values lead to larger block sizes. If the material to be processed is generally less percussive or lower in pitch, using a lower block rate will make the algorithm operate more efficiently.
Overlap Ratio	The amount of overlap between consecutive blocks.
Crossfade Ratio	The crossfade amount for the blocks.

Accuracy	The accuracy of the calculations. Normal is good for most sounds. High accuracy gives slightly better quality, but takes longer to process.
Algorithm	The algorithm used for pitch stretching. The Normal algorithm is used in most circumstances, but causes a "chipmunk effect" on vocals. Use the Formant-Preserving algorithm to help retain the natural quality of vocals.

The Time and Pitch parameters can be set by typing numbers in the appropriate boxes, or by dragging the sliders or the crosshair in the graph. Holding Shift while dragging the crosshair snaps the crosshair to the nearest axis: X (time), Y (pitch), or the diagonal (equal time and pitch). Diagonal values on the graph can be processed very quickly and with very high quality, but have the trade-off that changing pitch does not preserve duration, and vice versa.

For the most natural-sounding results, choose low settings; transpose by no more than a third or a fourth. Higher values, though, can be used for special effects.

Note:

This is a fast pitch shifter that uses minimal computation time.

To Apply Time/Pitch Stretch to Audio Data...

1. Select the audio data to be affected.

2. Choose **Audio Effects-Cakewalk FX-Time/Pitch Stretch** from the **Edit** menu or from the pop-up menu to open the Cakewalk FX Time/Pitch Stretch dialog box.

3. Set the time/pitch stretch parameters, as described in the table above.

4. Click OK.

Pro Audio applies the time/pitch stretch to the selected data.

8 Working with Notation and Lyrics

Notation

This chapter describes three Pro Audio views that are used to edit the musical aspects of your project.

- Pro Audio's Staff view lets you work with your composition in a standard musical staff, guitar tablature and a virtual guitar fretboard. You can add, move, and delete notes with your mouse or with your computer keyboard. You can add chord names, guitar chord grids, expression marks, hairpin symbols, pedal marks, and lyrics. And you can print professional-quality notation of a complete arrangement or individual parts, with up to 24 staves per page.

- The Meter/Key view lets you view, insert, and edit meter and key changes at any measure boundary in the song.

- The Lyrics view lets you edit a track's lyrics, and can be used to cue you with the lyrics during playback or recording.

In This Chapter

The Staff View

The Staff view is composed of a Staff pane and a Fretboard pane.

When you first open the Staff view, you may see only the Staff and not the Fretboard pane. Resize the Staff view by dragging its edges until you can see everything easily. When you save your file, whatever size the Staff view is will be the way it appears the next time you open the file.

The Staff pane displays MIDI note events as musical notation. For some musicians, this may be the most familiar and comfortable view in which to work. The Staff pane provides many features that make it easy for you to compose, edit, and print music.

For guitar players who are new to musical notation, the Fretboard pane represents the notes in the Staff pane as they would appear on a six-string guitar neck in standard tuning. All notes that appear in the Staff pane at the Now time are shown in the Fretboard pane. If you enter notes in the staff at the Now time, they appear on the fretboard. Like-wise, you can enter notes into the staff at the Now time by clicking the guitar strings on the fretboard. Notes and chords shown in the fretboard can be easily edited by dragging them up and down the guitar strings.
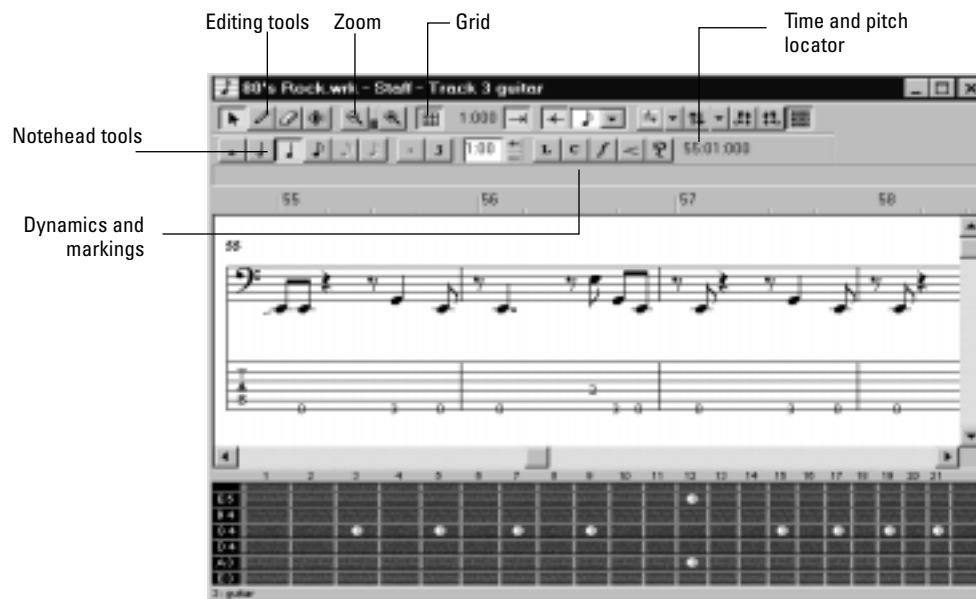
Opening the Staff View

There are three ways to open the Staff view:

- In the Track view, select the MIDI tracks you want to see, then click the Staff View button ▣ .

- In the Track view, select the MIDI tracks you want to see, then choose **View-Staff**.

- Right-click on a track in the Clips pane and choose **Staff** from the menu.

You can always change the tracks that are displayed: click the Pick Tracks button ▣ ▾ and select the tracks you want. You can display one or more tracks7.

The Staff view lets you edit, delete, copy, and move notes during playback or recording, in real time. This means you can loop over a portion of your project and hear any change you make on the next loop. You can freeze the Staff view from automatic scrolling during playback by pressing the Scroll Lock key.

Like many other views, the Staff view includes zoom tools that let you change the vertical and horizontal scale of the view. The Staff view also has a Snap to Grid ▣ button. For more information on this feature, see "Defining and Using the Snap Grid" on page 5-15.

Staff Pane Layout

The Staff pane can display up to 24 staves of standard and percussion notation. When you open the Staff pane, Pro Audio automatically picks a clef for each track—bass or treble—by looking at the range of pitches in the track. If a track has notes that fall into both clefs, or no notes at all, Pro Audio automatically splits the track into two staves, treble and bass. You can change the assignment of clefs with the Staff View Layout dialog box.

When you split a track into treble and bass staves, you must select a split point. Notes at or above the split are placed into a treble staff, notes below the split are placed into a bass staff.

A wide variety of editing options for notes, layout, and MIDI effects are available from the Staff Pane Right-Click menu.

Percussion settings are discussed in the section "Tablature" on page 8-29

The Staff Pane Right-Click Menu

The Staff pane Right-Click menu offers the following editing options:

Menu command	Result
MIDI Effects	Opens the MIDI Effects submenu. See "MIDI Effects" on page 6-49 for more information.
Layout	Opens the Staff View Layout dialog box.
Regenerate Tablature	Opens the Regenerate Tablature dialog box. "Regenerate TAB" on page 8-32 for more information.
Deglitch	Opens the Deglitch dialog box. See "Deglitch Dialog" on page 8-13 for more information.
Slide	Opens the Slide dialog box.
Quantize	Opens the Quantize dialog box. See "Quantizing" on page 6-17 for more information.
Groove Quantize	Opens the Groove Quantize dialog box. See "Quantizing" on page 6-17 for more information.
Interpolate	Opens the Event Filter Search dialog box. See "Edit-Interpolate" on page 6-33 for more information.
length	Opens the Length dialog box. See "Stretching and Shrinking Events" on page 6-13 for more information.
Retrograde	Reverses the order of selected events and clips.
Transpose	Opens the Transpose dialog box. See "Transposing" on page 6-9 for more information.
Scale Velocity	Opens the Scale Velocity dialog box. See "Adding Crescendos and Decrescendos" on page 6-16 for more information.
Fit to Time	Opens the Fit to time dialog box. See "Stretching and Shrinking Events" on page 6-13 for more information.
Fit Improvisation	See "Fit Improvisation" on page 6-27.

To Change the Staff Pane Layout...

1. Click the Staff View Layout button ⬚⬚ to open the Staff View Layout dialog box.

2. Select a track from the list. The Clef option shows the track's clef.

3. Select a new clef from the list.

4. If you select Treble/Bass, select a Split point.

5. If you select one of the Percussion options, click Percussion Settings to set up the appearance of percussion notes.

6. Repeat steps 2-5 for other tracks.

7. Click Close when you are done.

Pro Audio displays tracks using the new staff settings.

Tip:

If a piano part's left-hand and right-hand parts overlap, a split point will not correctly separate the two parts into treble and bass staves. You may prefer to put the two parts into two separate tracks.

The Fretboard Pane

The Fretboard pane shows you the notes located at the Now time in the Staff pane, laid out on a virtual guitar fretboard. For example, if the Staff pane shows you this:

The Fretboard pane shows you this:

The Fretboard pane stays in sync with the Now time during playback and recording, and stays in sync with the scrub time during scrubbing. The color of each note on the fretboard is the same as the color of the corresponding clip in the Track view. (See "Arranging Clips" on page 5-5] for information about setting clip properties.)

To turn the display of the Fretboard pane on or off, click .

Fretboard Popup Menu

When you right-click the Fretboard in the Staff view, the Fretboard popup menu appears, giving you choices for note editing, Staff view layout, and Fretboard appearance.

Menu command	Result
Select	Changes your cursor to the Select tool.
Draw	Changes your cursor to the Draw tool.
Erase	Changes your cursor to the Erase tool.
Scrub	Changes your cursor to the Scrub tool.
Layout	Opens the Staff View Layout dialog box.
Select Track	Controls which of the displayed tracks receive the notes you enter on the Fretboard.
Mirror Fretboard	Inverts Fretboard so highest-sounding string appears at the bottom.
Rosewood Hi	Fretboard appears in rosewood with high screen resolution.
Rosewood Lo	Fretboard appears in rosewood with low screen resolution.
Ebony Hi	Fretboard appears in ebony with high screen resolution.

Ebony Lo	Fretboard appears in ebony with low screen resolution.
Maple Hi	Fretboard appears in maple with high screen resolution.
Maple Lo	Fretboard appears in maple with low screen resolution.

Basic Musical Editing

The Staff view's tools let you edit a song by manipulating the elements of standard music notation. Using these tools, you can create and edit notes, pedal marks, expression marks, hairpins, and lyrics.

Inserting Notes on the Staff

You can add notes to your composition with simple point-and-click techniques. To help with your composing, Pro Audio gives you audio feedback as you place each note.

Six buttons let you select a notehead size ranging from a whole note to a 32nd note. Buttons to the right of the notehead buttons let you select dotted note or triplet modifiers. Selecting a notehead size also sets the snap time resolution to increments where the selected notehead can be legally placed.

You may want to pick a different snap-to grid value for a particular note. For example, if you want to insert a half note in the last quarter note position in a measure (in order to get two tied quarter notes), you must set the snap resolution to a quarter note. Pro Audio will automatically convert the half note to two tied quarter notes. The same method can be used to insert a syncopated note, such as a quarter note at an eighth note position.

You may also wish to disable the Fill Durations and Trim Durations options before you enter notes on the staff. This will allow you to see the true durations of all the notes you enter. These options are discussed in "Changing the Way Notes Are Displayed" on page 8-15.

To Insert a Note on the Staff...

1. Click the Draw tool ![draw tool].

2. Select a notehead size, and a modifier (dot or triplet) if desired.

3. Click on an empty space in the staff.

4. If desired, drag the note horizontally or vertically to a new time or pitch.

Pro Audio places the new note in the staff.

Inserting Notes with the Fretboard

You can also enter notes onto the staff from the fretboard using the mouse. You always enter notes into the staff at the Now time.

To Insert Notes on the Fretboard with the Mouse...

1. Click in the time ruler to set the Now time.

2. Click ![draw tool] to select the Draw tool.

3. Select a note duration, and a modifier (dot or triplet) if desired.

4. Click on the guitar strings in the fretboard to enter notes. You can enter up to six simultaneous notes (one per string).

    Advance the Now Time by the current note duration using the right arrow key while holding down the shift key. This allows you to quickly enter a series of notes.

Selecting Notes

Use the Selection tool ![selection tool] to make selections. Selection methods in the Staff view are similar to those in other views. Here is a summary:

To do this...	Do this...
Select a note or other symbol	Click it
Select several symbols at once	Click and drag a rectangle around them
Add symbols to the selection	Press Shift and either click on the symbols or drag a rectangle around the events
Add or remove symbols from the selection	Press Ctrl and either click on the symbols or drag a rectangle around the events

Select symbols in a time range	Click and drag in the time ruler
Select symbols between two markers	Click between the markers
Remove all selections	Click in an empty area

Note:

Tied notes must be selected together, since the series is really just a single MIDI note. To select tied notes, you must click or drag a rectangle around the first note of the series.

Moving, Copying, and Deleting Notes on the Staff

Selections can be cut, copied, pasted, and deleted with **Edit** menu commands. The techniques are similar to those used in other views. Selections can also be dragged and dropped to copy or move them. To keep track of your current position while dragging, you can keep an eye on the time and pitch locator in the upper-right corner of the Staff view.

Notes can be dragged horizontally, to a new time, or vertically, to a new pitch or staff. When you drag a note up or down to a new pitch, the note normally snaps to the notes in the current key signature (diatonic scale). This makes it easy to drag notes quickly among pitches that are in the current key. But you can also drag in half-steps (chromatic scale) by clicking the right mouse button while dragging. Right-clicking again returns you to the diatonic scale.

If you need to transpose more than a few notes, use the **Edit-Transpose** command. For more information, see "Transposing" on page 6-9.

To Move a Single Note…

1.   Click the Select tool 🔺 or the Draw tool ✏.

2.   Click the note to be moved.

3.   Drag the note to a new time, pitch, or staff.

Pro Audio moves the note to the new location.

To Move Several Notes…

1.   Click the Select tool [icon].

2.   Select the notes to be moved.

3.   Click one of the selected notes.

4.   Drag the notes to a new time, pitch, or staff.

Pro Audio moves the notes to the new location.

To Copy One or More Notes…

1.   Click the Select tool [icon].

2.   Select the notes to be copied.

3.   Press and hold the Ctrl key.

4.   Drag the notes to a new time, pitch, or staff.

Pro Audio inserts copies of the notes at the new location.

To Erase Notes with the Eraser…

1.   Click the Erase tool [icon].

2.   Click any notehead to erase the note.

3.   To erase several notes, click and drag the eraser.

Any notes whose notehead is touched by the eraser will be deleted.

Moving Notes from within the Fretboard

You can drag notes displayed in the fretboard horizontally along each string to change their pitch. They always change in the chromatic scale. You can not drag notes from one string to another.

To Change the Pitch of a Single Note…

1.   Click in the time ruler to set the Now time to the time of the note you want to change.

2.   Click the Select tool [icon] or the Draw tool [icon].

3.   Drag the note along the string to a new fret.

Pro Audio moves the note to the new pitch.

To Change the Pitch of a Chord...

1. Click in the time ruler to set the Now time to the time of the chord you want to change.

2. Click the Select tool .

3. While pressing Shift, click each of the notes you would like to change.

4. While continuing to press Shift, drag the notes along the strings.

Pro Audio moves the notes you selected to the new pitches.

Tip:

You can also move the Now time pointer to the exact note by using the Step Play buttons.

Auditioning

Sometimes it is useful to listen to your music slowly, note-by-note, rather than at full speed. For example, you may need to locate a bad note, or you may be trying to learn the correct fingering for a difficult passage.

The Staff view has two features that let you audition your composition at reduced speed: Scrub and Step Play. The Scrub tool lets you drag a vertical bar over the staff, playing the notes as it goes. You can scrub backward or forward at any speed. Step Play lets you step through the

song note by note, in either direction.

To Audition with the Scrub Tool...

1. Click the Scrub tool ⊕.

2. Click in the staff to display the vertical scrub line.

3. Drag the mouse horizontally to move the scrub line.

Pro Audio plays any notes the scrub line passes over.

To Play Notes with Step Play...

1. Set the Now time by clicking in the time ruler.

2. Step through the music as follows:

To do this...	Do this...
Step forward	Click 🎵, or press Ctrl-right arrow
Step backward	Click 🎵, or press Ctrl-left arrow

Changing Note Properties

The Staff view lets you edit all the MIDI parameters for a note, including
those not normally portrayed by standard musical notation. Note
properties are as follows:

Property...	Meaning...
Time	The starting time of the note
Pitch	The note's pitch
Velocity	The note's velocity (0 to 127)
Duration	The note's duration, in ticks or in beats and ticks
Channel	The MIDI channel on which the note is played
Fret	The fret at which the note is played on the neck
String	The string on which the note is played

To Edit a Note's Properties...

1. Right-click the note to open the Note Properties dialog box.

2. Edit the note's properties, as described in the table.

3. Click OK.

Pro Audio changes the note's parameters and redraws the note if necessary.

Deglitch Dialog

When recording MIDI guitar, even the best players occasionally play unintended notes. The Deglitch feature allows you to filter out the softest, shortest, and highest notes in the file.

There are three filters in the Deglitch dialog:

Pitch

With the Pitch filter you can set the maximum pitch allowed in the track. If a MIDI event has a higher pitch than the maximum you set, it is removed.

Velocity

With the Velocity filter you can set a minimum velocity allowed in the track. If a MIDI event has a lower velocity than the one you set, it is removed.

Duration

With the Duration filter you can set a minimum note duration for the track in either ticks or milliseconds. If a MIDI event has a shorter duration than the one you set, it is removed.

To Use the Deglitch Filter

1. Select a track or a section of track.

2. Select Edit/Deglitch from the menu.

   The Deglitch dialog box appears.

3. Check each of the filters you want to use.

4. Enter the parameters (maximum or minimum values) you want for each of the filters you are using.

5. Click OK.

If you are not happy with the result, select Edit/Undo from the menu to restore the original MIDI track.

Working with Triplets

The Staff view places certain limitations on the use of triplets. The limitations are:

• Triplets must occur in full sets of three.

• All three steps in a triplet must be notes (no rests) of the same basic duration.

• There can be no ties in or out of the triplet.

In most cases, the Staff view can recognize triplets in MIDI data. However, the slight timing inaccuracies inherent in live performances can complicate the detection of triplets. If working from performance data, you may find it useful to quantize the notes closer to exact triplet positions using the *Edit-Quantize* command. See "Quantizing" on page 6-17 for details.

To Enter a Triplet...

1. Turn on the Snap to Time option.

2. Click the Draw tool .

3. Click the appropriate notehead button.

4. Select the Triplet option .

5. Enter the first note at the desired location in the staff.

Pro Audio inserts all three triplet notes at the same pitch. You can then drag the second and third notes to their correct pitch locations.

Beaming of Rests

The Staff view supports beaming of rests, a practice that is popular with rhythmically complex music. Beam lengths are extended to include rests that are integral parts of the beamed group of notes. Short stems, called stemlets, extend from the beam toward the rest. This makes the rhythms easier to read, because the beat boundaries are made clear.

To Enable Beaming of Rests...

1. Click Layout button [icon] to open the Staff View Layout dialog box.

2. Select the Beam Rests option.

3. Click OK.

Thereafter, the Staff view beams rests as though they were notes.

Changing the Way Notes Are Displayed

Unlike musical notation programs, Pro Audio uses the MIDI events themselves as the permanent representation of the music; thus, the Staff view is only an interpretation of a MIDI performance.

MIDI notes do not always correspond exactly to notes on a staff. Whereas a staff defines precise grid-like starting times and durations for notes, a MIDI note can start at any arbitrary time during the song, and last for any length of time. If you record a performance from a MIDI keyboard, for example, you'll find that some notes may start slightly before the beat, and some a little after, and that the notes end a little late or a little early. Although these slight imperfections are what gives a performance its "human" quality, you don't necessarily want to see all these imperfections notated with excruciating precision.

The Staff view has two options you can select to affect the way MIDI notes are displayed on the staff:

Option...	Purpose...
Fill Durations	Visually rounds up note durations to the next beat or the next note, whichever comes first.
Trim Durations	Visually rounds down note durations if they extend a little way past the start of the next note.

Here's what the Staff view looks like with and without these options:
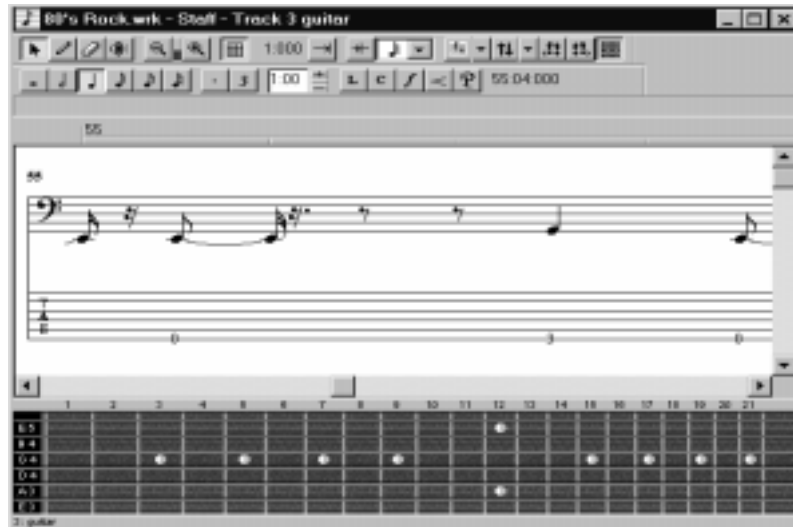
Fill and Trim off
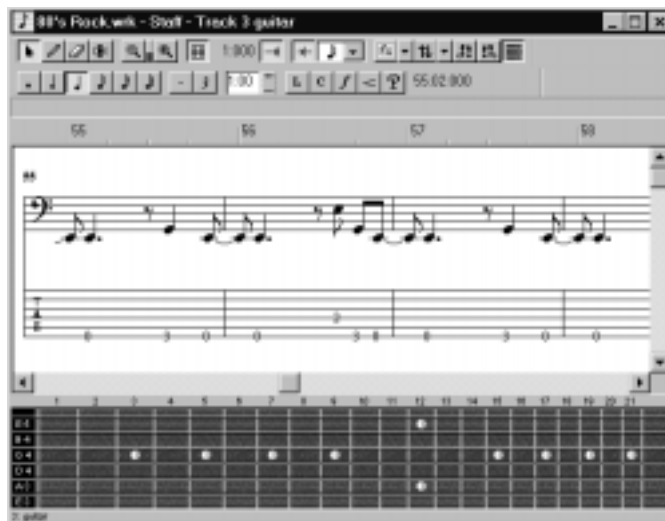
Fill and Trim on

On the other hand, if you are entering notes into the Staff view with the mouse, Fill and Trim Durations may produce confusing results. For example, with Fill Durations, an inserted eighth note in 4/4 time would look like a quarter note until you insert another eighth note immediately following it. It is recommended that you turn off the Fill Durations and Trim Durations options when entering notes; these options are more appropriate for looking at notes you recorded.

Using Enharmonic Spellings

Any musical note can be referred to by several different names. For example, C#3 and Db3 identify the same pitch, as do G4 and Abb4. The most appropriate name depends upon the current key signature, but can also depend on musical context.

Pro Audio uses a set of rules to automatically add accidentals (sharps or flats) to notes based on the current key signature. These rules cover the most common musical situations and usually lead to pleasing results. However, there is no guaranteed right way to resolve accidentals. Doing so ultimately requires knowledge regarding what key or scale is being evoked—knowledge that only the composer possesses. For example, if a modulation is being prepared, then the new key signature has not yet been completely established, and the harmony has already begun to shift. In fact, there may not even be a scale in a diatonic sense: chromatic scales, for instance, are supposed to sharp on the way up and flat on the

way down. Because no set of rules will suffice for all situations, the composer needs the ability to override any default choice.

Notes in Pro Audio normally do not have a forced enharmonic spelling. This means that they will automatically change to match the default for a new key signature. If you specify spelling that matches the default choice, Pro Audio will drop any forced spelling and switch back to default behavior. Otherwise, the forced spelling is remembered for that note, and will not change to follow the key signature. If you change the pitch of a note by some other means (for instance, by dragging it up or down), it will lose any forced spelling, because it very likely no longer applies to the new pitch. Enharmonic spelling overrides for each note are saved in the project file.

When you type a note's enharmonic spelling, use the following table as a guide:

Accidental...	Character...	Example...	Displays as...
Flat	b	Cb5	
Sharp	#	C#5	
Double flat	"	C"5	

Double sharp	x	Cx5

To Change a Note's Enharmonic Spelling...

1. Right-click the note to open the Note Properties dialog box.

2. In the Pitch textbox, type a new spelling for the note.

3. Click OK.

Pro Audio displays the note with the new enharmonic spelling.

You can change enharmonic spellings in other views, such as the Event List view, by similarly typing a new spelling wherever the note pitch is displayed as a text string.

You can also use the **_Edit-Interpolate_** command to change enharmonic spellings—for example, to change multiple occurrences of Eb5 to D#5, or even all Ebs to D#s. See "Edit-Interpolate" on page 6-33 for more information.

MIDI Channels and Voices

If you set notes to different MIDI channels in the Staff view, they will automatically be forced into separate voices. This gives you greater control over voice assignment and beaming, and is especially important in keyboard and percussion notation. The use of different MIDI channels is conceptually linked to the use of different instruments. Therefore, setting notes to different channels gives you a useful way to show separate voices, whether the track has a forced channel or not.

You can disable the forced mapping of MIDI channels. For more information, see _Appendix D: MIDI Files_.

MIDI Channels and the Fretboard

You can display notes on the fretboard based on the note event's MIDI channel. (Do not confuse this with the Track MIDI channel. A single track can hold events on many different MIDI channels. See Chapter 3, _Assigning a MIDI Channel (Chn)_ for more information.) Displaying notes using this method is 100% accurate because each string is repre-

sented by an individual MIDI channel. For example, String 1 = MIDI channel 11, String 2 = MIDI channel 12, etc.

To Display Notes on the Fretboard Using its MIDI Channel. . .

1. Set the MIDI Guitar to transmit on 6 consecutive channels. This is often referred to as "MONO" mode. Refer to your MIDI Guitar device documentation for more information.

2. Select and Arm a track.

3. If you want the data from all 6 strings to be recorded to a single track, set the Source to OMNI. If you want each string on a separate track, you need to set up each individual track to record on the corresponding MIDI channel. The GR-30 Guitar Synthesizer template is designed to do this, so you may want to open that from the Quick Start Menu.

4. Open the Staff view.

5. Click the Staff View Layout button

6. Click Define.

7. In the Method field, click MIDI Guitar.

8. Set Pro Audio to transmit on the same series of MIDI channels. Select 1 for 1-6, 2 for 2-7, etc.)

   MIDI Guitar devices can transmit in MONO using a different series of MIDI channels, but Pro Audio needs to be listening to the same channels in order to properly display the MIDI guitar input.

9. Click Close.

10. Click OK.

Pro Audio displays notes on the Fretboard based on its MIDI channel.

If you are planning to record or input notes from a MIDI Guitar Synth or MIDI converter, you need to set this up on the instrument. In the case of the Roland GR-30, for example, you set it to send on MIDI Channel 11, MONO. This sends out each corresponding string on channels 11-16.

Chords and Marks

The Staff view lets you add and edit chord symbols, dynamic markings, hairpin symbols, and pedal events. Like notes, these symbols are placed in the score with the Draw tool. They can be selected, cut, copied, pasted, deleted, and dragged and dropped. With the exception of pedal marks, though, these symbols have no audible effect; they serve only to enhance and clarify the printed score.

Chord symbols   Guitar chord grids

Expression marks   Pedal marks
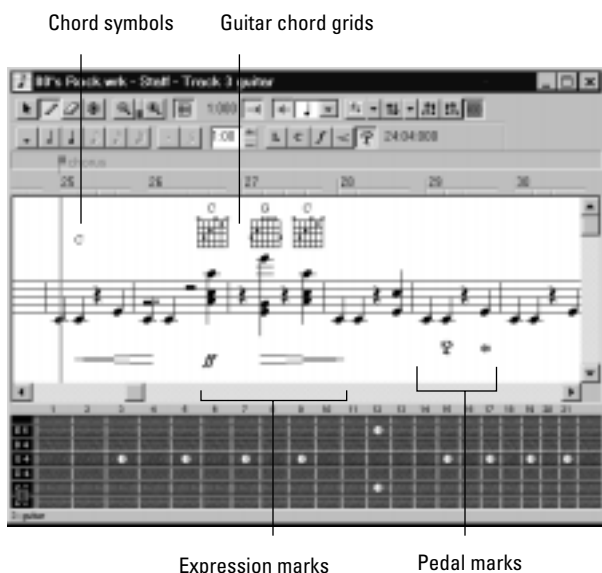
Adding Chord Symbols

The Staff view lets you enter chord symbols above the staff. You can enter both ordinary chord names and guitar chord symbols, which display both the chord name and fingering. Pro Audio has a large number of predefined chords from which you can choose. You can also define and save your own chords.

If a track is split into treble/bass staves, chords are allowed only above the upper (treble) staff.

Pro Audio stores its library of chords in the file *chords.liw*. The chords in the library are sorted into groups. You can add and remove chords from the library, create new groups (i.e., for alternative guitar tunings), and add chords from a different library file.

You edit chords in the Chord Properties dialog box. Chord properties are shown in the following table:

Property...	Meaning...
Time	The time of the chord, in measure, beat, and tick (MBT) format
Name	The name of the chord
Group	The chord group

The Chord Properties dialog box also lets you draw guitar chord grids and manage the chord library.

You can suppress the display of all guitar chord diagrams by deselecting the Show Chord Grids option in the Staff view's Layout dialog box. With this option disabled, only chord text appears.

To Add a Chord Symbol...

1. Click the Draw tool 🖊.

2. Select the Chord tool 🄲.

3. Position the pointer above the staff (the pointer changes to a pencil when you are in a legal position).

4. Click to place a chord symbol.

Pro Audio inserts a copy of the most recently added chord (by default, C). You can then edit the symbol to display the chord you want.

To Move a Chord Symbol...

1. Click the Draw tool 🖊.

2. Drag the chord symbol to a new location.

To Edit a Chord Symbol...

1. Right-click the symbol to open the Chord Properties dialog box.

2. Edit information about the chord according to the table:

To do this...	Do this...
Move a chord in time	Change the Time property.
Give the chord a new name	Select a chord from the dropdown list, or type a new name. Use # for sharp and b for flat.
Add descriptive text to the chord name	Type the text in square brackets after the chord name. The text does not appear in the Staff view.
See a different set of chords	Select a group from the list. This option only applies if you have created a custom chord library.

3. If desired, add a guitar chord grid (see below).
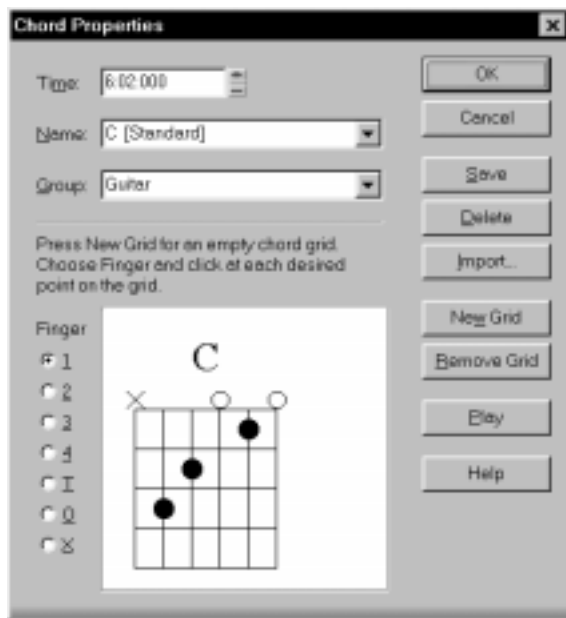
4. Click OK.

The Staff view displays the chord with the new properties, moving it to a new time if necessary.

To Add a Guitar Chord Grid...

1. Right-click the chord symbol to open the Chord Properties dialog box.

2. Follow the instructions in the table:

To do this...	Do this...
Display a blank chord grid	Click New Grid
Place a dot on the grid	Select the finger number (1-4, or T for Thumb), then click the grid at the appropriate string and fret location
Assign an open string	Select O, then click on the string
Assign a muted string	Select X, then click on the string
Change the finger assigned to a dot	Click the dot repeatedly to cycle through the fingers
Insert a fret designation	Click to the right of the grid and enter the number of the index finger fret in the Chord Fret Number dialog box
Play the chord (Audition)	Click Play
Remove the chord grid	Click Remove Grid

3. Click OK.

The Staff view displays the chord with the new guitar chord grid.

To Manage the Chord Library...

1. Right-click the chord symbol to open the Chord Properties dialog box.

2. Follow the instructions in the table:

To do this...	Do this...
Add a chord to the library	Select a group, enter a name in the Name box, enter a guitar grid (if desired), and click Save
Delete a chord from the current group	Select the chord from the list and click Delete

Add a new group	Type a name for the group in the Group textbox and click Save
Delete a group	Select a group from the list and click Delete
Merge chords from an external chord library	Click the Import button and select a file

3.   Click OK.

Pro Audio saves the chord library with the changes you made.

Adding Expression Marks

Expression marks tell a performer how to interpret the notes and durations on the page. They provide a necessary supplement to simple notation, in which notes have only pitch and duration, but no hint of how loudly, softly, or smoothly, they are to be played. Dynamic marks—from *ppp* for "very quietly" through *fff* for "quite loudly"—allow notation to convey volume instructions. Expression marks are also needed to specify other aspects of performance, such as whether a passage is to be played legato or staccato. Finally, expression marks can be used to convey to the performer the composer's suggestions or requirements as to how a passage should be interpreted. In such cases the language used can leave much to the imagination, as in *with majesty* or *abrasively*.

Expression marks do not change the underlying MIDI data. They only provide information to the reader on how a piece should be performed.

If the track is split into treble/bass staves, expression marks are allowed only below the treble staff.

When entering an expression mark, you can leave a dangling hyphen at the end of an expression mark to insert automatic spaced hyphens until the next expression mark. For example:

cresc.   -   -   -   ff

It is often desirable to terminate such a series of hyphens with a blank expression mark. For example:

accel.   -   -   -

Expression text is italicized in the Staff view. Standard dynamic markings also appear bold.

To Add an Expression Mark...

1.   Click the Draw tool ✎.

2.   Select the Expression tool ƒ.

3.   Position the pointer below the lowest note in the staff. (The pointer changes to a pencil when you are in a legal position.)

4.   Click to open an insertion box.

5.   Type the expression mark text. Press Esc to abort the operation.

6.   Press Enter, or press Tab or Shift-Tab to move to the next or previous mark, respectively.

Pro Audio inserts the new expression mark below the staff.

To Edit an Expression Mark...

1.   Right-click the expression mark to open the Expression Text Properties dialog box.
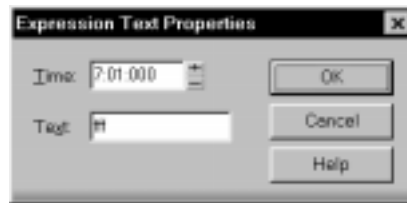
2.   Edit the time and text of the expression mark as desired.

3.   Click OK.

The Staff view displays the expression mark with the new text, including moving it to a new time if necessary. You can also use the Draw tool and click on an expression mark directly to change its text.

Adding Hairpin Symbols

Some musical phrases vary dynamically, increasing or decreasing in loudness for dramatic effect. Pro Audio lets you insert traditional

crescendo and diminuendo hairpin symbols that convey this information to a performer, as shown here:
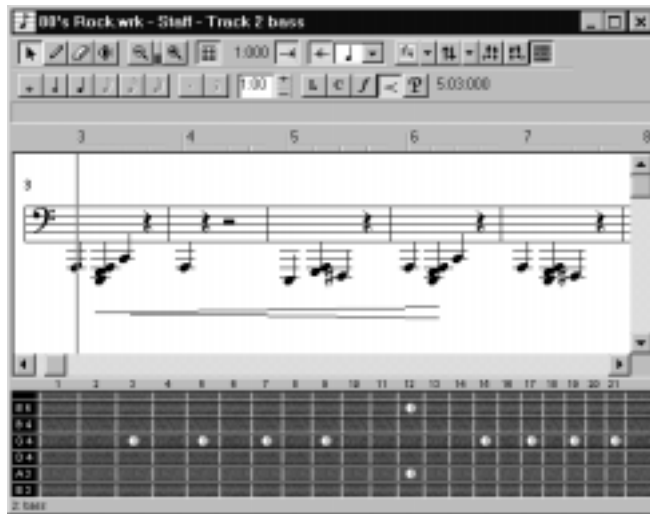
If the track is split into treble/bass staves, hairpin symbols are allowed only below the treble staff.

To Add a Hairpin Symbol...

1. Click the Draw tool [icon].

2. Select the Hairpin tool [icon].

3. Position the pointer below the staff (the pointer changes to a pencil when you are in a legal position).

4. Click to place a hairpin symbol.

Pro Audio inserts a copy of the most recently added hairpin symbol, which you can edit as desired.

To Edit a Hairpin Symbol...

1. Right-click on the hairpin symbol to open the Hairpin Properties dialog box.

2. Edit the starting time, duration, and type of the hairpin as desired.

3. Click OK.

The Staff view displays the hairpin symbol with the new properties, including moving it to a new time if necessary.

Adding Pedal Marks

Pedal marks traditionally indicate where the sustain pedal of a piano is to be pressed and for how long. With Pro Audio, you can achieve the same effect by inserting a pair of symbols indicating when the sustain pedal controller is to be turned on (down) and when it is to be turned off (up). Unlike chord symbols, expression marks, and hairpin symbols, each pedal symbol corresponds to a MIDI event. The other symbols are purely ornamental, intended to provide a composer with a way to communicate suggestions or requirements to performers.

Pedal event parameters are as follows:

Parameters...	Meaning...
Time	The time of the event, in measures, beats, and ticks (MBT).
Channel	The MIDI channel on which the event will be sent.
Value	The event value. A value of 127 depresses the pedal, a value of 0 raises it. (Some advanced synthesizers support values between 0 and 127 for "partial pedaling.")

If the track is split into treble/bass staves, pedal marks are allowed only below the bass staff.

You can suppress the display of all pedal marks by deselecting the Show Pedal Events option in the Staff view's Layout dialog box.

To Add a Pedal Mark...

1. Click the Draw tool ✎.

2. Select the Pedal tool ℗.

3. Position the pointer below the staff (the pointer changes to a pencil when you are in a legal position).

4. Click to place a pedal mark.

Pro Audio inserts a pair of pedal symbols (a pedal down and a pedal up). You can click and drag either symbol to a new time.

To Edit a Pedal Event...

1. Right-click the pedal symbol (pedal down or pedal up) to open the Pedal Event Parameters dialog box.

2. Edit the pedal event parameters, as described in the table above.

3. Click OK.

Pro Audio changes the pedal event parameters, including moving the symbol to a new time if necessary.

Tablature

The Staff view can display guitar or bass MIDI tracks as tablature. You can generate and edit tablature or enter notes on either the fretboard or on the tablature staff to create a new track. You can export tablature to an ASCII file for printing or distribution on the Web.

Tablature Settings

Both the Staff View Layout dialog box and the Tablature Settings dialog box create tablature settings for a whole track at a time. To modify tabla-

ture for selected parts of a track, select part of a track and use the Regenerate command.

In the Staff View Layout dialog box you can choose a preset style of tablature by choosing from the Preset popup menu, or you can define your own style by clicking the Define button in the Staff View Layout dialog box to open the Tablature Settings dialog box.

To Define a Tablature Style..

1. In the Staff View Layout dialog box, click the name of the track you want to define tablature for.

2. Click the Define button (lower right corner).

    The Tablature Settings dialog box appears.

3. Click the Tablature tab and choose a tablature method from the Method dropdown list. There are three methods to determine how the TAB is displayed:

    - **Floating** - which allows the notes to spread over the entire fretboard

    - **Fixed** - This specifies where on the neck these notes should be played. When Fixed is selected the Finger span and Lowest fret fields are used together to define the "box" where the notes are displayed. The Finger span parameter determines how many consecutive frets will be used to display the note. For example, if Finger span is set to 4, then Pro Audio will attempt to place all the notes within those 4 frets. The Lowest Fret then determines where on the fretboard the notes will be displayed within the Finger span. The red box in the fretboard display changes to reflect the settings in these two parameters.

    - **MIDI Channel** - This uses the event's MIDI channel to determine which string the note should be displayed on. When MIDI Channel is selected, the user chooses which series of MIDI Channels should be considered. This is useful for MIDI Guitarists that record parts in MONO mode, where each string transmits on a different MIDI channel. (Values: 1 - 11). Selecting "1" will cause it to use MIDI channels 1 - 6, selecting 2 , 2 - 7, and so on.)

    NOTE: Select the Skip Channel 10 option if you are using a Yamaha G50 or other device which reserves channel 10.

4. Type a number into the Number of Frets field. This determines how many frets the guitar has that the tab is based on.

5. In the String Tuning fields, choose the instrument from the drop-down list and number of strings from the Number of Strings field.

    The open string pitches for the instrument you choose automatically appear in the string number fields below the dropdown list.

6. Customize any of the open string pitches by using the "+" or "-" buttons on the string number fields.

7. Save your settings by typing a name into the Preset field at the top of the dialog box and clicking the disk icon next to it. You can remove presets from the list by clicking the X button next to the disk icon.

The next time you want to use these settings for a track, choose your Preset in the Staff View Layout dialog box from the Presets dropdown list.

Changing Fretboard Texture and Orientation

You can change fretboard texture and orientation (high string on top or bottom of neck) in the Staff View Layout dialog box, or by right-clicking the Fretboard.

To Change the Fretboard Texture and Orientation...

1. Open the Staff View Layout dialog box.

2. Click the Define button (lower right corner).

    The Tablature Settings dialog box appears.

3. Click the Fretboard tab.

4. In the Texture field, choose a texture from the dropdown list.

5. If you want to reverse the standard string orientation, in the Orientation field click Low String on Top (Mirror).

6. Click OK.

The Fretboard changes to reflect your choices.

Quick TAB

Pro Audio quickly creates a tablature based on standard fingering patterns. After you try the quick version, you can customize the tablature to your liking.

To Create a Quick TAB...

1.   Open a file that contains a MIDI guitar track.

2.   In the Track view, select the track number of the track you want to display tablature for.

3.   From the View menu, choose Staff.

     The Staff view appears, displaying a fretboard and the notation of your MIDI track. To see everything, you may need to resize the Staff view by dragging the top border upward a few inches.

4.   From the Staff view toolbar, click the dropdown arrow on the Staff View Layout button to display the tablature dropdown list.

5.   Choose Quick TAB from the dropdown list.

     A tablature grid appears, displaying the fret numbers for all the notes in the track.

6.   From the File menu, choose Save. Saving your file saves TAB settings for each track you generated TABS for.

Press the Spacebar to play your file. Notice that the Fretboard displays the name of each note above the string and fret you would play it on as the note plays.

Regenerate TAB

The *Regenerate TAB* command works on selected regions in a track to modify the fingering according to the method you choose. The TAB display by default uses the 'floating' algorithm which allows the notes to spread over the entire fretboard. By choosing the "fixed" algorithm instead, you can designate a specific finger span and lowest fret which causes the TAB of a selected region to be displayed within this range. This usually creates a more compact fingering system.

The Regenerate TAB command gives you a third choice for displaying tablature MIDI channel. This uses the event's MIDI channel to determine which string the note should be displayed on. When MIDI Channel is selected, the user chooses which series of MIDI Channels should be

considered. This is useful for MIDI Guitarists that record parts in MONO mode, where each string transmits on a different MIDI channel.

To Regenerate TAB...

1. In the Staff view, use the Select tool to drag a rectangle around the notes or TAB numbers you want to change.

2. In the Staff view toolbar, click the dropdown arrow on the Staff View Layout button to display the tablature dropdown list.

3. Choose Regenerate TAB to open the Regenerate Tablature dialog box.

4. Select 'Fixed' from the 'Method:' field and fill in values for Finger Span (usually 4), Lowest Fret, and Number of Frets (usually 21).

5. Click OK.

Pro Audio regenerates a TAB based on your specifications. If notes are out of the range you specified, Pro Audio displays them as close to that range as possible.

Entering Notes from the TAB Staff

You can enter notes or chords directly from the TAB staff.

To Enter Notes from the TAB Staff...

1. Open the Staff View, and choose Quick TAB from the tablature dropdown menu.

2. Press Ctrl-Home to move the Now Time to the start of the project. You may want to display the Now Time by choosing **View-Big Time**.

3. Choose the desired note duration (keyboard shortcut: press 1 for whole note, 2 for half, 3 for a 32nd note, 4 for quarter, 6 for a 16th note, 8 for an 8th note).

4. Click the Draw tool.

5. Enter a note by clicking a line in the TAB staff.

6. Without letting go of the mouse, click and drag the cursor up to set the fret number.

Single Note Editing from the TAB Staff

Pro Audio enables you to edit single notes from the TAB staff in several ways:

• With the Draw tool selected, drag fret numbers up or down. When you reach the desired fret number, release the mouse.

• With the Draw tool selected, move a note to a different string by holding down the Alt key while you drag the fret number to a different line. If the note you are moving won't play on the string you are dragging it to, you won't be able to move it.

• Right-click the fret you want to edit. A list of fret numbers appears. Select the one you want, and the fret you right-clicked changes to the fret number you selected.

Editing Chords or Groups of Notes from the TAB Staff

To edit chords or groups of notes in the TAB staff, first select which notes you want to edit, and then drag them to new pitches or strings.

To Edit Chords or Groups of Notes from the TAB Staff

1. Click the Select tool in the Staff view toolbar.

2. In the TAB staff, drag a rectangle around the chord or group of notes you want to edit, and release the mouse.

3. Drag the fret numbers you selected up or down by the amount you want.

4. You can drag the notes to different strings by holding down the Alt button while you drag. If the notes you are moving won't play on the strings you are dragging it to, you won't be able to move it.

To Export to an ASCII TAB File...

1. Select a track in the Track or Piano Roll view.

2. Select **Tools-Export Track to TAB**.

    The Save As dialog appears.

3. Enter a file name in the File name field.

4. Click OK.

Pro Audio saves the track with the file extension .TXT.

Editing Notes and Chords from the Fretboard

You can transpose single notes or chords from the Fretboard.

To Transpose Single Notes...

1. Move the Now Time to the note you want to edit by pressing Shift-Right/Left Arrow. You may need to change the note duration by clicking one of the note icons in the Staff view toolbar.

2. Use the Select tool to drag the note left or right on the fretboard.

To Transpose Chords...

1. Move the Now Time to display the chord you want to transpose.

2. Shift-select all the notes in the chord.

3. Shift-drag the chord to a new position and release the mouse.

Working with Percussion

The Staff view can display percussion tracks on a five-line percussion staff or on a single percussion line. The staff usually displays notes for a drum set or multiple percussion instruments; the line is used to display notes for a single instrument (although it need not be so).

Pro Audio lets you control the appearance of percussion staffs in considerable detail. You can display percussion notes using several different types of noteheads and articulation symbols, and you can map any percussion sound to any position on the percussion staff (in a percussion track, each MIDI note value designates a different percussion instrument; mapping lets you display any instrument in any position on

the staff, regardless of the underlying MIDI note value). You can save your settings as a preset, and use them again on other tracks and in other projects. Pro Audio supplies a standard preset based on the General MIDI percussion standard and popularly accepted percussion staff positions and noteheads.

Setting Up a Percussion Track

Before you use the percussion capabilities of the Staff view, your percussion track should be set up correctly. This will allow you to hear the proper sounds when placing notes and during playback, and will allow you to see the correct percussion instrument names rather than generic note names in the Piano Roll view, Event List view, and Percussion Notation dialog box.

To Set Up a Percussion Track...

1. Right-click on the track in the Track pane and choose **Track Properties** to open the Track Properties dialog box.

2. Assign the port and channel for your percussion instrument. For example, if the port is assigned to a sound card that supports General MIDI, use channel 10.

3. Click Instruments to open the Assign Instruments dialog box.

4. Make sure that the port/channel combination used by your track is assigned to a percussion instrument definition. For example, channel 10 of a General MIDI port should be assigned to the General MIDI Drums instrument definition.

5. Click OK in both dialog boxes.

Pro Audio shows the new track port and channel in the Track view, and will use the proper percussion instrument names in the Piano Roll view, Event List view, and Percussion Notation dialog box.

For more information about instrument definitions, see Chapter 10, *Using Instrument Definitions*.

Setting Up a Percussion Staff or Line

The first time you display a percussion track in the Staff view, Pro Audio picks a default percussion clef for the track. Tracks with only one note value are assigned the Percussion Line clef. Tracks with multiple note values are assigned the Percussion Staff clef.

If you want to change a Percussion Staff to a Percussion Line or vice versa, or if you want to change another type of staff to a percussion staff, you can do so in the Staff View Layout dialog box. If you change a track's clef to a non-percussion clef, the percussion notation settings will be lost.

The lowest and highest lines on the Percussion clef are E5 and F6, respectively. The Percussion Line represents E5.

By default, percussion staffs are given Pro Audio's default note bindings and notehead assignments. If you want to use your own notation, or if you want to set up the appearance of a percussion line, you need to use the Percussion Notation Key dialog box. In this dialog box, the percussion sounds and staff positions that are bound have an asterisk near their names. When you select a bound percussion sound, a line joins the sound to its staff position. Each percussion sound can be bound only to a single position, but each position may be bound to several sounds. You can use different notehead types and articulation symbols to visually distinguish the sounds.

To Assign a Percussion Staff or Line to a Track…

1.   Click the Staff View Layout button [icon] to open the Staff View Layout dialog box.

2.   Select your percussion track from the list.

3.   Select Percussion Staff or Percussion Line from the Clef dropdown list.

4.   Click Percussion Settings to set up the appearance of percussion notes (see below).

5.   Click Close.

Pro Audio changes the track's clef to the selected percussion clef.

To Set Up a Track's Percussion Notation Key…

1.   Click the Staff View Layout button [icon] to open the Staff View Layout dialog box.

2.   Select your percussion track from the list.

3.   Click Percussion Settings to open the Percussion Notation Key dialog box.

4.   Set up the percussion notation key according to the following table:

To do this...	Do this...
Map (bind) a percussion sound to a line or space on the staff	Select the sound (or corresponding MIDI note) in the MIDI Note list, select the intended position in the percussion staff in the Display As list, then click Bind.
Set the notehead and articulation mark for a percussion sound	Select the sound in the MIDI Note list, then select a Notehead Type and Articulation Symbol. (Only bound sounds can be assigned a notehead type and articulation symbol other than the default.)
Set the default staff position, notehead type, and articulation symbol for unbound percussion sounds	Select the default position in the Display As list, select a Notehead Type and Articulation Symbol, then click Default Note.
Remove a binding	Select the percussion sound in the MIDI Note list, then click Unbind. Unbound notes are displayed in the default position.
Load a preset	Select the preset from the Preset list.
Save your settings as a preset	Click the Save button 🖫 and enter a preset name.
Clear all bindings	Click Zap All.
Select notes in the note lists with a MIDI keyboard	Click in the MIDI Note or Display As list, then strike a key on your keyboard.

5.   Click OK to close the Percussion Notation Key dialog box.

6.   Click Close to close the Staff View Layout dialog box.

The Staff view shows the percussion clef with the note bindings and noteheads you assigned.

Ghost Strokes

In percussion notation, parentheses around a note mean that it is a ghost stroke, played very lightly and barely heard. Pro Audio supports ghost strokes by displaying parentheses around any percussion note event with velocity less than 32 (a fixed, arbitrary threshold). If necessary, you can adjust the Vel+ parameter of the track and the velocities of the individual notes to effectively move this threshold without changing the way the note sounds.

Printing

The Staff view provides printing support of standard musical notation in nine staff sizes. The Staff view prints general project information from the File Info dialog box (see "Labeling Your Projects" on page 4-34) at the beginning of the score, including the song's title (or file name), subtitle (dedication), playing instructions, author/composer, and copyright. In addition, Pro Audio identifies the tracks by number and name, and numbers each measure and each page.

Pro Audio lets you select a size for your printed score. Engravers have nine standardized sizes of the five-line staff. The vertical distance between the lines of each staff is called its rastral size, or measurement. Each rastral size has a number and is used by publishers for a specific genre of musical composition.

Number...	Trade names...	Genre usage...
0	Commercial or Public	Wire-bound manuscript
1	Giant or English	Elementary band and orchestra books; instruction booklets
2 or 3	Regular, Common, or Ordinary	Sheet music for concertos and classics
4	Peter	Folios, works for organ, etc.
5	Large middle	Band/wind ensemble music; sheet music
6	Small middle	Chorals; condensed sheet music
7	Cadenza	Pocket editions; cues in piano parts; military marches
8	Pearl	Thematic advertisement; ossia

To Print a Score...

1. Make sure the Staff view is the current window.

2. Choose *File-Print Preview*.

3. If you want, click Zoom, or click in the music, to zoom the view in and out.

4. Click the Configure button to select a rastral size.

5. When zoomed out, you can press Page Up and Page Down to navigate between pages.

6. Click Print.

Pro Audio displays the Windows Print dialog box, from which you can set up your printer and print the score.

Alternatively, you can choose *File-Print* and skip the print preview window.

The Meter/Key View

The Meter/Key view lets you enter meter and key changes at measure boundaries. Meter and key changes affect all tracks.

What Is Meter?

The meter—also known as the time signature—describes how to divide time into rhythmic pulses. When you set the meter, you are specifying the number of beats per measure and the note value of each beat. Common meters include:

• 2/4 (two beats per measure, quarter note gets a beat)

• 4/4 (four beats per measure, quarter note gets a beat)

• 3/4 (three beats per measure, quarter note gets a beat)

• 6/8 (six beats per measure, eighth note gets a beat)

The top number of a meter is the number of beats per measure, and can be from 1 through 99. The bottom number of a meter is the value of each beat; you can pick from a list of values ranging from a whole note to a thirty-second note.

The meter affects several things in Pro Audio:

• Metronome accents

• How measure, beat, and tick (MBT) times are calculated and displayed

• How the Staff view is drawn

While Pro Audio in general allows meters to have up to 99 beats per measure, the Staff view cannot display such measures. You will receive an error message if you try to use the Staff view with meters exceeding its limit.

Internally, Pro Audio stores times as "raw" ticks or clock pulses. The **timebase**—the number of pulses per quarter note (PPQ)—is adjustable, from 48 to 480 PPQ. If you are using a timebase of 120 PPQ and the song file is in 4/4 time, then a whole measure equals 480 ticks. See "Setting the MIDI Timing Resolution" on page 4-8 for more information about the timebase.

Usually the easiest approach to working with meter changes is to set all of them up before doing any recording. Use the Meter/Key view or the *Insert-Meter/Key Change* command to add meter changes at the desired measures.

What Is Key?

In musical terms, a key is a system of related notes based on the tonic (the base pitch) of a major or minor scale. A key signature is a group of sharps or flats placed immediately to the right of the clef sign. The key signature tells a performer that certain notes are to be systematically raised or lowered.

There are fifteen different key signatures—seven with sharps, seven with flats, and one without either. The fifteen key signatures correspond to fifteen different major scales, and to fifteen different minor scales (for example, the key signature for C major is the same as for A minor).

The key signature affects several things in Pro Audio:

- The key signature controls how Pro Audio displays notes. In the Event List view and some dialog boxes, Pro Audio converts the MIDI pitch number to labels like Db (D-flat in the key of C).

- The Staff view uses the key signature to display notation correctly.

- How the notes are transposed when the Diatonic option is enabled.

The key signature affects only how Pro Audio displays pitches for you. Changing the key signature does not affect the MIDI key number (pitch) stored with each note. To actually transpose pitches, use the Transpose command or edit notes individually by using the Piano Roll, Event List, or Staff views.

Frequently you use only one key signature for an entire song. The default key is C. You can change these defaults by creating your own default template file. For more information, see "Templates" on page 12-4.

Opening the Meter/Key View

To open the Meter/Key view, click ![icon] or choose **View-Meter/Key**.

The Meter/Key view displays a list of meter/key changes in the project. There is always an entry for measure 1, because there must always be a meter and key signature for the song. The default meter is 4/4 and the default key is C. You can change these defaults by creating your own default template file. For more information, see "Templates" on page 12-4.

Each meter/key change has the following properties:

Property...	Meaning...
At Measure	The measure where the meter/key change takes place.
Beats per Measure	The number of beats per measure, the upper number in the time signature.
Beat Value	The note length of a beat, the lower number in the time signature. 2 corresponds to a half note, 4 to a quarter note, 8 to an eighth note, etc.
Key Signature	The key signature.

Adding and Editing Meter/Key Changes

The Meter/Key view displays a list of all the meter/key changes in the song. You can add, delete, or edit meter/key changes by clicking the buttons at the top of the view. You can also insert meter/key changes into the project with the **Insert-Meter/Key Change** command.

To Add a Meter/Key Change...

1. Open the Meter/Key view.

2. Click Add ![icon], or choose ***Insert-Meter/Key Change***, to open the Meter/Key Signature dialog box.

Meter/Key Signature

At Measure: 6

Meter

Beats per Measure: 4

Beat Value: 4

Key Signature

1 Sharp (G)

OK | Cancel | Help
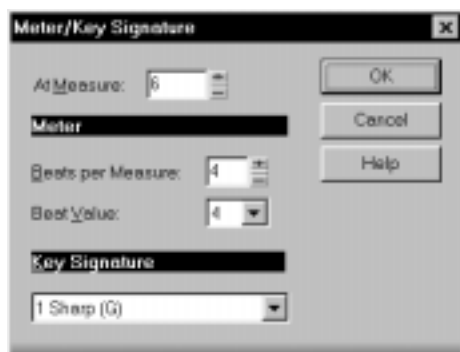
3. Enter information about the new meter/key change.

4. Click OK.

Pro Audio inserts the meter/key change into the project. The meter/key change will appear in the Staff view at the appropriate measure.

To Delete a Meter/Key Change...

1. Select the meter/key change to be deleted from the list.

2. Select additional meter/key changes by using Shift-click and Ctrl-click.

3. Click Delete ![icon].

Pro Audio removes the meter/key change from the project. Note that you cannot delete the first meter/key change from measure 1 of a project.

To Move a Meter/Key Change...

1. Select the meter/key change to be moved.

2. Click Add ![icon].

3. Edit the Measure parameter to the meter/key change's new measure.

4. Click OK.

5.   Select the original meter/key change again.

6.   Click Delete ⊠.

Pro Audio removes the original meter/key change and inserts a copy of it at the new measure.

To Edit a Meter/Key Change...

1.   Select the meter/key change to be edited.

2.   Click Change 🖼 to open the Meter/Key Signature dialog box.

3.   Edit the meter/key change properties.

4.   Click OK.

Pro Audio changes the properties of the meter/key change.

Working with Lyrics

Pro Audio lets you create, edit, and display lyrics, the words and syllables associated with notes in a track. Lyrics can be the words to a song, the text of a vocal passage, a narration to be read along with the music, cues of some type, or text totally unrelated to the music. Each word or syllable in the lyrics must be associated with a note in a MIDI track. Each MIDI track can have its own lyrics.

Although lyrics can logically be associated with digital audio data, you cannot actually place lyrics in an audio track. If you want to create lyrics for an audio track, you must create an auxiliary MIDI track to hold the lyrics.

You can enter and edit lyrics in two ways:

•   Using the Lyrics tool in the Staff view

•   Using the Lyrics view

•   Inserting lyric events in the Event List view.

The Staff view is usually the preferred location for entering lyrics, since you can see the notes with which the lyrics are associated. The Lyrics view can also be used for entering or editing lyrics, but its main strength is that it can display lyrics in a larger, more readable format. You might use the Lyrics view to display song lyrics during recording and playback, so performers can see the words and sing along. You can make the font size in the Lyrics view as large as desired, so that the lyrics can be read

at a distance from the monitor. During playback, the current line in the lyrics is enclosed in a box and the current word is highlighted.

Lyric events are similar to text events. Like any other event, they occur at a particular time. They contain text, just like general-purpose text events, but generally they contain only a single word (or syllable of a word). As events, Lyrics can be edited in the Event List view (see "The Event List View" on page 6-43).

Adding and Editing Lyrics in the Staff View

The Staff view displays lyrics below their associated track. If the track is split into treble/bass staves, lyrics are aligned with notes in both staves, but are displayed below the treble staff.

When a lyric word or syllable spans multiple notes, a trailing underline or series of regularly spaced hyphens is automatically drawn, following conventional lyric notation practice.

To Add Lyrics to a Track...

1. Click the Draw tool [icon].

2. Select the Lyrics tool [icon].

3. Position the pointer below the staff, under the first note to be assigned lyrics. (The pointer changes to a pencil when you are in a legal position.)

4. Click to open an insertion box.

5. Follow the instructions in the table:

To do this...	Do this...
Enter a word or syllable	Type it in the insertion box
End the word or syllable and move to the next note	Type a space, tab, or hyphen
Skip over a note	Type a space or hyphen
Move back to the previous note	Press Shift-Tab

6. Press Enter when you are done.

Pro Audio displays the new lyrics below the staff.

To Edit Lyrics...

1. Click the Draw tool ![draw tool icon].

2. Click the word you want to change.

3. Edit the word as desired.

4. Press Enter.

Pro Audio replaces the old word with the new one.

Opening the Lyrics View

There are three ways to open the Lyrics view:

*   In the Track view, select the track whose lyrics you want to see, then click ![button]

*   In the Track view, select the track whose lyrics you want to see, then choose *View-Lyrics*

*   Right-click a clip in the Clips pane and choose *Lyrics* from the menu

The Pick Track button ![icon] opens a dialog box where you can select the track whose lyrics you want to see. Select the desired track, then click OK.

To select a font for the display, use one of the following:

Option/Button...	Purpose...
![f_a icon]	Selects the first font. By default, this is a small font useful for editing.
![f_b icon]	Selects the second font. By default, this is a larger font useful for reading lyrics at a distance.
![Font button]	Opens a dialog where you can select a font. The selected font is then assigned as Font A or B (depending on which is currently selected).

Adding and Editing Lyrics in the Lyrics View

Lyrics appear in the Lyrics view as a stream of syllables, each one associated with a note in the track. In this context, a **syllable** is any continuous string of characters, without a hyphen. For example, "love," "desire," and "infatuation" are all syllables; each one would be associated with a single note. If you want to break a word into multiple syllables, you must hyphenate the word. For example, "de-sire" would map onto two notes, since it is now two syllables long.

When you enter the lyrics, you can mark the syllables the way you want, or you can simply type the text in normally and use automatic hyphenation to break the text into syllables. This means that you can add lyrics to a project by copying and pasting them from another application (such as a word processor), and then hyphenate them automatically.

To extend a single syllable over more than one note, you can use extra hyphens, separated by spaces. For example, in "Oh-say can you see…", the "Oh" is extended over two notes. If a track contains no lyrics yet, the display will show only a series of hyphens (one for each note in the track).

If you enter more syllables than there are notes in the track, Pro Audio assigns the extra lyrics times at quarter note intervals.

To Enter Lyrics in the Lyrics View...

1. Click in the upper left corner of the view to position the cursor at the start of the text.

2. Follow the instructions in the table:

To do this...	Do this...
Enter a word or syllable	Type it
End a word or syllable and move to the next note	Type a space or hyphen
Break a line for easier viewing	Press Enter

To Edit Lyrics in the Lyrics View
Editing in the Lyrics view follows standard Windows conventions for cursor movement, selection, cut (ctrl+x), copy (ctrl+c), paste (ctrl+v), and delete (Delete). When you pause, Pro Audio will update all lyric events in the track.

To Hyphenate the Lyrics...

1. If you want, select a portion of the lyric text. If you do not select any text, all the lyrics will be hyphenated.

2. Click the Hyphenate button.

Pro Audio hyphenates the lyrics.

9

Mixing and Effects Patching

This chapter describes the Console view, a live digital mixer that gives you full track-by-track control over recording and playback of your project. Using the Console view, you can:

- Set track parameters such as port, channel, bank, patch, and source

- Mute and solo tracks

- Arm tracks for recording

- Monitor your input devices with track level meters

- Control volume and panning

- Control MIDI track chorus and reverb

- Add real-time effects to digital audio and MIDI tracks

The Console view supports automation, which lets you record and play back volume and pan changes and MIDI reverb and chorus settings.

The Console view also lets you mix together the digital audio portions of a project, including all real-time effects and control movements, to a stereo track or stereo pair of audio tracks. You can use the mixed-down tracks to create a CD master or to put your work on the World Wide Web.

In This Chapter

The Console View

The Console view contains all the controls you need to mix your project. To open the Console view click the Console view button ▨ or choose *View-Console*.

Toolbar ——

MIDI module ——

Audio module ——

Mute/Solo/Arm buttons ——
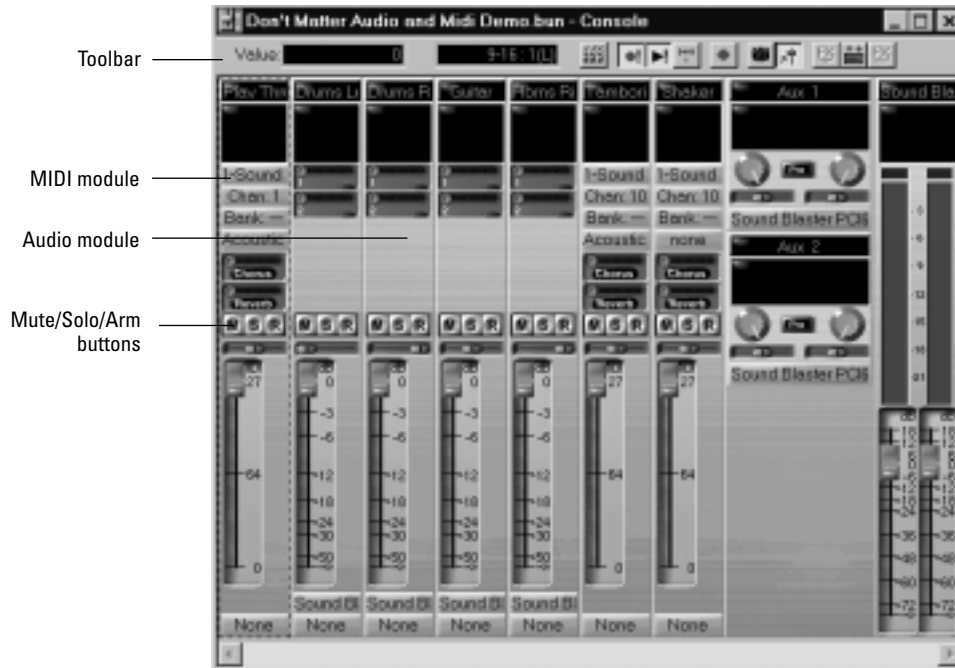
Sound controls in the Console view are grouped in **modules**. There are four types of modules:

Module type...	What you can do...
MIDI track	Set the track's output port, channel, bank, and patch; set the input source; mute, solo, and arm the track; set channel volume, panning, chorus, and reverb levels; apply real-time effects
Audio track	Set the track's output port; set the input source and monitor input levels; mute, solo, and arm the track; set track volume and panning; apply real-time effects; send audio data to aux buses

Aux bus	Receive input from one or more audio tracks, apply real-time effects, and send the results to an output port
Main	Apply real-time stereo master effects; monitor output levels using meters; control the stereo volume of audio output to an audio port

One module is always outlined with a broken line. This corresponds to the track with the focus in the Track view. You can change the focus by clicking to the right of the module's volume fader.

The Console view contains several different types of controls. Here's how they are used:

Adjust the slider to the desired setting

Right-click to patch an effect

Click a button to enable/disable it

Drag the pan fader left or right

Drag the volume fader up or down

Click the button to select from a menu
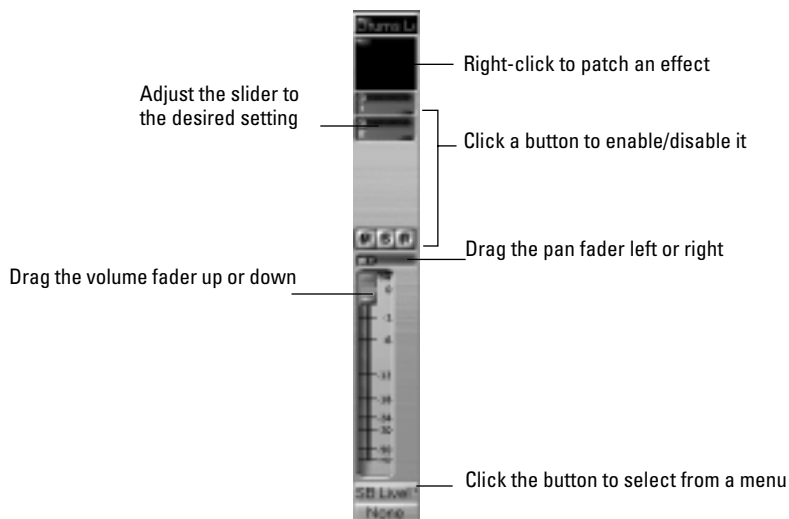
You can adjust knobs in four different ways:

• Click along the outer edge of the knob to move the knob to that position

• Drag the outer edge of the knob in a circular motion to set the desired position

• Click on the center of the knob and drag the mouse up or down to adjust the knob

• Double-click the center of the knob to return it to its snap-to position

Volume and pan faders also have snap-to positions; double-click a fader's knob to return the fader to its snap-to value.

The controls and effects patch points all have tool tips associated with them. To see a description of a particular control or effect, simply rest the cursor over the item for a few seconds.

Configuring the Console

The Console view can be reconfigured in a variety of ways. You can:

- Choose the modules that you want to see

- Adjust the display of audio meters and clip indicators

- Change the number of aux buses

- Choose between balance or pan controls on aux buses and main outputs

- Set control snap-to positions

- Insert new tracks

- Name tracks and aux buses

Meters are helpful in determining the relative volumes of your audio tracks and in detecting and preventing overload. By default, the Console view displays output level meters in Main output modules at all times, and displays record level meters in individual tracks whenever they are armed and have an audio input source. The display of meters, however, can place a considerable load on your computer. Showing only the peak indicators, or hiding the meters entirely, can reduce the load on your computer. This may increase the number of audio tracks and real-time effects you can play back at one time.

There are three options you can access from the ***Options-Audio*** command that affect the layout and operation of the Console view. First, Pro Audio lets you control the number of aux buses that appear in the Console view. If you are not planning to make use of any aux buses, you can reduce this number to zero to save space and make the Console view more compact.

Second, Pro Audio lets you choose two modes of operation for the stereo pan/balance controls:

Mode...	What it means...
Balance	Constant audio is not maintained as the signal is swept across the stereo field. As the balance control is moved toward the left channel, for example, the volume of the right channel is gradually reduced to zero, while the left channel volume is left unchanged.
Pan (Constant Power)	Constant audio is maintained as the signal is swept across the stereo field. As the pan control is moved, both the right and left channel volumes are changed to ensure that the total power delivered to the two channels remains constant.

Third, Pro Audio offers two **tapering** options for how MIDI volume and velocity are combined to produce actual gain values. With either option, the actual effective gain on an audio track is the product of two gain contributions. One contribution comes from the track volume. The other comes from the event velocity and track velocity offset.

The track volume gain contribution is the same regardless of the taper. If the MIDI volume is m, then the gain contribution gVolume is as follows:

$$gVolume = (m \wedge 2)/(127 \wedge 2)$$

The velocity contribution depends on the taper you've chosen. If the sum of the event velocity and the track velocity offset is v, then the velocity contribution gVelocity is as follows:

Tapering option...	Velocity contribution...
Linear	gVelocity = (v - 103) * 0.75 (approximate)
Quadratic	gVelocity = (v ^ 2) / ((127 ^ 2) / 4)

To Choose the Modules that are Displayed...

1. Click the Module Manager button ▦ to open the Module Manager dialog box.

2. In the module list, check those modules you would like displayed in the Console view, and uncheck the rest. You can use Shift-click, Control-click, or the quick select buttons to select multiple modules; press Space to check or uncheck all the selected modules at once.

3. Click OK.

To Hide a Module...

1. Right-click on the module and choose *Hide Module*.

To Change the Meter Display...

1. Use the tools in the Console view toolbar as described in the table that follows:

Tool...	How it works...
[icon]	When pressed, Record level meters are displayed when a track has an audio input source and is armed for recording.
[icon]	When pressed, Playback level meters are displayed on all Main outputs.
[icon]	When pressed, peak indicators are displayed instead of meters. The peak indicators light if the signal is clipping.

To Change a Meter's Range...

Right-click on the meter and choose a new range.

To Change the Number of Aux Buses...

1. Choose *Options-Audio* and click the General tab.

2. Enter the desired number of aux buses in the Number of Aux Buses box.

3. Click OK.

The next time you start Pro Audio, the Console view contains the designated number of aux buses.

To Choose Balance or Pan Controls...

1. Choose *Options-Audio* and click the General tab.

2. Choose Balance Control or Constant Power in the MIDI Pan Mapping box.

3. Click OK.

Pro Audio interprets MIDI pan messages as you requested.

Mixing & Effects

To Set the Volume Taper...

1. Choose **Options-Audio** and click the General tab.

2. Select Linear Scale or Quadratic Taper from the MIDI Volume Mapping list.

3. Click OK.

Pro Audio combines volume and velocity according to the settings you have chosen.

To Set the Snap-to Position of a Knob or Fader...

1. Set the control to the desired position.

2. Right-click on the control and choose **Set Snap-To=Current**.

From now on, the control returns to this position when double-clicked.

To Insert a New Track...

1. Right-click on an empty area in the Console view.

2. Choose **Add Track-Audio** or **Add Track-MIDI**.

Pro Audio adds a new track to the project..

To Rename a Track or Aux Bus...

1. Click on the module name.

2. Type a new name.

3. Press Enter.

If you rename a track, the new name is copied to the Track view. If no name has been assigned to a track, the Console view displays the track's number.

Mixing MIDI

Each MIDI track in your project is assigned a strip in the Console view.
A MIDI strip looks like this:
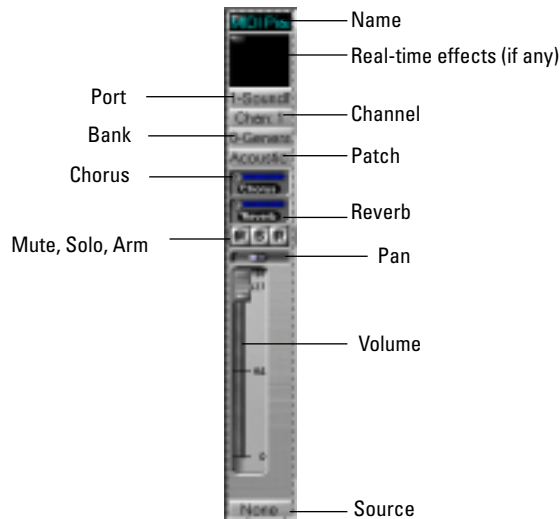
The chorus, reverb, pan, and volume controls work by sending controller
messages to your MIDI device. As you move the knobs and faders for
these controls, the controller value is shown in the Console view toolbar.
These messages are merged into the stream of MIDI data sent to the
output port (note that not all MIDI devices support chorus and reverb
controller messages).

Tip:
You can control the level of all MIDI tracks at once by grouping the
MIDI faders. For more information, see "Using Control Groups" later
in this chapter.

You can control the mixing and playback of a MIDI track as follows:

To do this...	Do this...
Add a real-time MIDI effect to the track	Right-click in the Effects patch point and select an effect from the list (for more information, see "Using Real-Time Effects" later in the chapter)
Remove an effect	Select the effect and press **Delete** or right-click and select **Delete**.
Select the output port	Click the Port button and choose one from the list
Select the channel	Click the Channel button and choose one from the list
Select the bank	Click the Bank button and choose one from the list
Select the patch	Click the Patch button and choose one from the list
Set the Chorus level	Adjust the Chorus slider
Set the Reverb level	Adjust the Reverb slider
Mute the track	Click the Mute button
Solo the track	Click the Solo button
Arm the track for recording	Click the Arm button
Set the Pan level	Adjust the Pan fader
Set the Volume level	Adjust the Volume fader
Select the input source	Click the input source button and choose one from the list

When moving the Volume fader, the Value box in the toolbar displays the level from a scale of 0 (minimum) to 127 (maximum). When you move the Pan slider, the Value box displays the pan value on a scale that ranges from 0 (hard left) to 64 (center) to 127 (hard right).

Routing and Mixing Digital Audio

The Console view lets you route and mix your digital audio data in a number of different ways. The "wiring diagram" for digital audio in the Console view looks like this:
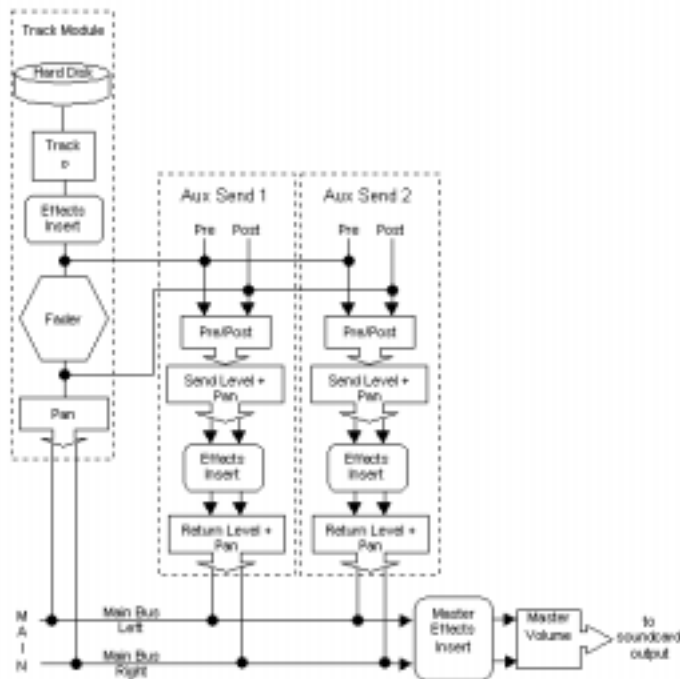
Audio events in each track are processed by any real-time audio effects you have patched in place, passed through the track pan control and volume fader, and then sent to the designated main output, in stereo.

This is shown in the picture below:

Real-time effects (if any) —

Aux Send level sliders —

————— Aux Send on/off button

Pan control —

Volume fader —

Destination (main output) —

————— Source (audio input)
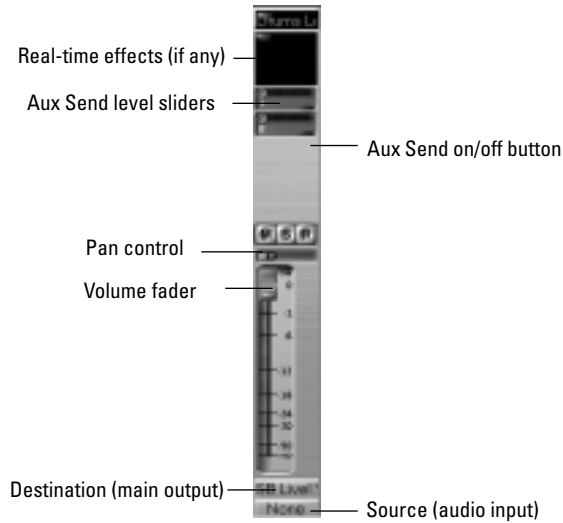
Any audio track can be tapped, before or after the track volume control, and sent to one or more aux buses. An aux bus can tap any number of audio tracks. Each track's data passes through the track's send level knob on its way to the aux bus. This is shown in the diagram below:

————— Pre-fader (volume is not adjusted by the incoming track volume fader)

Both tracks routed to Aux 1 —

This track is routed to Aux 2 —

————— Post-fader (volume is adjusted by the incoming track volume fader)
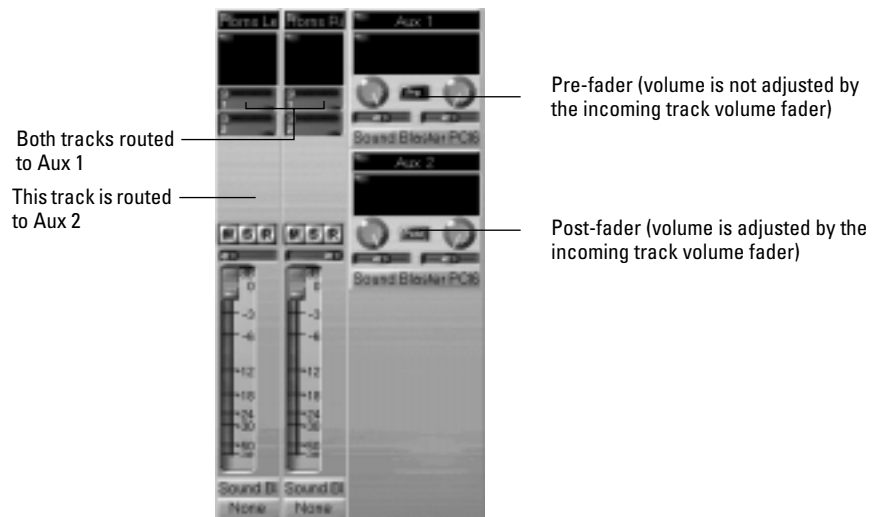
The audio in each aux bus passes through the send level and pan controls, is processed by any real-time effects you have patched, sent through the return level and pan controls, and then sent to the designated main output, in stereo. This is shown in the picture below:

Real-time effects

Send level

Send balance

Return level

Return balance

Destination (Main output)
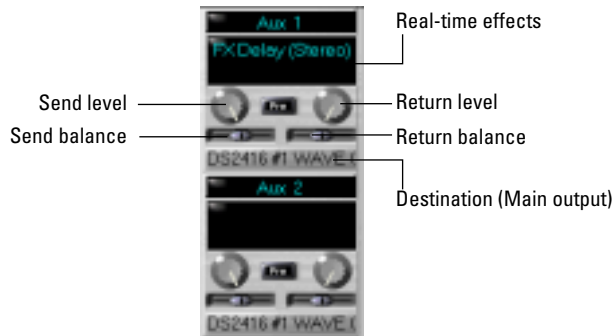
At each main output, all audio data from audio tracks and aux buses that were routed to the main are mixed together and processed by the main's real-time effects. Finally, the data passes through the master volume faders and is sent to the output port, as shown in the following picture:

Real-time effects

Level meters

Left channel output volume fader

Right channel output volume fader
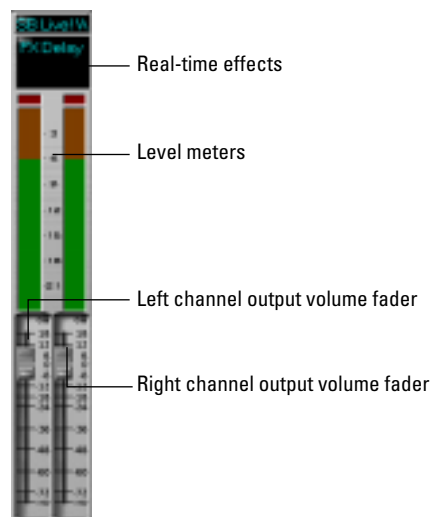
Audio Track Modules

You control the mixing and playback of an audio track as follows:

To do this...	Do this...
Add a real-time audio effect to the track	Right-click in the Effects patch point and select an effect from the list (for more information, see "Using Real-Time Effects" later in the chapter)
Remove an effect	Select the effect and press **Delete** or right-click and select **Delete**.
Send audio data from the track to an aux bus	Select the corresponding Aux Send Enable and set the Aux Send Level (for more information, see "Aux Buses," the next section)
Mute the track	Click the Mute button
Solo the track	Click the Solo button
Arm the track for recording	Click the Arm button
Set the Pan level	Adjust the Pan control
Set the Volume level	Adjust the Volume fader
Select the output port	Click the Output Port button and choose one from the list
Select the input source	Click the Input Source button and choose one from the list

When moving the Volume fader and Aux Send Level knobs, the Value box in the toolbar displays the value in dB (decibels). A value of 0 dB indicates full signal strength; negative values indicate an attenuated signal. When you move the Pan slider, the Value box displays the pan value on a scale that ranges from 0 (hard left) to 64 (center) to 127 (hard right).

Aux Buses

Aux buses are useful for mixing together different audio tracks (in stereo) and applying effects to the mix. You can mix the tracks at different volume levels by adjusting each track's aux send level. Each track's Pan control is used to determine its right/left position in the mix.

You control the aux bus as follows:

To do this...	Do this...
Send audio data from an audio track to the aux bus	In the audio track's strip, press the Aux Send Enable button corresponding to the aux bus
Set the level of the audio data sent to the aux bus	In the audio track's strip, set the Aux Send Level corresponding to the aux bus
Bypass all input audio tracks' volume faders	Press the Pre-Fader Enable button
Set the input level to the aux bus	Adjust the Send level
Set the input panning to the aux bus	Adjust the Send pan
Add a real-time audio effect to the bus	Right-click in the Effects patch point and select an effect from the list (for more information, see "Using Real-Time Effects" later in the chapter)
Remove an effect	Select the effect and press *Delete*, or right-click and choose *Delete*
Set the output level	Adjust the Return level
Set the output panning	Adjust the Return balance
Select the output port	Click the Output Port button and choose one from the list

As with Audio strips, the Value box in the toolbar displays the send and return levels in decibels and the send and return balance values on a scale of 0 to 127.

Audio Main Output Modules

One module in the Console view is dedicated to each audio output port. The number of main modules you will see depends upon the number and type of audio outputs in your computer. Some sound cards have multiple audio outputs; each stereo output will have its own module in the Console view. If the mains on your audio card are mono, choose *Options-Audio*, click the General tab, and click the Mono box. The mains will then appear as mono in the Console view.

Here's what you can do in the main modules:

To do this...	Do this...
Add a real-time audio effect to the mix	Right-click in the Effects patch point and select an effect from the list (for more information, see "Using Real-Time Effects," later in the chapter)
Remove an effect	Select the effect and press **Delete**, or right-click and choose **Delete**
Set the output volume	Adjust the Left or Right Volume fader

As you drag the volume sliders, the Value box in the toolbar displays the volume level in decibels.

Using Real-Time Effects

In Chapter 6, you learned how to use Pro Audio's plug-in MIDI effects to modify MIDI data, and in Chapter 7, you learned how to use Pro Audio's plug-in audio effects to modify digital audio data. In the Console view, you can use plug-in effects nondestructively, in real time.

For example, suppose you want to add a reverb effect to an audio track containing a recorded violin solo. You could do it in two different ways:

• Select the track's data in the Track or Audio view and use the ***Edit-Audio Effects-Cakewalk-FX Stereo Reverb*** command.

• In the Console view, patch the Cakewalk FX Stereo Reverb effect in the track's patch point.

Let's look at the advantages and disadvantages of each method.

In the first (offline) case, you are applying a destructive edit. The digital audio data itself is modified. Although this may be exactly what you want, it does limit your options. If you want to modify the effect parameters slightly or to remove the effect and try a different effect, you must use the ***Undo*** command, or revert to a saved copy of the original data.

In the second case, you are applying the effect nondestructively—the digital audio data in your track is not changed but simply altered on the fly during playback. This means you can experiment with effects parameters, bypass effects, or remove them entirely at any time. Since most effects require complex numeric calculations, real-time effects

processing puts a heavy load on your computer's CPU. If you use too many effects, the CPU will not be able to keep up and playback will sound choppy and disconnected.

You can also apply real-time audio effects to a submix in an aux bus or to a main output. For example, rather than patching separate reverb effects in each of several guitar tracks, you can mix the guitar tracks together in an aux bus and apply a single reverb effect to the submix. This makes much more efficient use of CPU time. Patching effects on an aux bus or main output also opens up new creative possibilities.

There are several reasons why you might want to apply effects offline (destructively):

- If you want to apply more effects than your CPU can handle, applying some of the effects offline will reduce CPU usage during playback.

- If you want to apply effects to an individual audio event or clip, rather than the whole track, it is simpler to do so using offline effects.

The ***Tools-Mixdown Audio-Export to File(s),*** allows you to apply real-time effects when you export, so you do not need to apply your effects destructively or use the ***Mixdown Audio-Bounce to Track(s)*** command to prepare the tracks beforehand. For information about ***Mixdown Audio***, see "Mixing Down and Distributing Audio" on page 9-29.

Effects Parameters

Each effect in an effects patch point has its own independent set of parameter values. For example, you can apply a short reverb in one track and a long reverb in another track. The dialog boxes for real-time effects contain the same parameters described in Chapters 6 and 7, though there are a few differences:

- You can adjust the parameters while playback is in progress, so there is no need for an Audition button.

- For Audio effects, because mixing is handled through the Console view, there is no Mixing tab.

- You do not need to click OK for the effect to be applied.

Refer to the sections "MIDI Effects" on page 6-49 and "Audio Effects" on page 7-37 for descriptions of the effects and their parameters.

Using Real-Time Effects

It is very easy to use the Console view's real-time effects. Here's what to do:

To do this...	Do this...
Add a real-time effect to a MIDI track, audio track, aux bus, or main	Right-click in the Effects patch point and select an effect from the list
Change the order in which effects are used	Drag the effects up or down in the patch point list
Edit an effect's parameters	Double-click on the effect to open the effect's dialog box
Move an effect to a different patch point	Drag the effect to another patch point

When you place an effect in the patch point, an abbreviated name is used to describe the effect. Sometimes the limited space makes it impossible to identify the effect. If this occurs, simply rest the cursor over the effect for a second or two, and a tool tip will pop up to display the full name of the effect.

Applying Audio Effects

From the Console view you can destructively apply audio effects for one or more tracks. When you are pleased with the audio effects you have patched into a track, you can apply the effects to the track. Applying effects to a track saves resources, allowing you to include additional tracks and/or effects.

Note:

Effects can be undone, but effects are not re-patched in the Effects bin(s).

To Apply Multiple Audio Effects Offline...

1. Add one or more audio effects to one or more tracks in either the Track view or the Console view.

2. In the Track view, select the tracks or clips you want to be affected.

3. Open the Console view and click ▣.

   The Apply Audio Effects dialog appears.

4. If desired, select the option to delete the effects after applying them.

5. Click OK.

If you do not delete the effects after applying them, they remain applied.

Applying MIDI Effects

The Console view lets you destructively apply the MIDI effects in a track's patch point. This makes it easy for you to experiment with MIDI effects before you commit to them on a more permanent basis.

To Apply MIDI Effects Destructively...

1. In the Track view, select the tracks or clips to be affected.

2. In the Console view, click ▣ to open the Apply MIDI Effects dialog box.

3. If desired, select the option to delete the effects after applying them.

4. Click OK.

If you don't delete the effects after applying them, they continue to be applied during playback, even though they have already been applied once.

CPU Usage of Audio Effects

The number of real-time audio effects that your computer can handle depends on the number of audio tracks in your project, the number and type of effects you want to apply, and the type and speed of your CPU. Certain effects are more CPU-intensive than others, and enabling certain settings (such as using equalization within the Stereo Reverb)

increases CPU usage for those effects. The following table shows a comparison of the relative CPU usage of Pro Audio's FX effects.

Effect...	Typical...
Parametric EQ	5-9%
Stereo Chorus	8-14%
Stereo Delay	9-16%
Stereo Flanger	8-14%
Stereo Reverb	15-23%

CPU usage was measured on a MHz Intel Pentium processor under Windows 95.

Using Control Groups

Pro Audio lets you link faders, knobs, or buttons in the Console view into **groups**. Groups are collections of controls whose movements are linked together. For example:

- Two volume faders can be grouped so that when you increase or decrease the volume of one track, the volume of the other track changes in exactly the same way.

- Four mute buttons can be grouped so that when you click on the mute button to mute track 1, tracks 1 and 2 are muted and tracks 3 and 4 are un-muted.

The Console view identifies knobs and faders that are grouped using a colored group indicator that is displayed on the controls in each group. The controls in group A are displayed with a red indicator, the controls in group B with a green indicator, and so on. Faders and knobs can be grouped together. Buttons can only be grouped with other buttons.

When you group buttons together, the way they work is based on their position when you create the group:

- Buttons that are in the same position when grouped will turn on and off together at all times.

- Buttons that are in opposite positions when grouped will always remain in opposite positions.

With faders and knobs, you have several additional options. There are three general types of groups: absolute, relative, and custom. Here's how they work.

Absolute

The range of motion in all controls in the group is identical. When you move one control in the group, all other controls in the group move the same amount in the same direction. The controls do not necessarily need to start at the same level. Here are two examples:
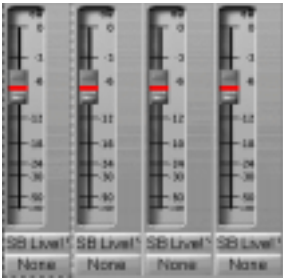
The controls are grouped in this position
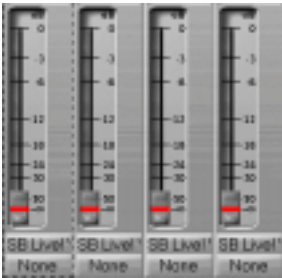
The first control is raised to maximum volume
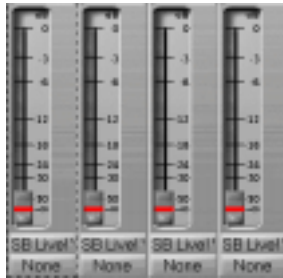
The first control is lowered to minimum volume
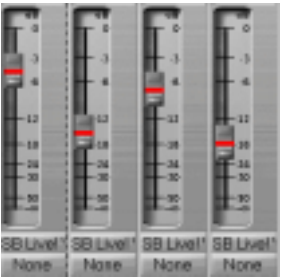
The controls are grouped in this position
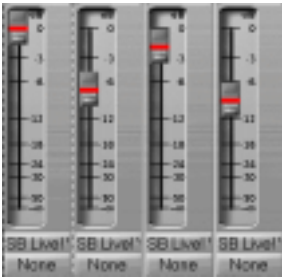
The first control is raised to maximum volume
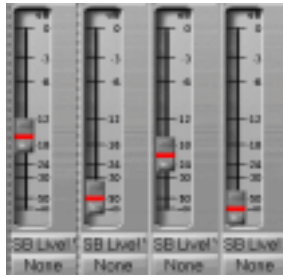
The fourth control is lowered to minimum volume

Relative

The range of motion for controls in the group is not the same. All controls in the group have the same value at one point—the lowest level for send,

return, and volume levels, and zero for pan controls. Here are two examples:

The volume controls are grouped in this position
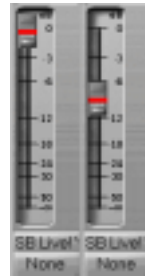
The first control is raised to maximum volume

The first control is lowered to zero volume

The pan controls are grouped in this position

The first control is panned to center

The first control is panned to the right

Custom

Sometimes you want to define a more complex relationship between the controls in a group. For example:

- You want two controls two operate in reverse—when one fader drops, the other increases (cross fade).

- You want two volume faders grouped so that they are locked together at maximum level, but drop at different rates.

- You want two faders to be locked together with the same range of motion, but a third fader grouped with them to have a different range of motion.

Custom groups let you set the range of motion for each control in the group by entering a starting and ending value. As any one control in the group is moved from is starting position to its ending position, the other controls in the group exercise their full range of motion.

When you have defined a custom group, you can adjust the starting and ending position of each control using the Group Settings dialog box or using pop-up menus on the controls in the group.

To Add a Control to a Group...

1.   Right-click on the control.

2.   Choose a group from the **_Group_** submenu.

Pro Audio adds the control to the group. Knobs and faders are highlighted with the group's color indicator.

To Remove a Control from Its Group...

1.   Right-click on the control.

2.   Choose **_Ungroup_** from the menu.

Pro Audio removes the control from the group and displays the control with the neutral color indicator.

To Set the Group Type to Relative or Absolute...

1.   Right-click on any control in the group and choose **_Group Properties_** to display the Group Properties dialog box.
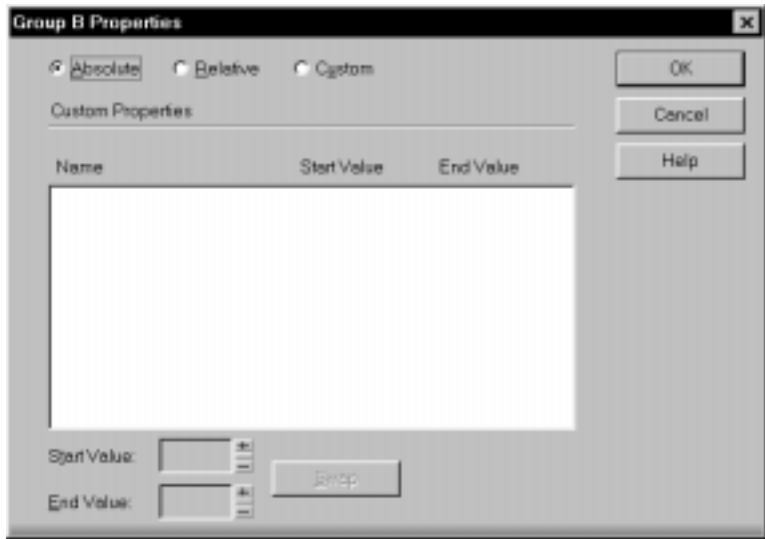
2.   Choose Absolute or Relative as the group type and click OK.

Pro Audio uses the type to determine the range of motion for the group's controls.

To Create a Custom Group...

1. Right-click on any control in the group and choose **Group Properties** to display the Group Properties dialog box.

2. Choose Custom as the group type. The starting and ending values for each control are displayed.

3. To change the starting or ending value for a control, click on the control in the list and enter new values in the Start and End box.

4. To swap the starting and ending value, click the Swap button.

5. Click Close when you are done.

Pro Audio uses the type to determine the range of motion for the group's controls.

To Adjust the Start Value of a Control...

1. Set the control to the desired starting value.

2. Right-click on the control.

3. Choose **Set Start-Current**.

Pro Audio sets the start value of the control.

To Adjust the End Value of a Control...

1. Set the control to the desired ending value.

2. Right click on the control.

3. Choose **Set End-Current**.

Pro Audio sets the end value of the control.

Using Remote Control

Pro Audio lets you use a MIDI device to remotely control knobs, buttons, and sliders in the Console view. For example, you can:

• Use a key on your keyboard to temporarily mute a track

• Work the send level in an aux bus with your pitch bend wheel

• Set the main volume levels with NRPN messages

If you set up remote control for a grouped control, the remote control works all controls in the group.

The type of MIDI message used to work a control is selected in the Remote Control dialog box. The options are as follows:

Message option...	Message effect on buttons...	Message effect on sliders and knobs...
None	No remote control	No remote control
Note On	The button state is toggled	The slider/knob is alternately maximized and minimized
Note On/Off	The button state is toggled when Note On is received, and toggled again when Note Off is received	The slider/knob is maximized when Note On is received, and minimized when Note Off is received
Controller	Not applicable	The slider/knob value is set to the controller value
Wheel	Not applicable	The slider/knob value is set to the wheel value, with the values mapped from their original range of –8,192 to 8,191 to a range of 0 to 127
RPN	Not applicable	The slider/knob value is set to the RPN value, with the values mapped from their original range of 0 to 16,383 to a range of 0 to 127
NRPN	Not applicable	The slider/knob value is set to the NRPN value, with the values mapped from their original range of 0 to 16,383 to a range of 0 to 127

To Set Up Remote Control for a Knob, Button, or Fader...

1. Right-click on the control and choose **Remote Control** from the menu.

2. Choose the remote control type, as described in the table above.

3. Set the note or controller number if applicable.

4. Click OK.

You can now work the control from your MIDI device.

Recording Automation Data

You can move the knobs and faders in the Console view while playing back a project to adjust the playback levels and panning. In addition, you can record changes that you make to these controls so that the changes become a part of your project. Recording changes so that they play back automatically is known as **automation**.

There are two general approaches to recording control movements:

Approach...	How it works...
Snapshot	You set all the controls to the values you want, and then create a snapshot of these settings at a particular Now time. When you play back the project later, all the controls will snap back to these settings when you reach the appropriate Now time.
Real-time recording	You move controls in any way you like during either recording or playback. The changes you make are recorded so that they become part of your project. When you play back the project later, the controls move exactly as you recorded them.

The first approach is useful, for example, when your project contains a variety of distinct sections and you want to make a sudden change in one or more settings between the sections.

The latter approach is most useful when you want to create smooth transitions from one section to another. For example, you could crossfade two audio tracks or gradually change the stereo balance on an aux bus. Once you record these changes, they will play back along with your project automatically.

Pro Audio is smart about recording data in real time. Automation data is recorded only for the controls you actually manipulate and only for the period of time in which you adjust the control. This lets you record automation data in multiple passes—the first time through you record one control's movements, the second time you record a different control's movements, etc.

The Console view lets you record and re-record automation data as many times as necessary. When you record new movements for a control, any old events for that control during the same time interval are replaced by the newer ones. Movements of other controls are unaffected.

You can re-record moves again and again until you've got the movement exactly how you want it. You can also edit automation data using the Controllers pane in the Piano Roll view.

Automation data for an individual track is saved as a series of controller events on the corresponding track. Automation data for an aux bus or main is saved as a series of controller events on a special track, with a track name of "Console Automation Data." This track is displayed in the Track view; deleting the track will remove all aux and main automation data. However, this track is not displayed in the Console view.

There are three tools in the Console view toolbar that are used to control recording and automation:

Icon...	Tool...	What it's for...
	Update	Makes the knobs and faders in the console update automatically during playback
	Snapshot	Records a snapshot of the current position of all knobs and faders
	Record	Activates real-time recording of all knob and fader movements

If you are not happy with the automation data you recorded, you can always use *Undo* to remove it. The automation data you record using the Console view can be displayed and edited using either the Controllers pane in the Piano Roll view or the Event List view. For more information on the Controllers pane, see "Controllers, RPNs, NRPNs, and Automation Data" on page 6-35. For more information on the Event List view, see "The Event List View" on page 6-43.

To Record a Snapshot While Playback Is Stopped...

1. Set the Now time to the point in the project where you want the settings to take effect.

2. Adjust the knobs and faders to the desired settings.

3. Click .

Pro Audio records a snapshot of the current control settings.

If the Now time is the very beginning of the project, then the snapshot will change the track parameters to match the controls in the panel, instead of recording automation events.

To Record a Snapshot While Playback Is in Progress...

1. Make sure the button in the Console view toolbar is not pressed so that update is disabled.

2. Change the Now time to a few bars or seconds before the time you wish to take the snapshot.

3. Adjust the knobs and faders to the desired settings.

4. Start playback.

5. When you have reached the appropriate time, click on the Snapshot button.

Pro Audio records a snapshot of the current control settings.

To Record Control Changes in Real Time...

1. Make sure the button in the Console view toolbar is pressed so that automation recording is enabled.

2. Set the Now time to a few bars or seconds before the time at which you want to record knob and fader movements.

3. Click or press the Space bar to start playback.

4. Adjust the controls as you wish while playback is in progress.

5. When you are done, click or press the Space bar to stop playback.

6. Click the button in the Console view toolbar to turn off real-time recording.

Pro Audio saves controller messages for any knob or slider you moved during playback. The data replace any previous data in that time period, for that controller, on that track.

To View and Edit a Control's Automation Data...

1. Right-click on the control and choose **_Edit Automation Data_**.

2. In the Controllers pane of the Piano Roll View, edit the controller data as desired.

For more information about editing controller data in the Piano Roll view, see Chapter 6, *Editing Events and Controllers*.

Mixing Down and Distributing Audio

The **Mixdown Audio-Bounce to Track(s)** command lets you combine one or more audio tracks into a submix. A submix can be a mono track, a stereo track or two mono tracks (one for the right stereo channel and one for the left) that contain the mixture of the original tracks, preserving the volume, pan, and effects for each track. After their creation, the submix tracks are just like any other tracks -- you can edit them, add effects, copy them to another project, etc. The original, unmixed audio tracks are not deleted, so you can archive them and recover them later, or continue using them as before.

The **Mixdown Audio-Bounce to Track(s)** command operates completely offline, meaning you can mix down tracks that may be too complex for your machine to actually play in real time.

Here are some reasons to use **Mixdown Audio-Bounce to Track(s)**:

*   Your mix is so complex that realtime playback is impossible. **Mixdown Audio-Bounce to Track(s)** will produce the correct mix, and store the result in a new track or pair of tracks.

*   You are running out of audio tracks. **Mixdown Audio-Bounce to Track(s)** can combine any number of audio tracks into just one or two tracks.

*   You require more CPU time for your real-time effects. With **Mixdown Audio-Bounce to Track(s)**, you can premix some of your tracks with real-time effects applied, saving CPU time during playback.

If you mix down to tracks that already have data, the new events are placed in the track, but do not overwrite existing material.

If you have multiple audio devices (such as two sound cards) you can check the option to create a mix for each wave device. This will create a separate submix (on a separate set of tracks) for each device.

To Mix Down Audio Tracks...

1. Set all volume, pan, effects, and automation settings just as you want them.

2. Choose **Tools-Mixdown Audio-Bounce to Track(s)** to open the Mixdown Audio/Bounce to Track(s) dialog box.
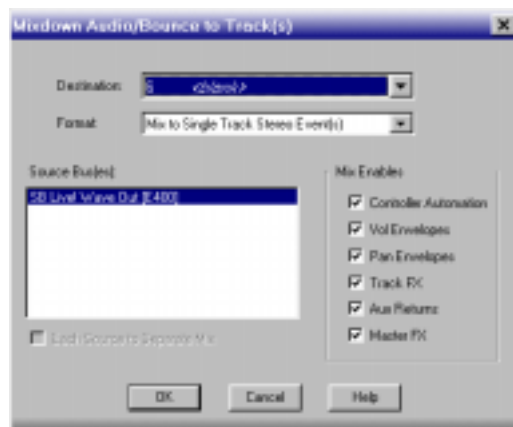
3. Select the destination track for the mixdown.

4. Click OK.

Pro Audio mixes the audio data and a new track(s) appear(s) on the destination track.

Preparing Audio for Distribution

You can use Pro Audio to prepare audio files, or audio/video files for distribution via the World Wide Web or other electronic means. Four formats are supported:

Format...	Definition...
Wave	The standard digital audio format used under Windows, with a file extension of *.wav*
RealAudio	Digital audio encoded and compacted for streaming over the Internet, with a file extension of *.ra*
Windows Media Advanced Streaming Format	Compressed digital audio for streaming over the Internet, with the file extension .WMA.
MP3	Highly compressed digital audio designed for quick downloads via the Internet, with the file extension .MP3.

If your audio hardware is configured for stereo playback, Wave files are created in stereo; if your audio hardware is configured for monophonic playback, the Wave file is created in mono.

To Export Audio to RealAudio Format

1.   Select the track or tracks you want to export.

2.   Choose **Tools-Mixdown Audio-Export to File(s)** to display the Export Audio dialog box.

3.   Select RealAudio from the Save as Type list.

4.   Select a soundcard or soundcards from the Source Bus(es) field.

5.   Enter a file name and click Save to display the RealAudio Settings dialog box.

6.   Select options as described in the table above and click OK.

The audio is compacted and exported to the RealAudio file.

If your project contains audio data, the RealAudio Settings dialog box lets you define the settings for the RealAudio data, as follows:

Option...	Meaning...
Title	Title of the file
Author	Author of the file
Copyright	Copyright statement
Enable Selective Record	Lets people save the file to their hard drive for later listening off line
Enable Perfect Play	Lets people with low-bandwidth connections download a higher resolution version of the audio, at the expense of download time
Enable Mobile Play	Lets people download file to a local drive for playback later
Target Connection Rate	Allows download at all checked rates
Include RA 5.0 CompatibleStream	Ensures compatibility with older versions of RealAudio
Content Type	Optimizes the data for specific content

You may choose several formats if you wish. The RealAudio 2.0 formats are good for backwards compatibility with older players and for 14.4 Kb capability. The remaining formats let you choose Mono or Stereo playback. Stereo formats trade bandwidth for stereo, so use these only when the stereo aspect is important.

To Export Video and Audio to an AVI File...

1. Choose *Tools-Export Video to AVI*.

2. Type a name for the new file.

3. Click OK.

The audio in your project is mixed down automatically and saved with the video in the new AVI file. For more information about video files, see "Video Playback" on page 3-30.

To Export Audio to Wave File Format

1. Select the track or tracks you want to export.

2. Choose **Tools-Mixdown Audio-Export to File(s)** to display the Export Audio dialog box.

3. Select Wave from the Save as Type list.

4. Select a soundcard or soundcards from the list in the Source Bus(es) field.

5. Enter a file name and click Save.

The audio is exported to the Wave file.

To Export a Project in Windows Media Format

1. Select the track or tracks you want to export.

2. Choose **Tools-Mixdown Audio-Export to File(s)** to display the Export Audio dialog box.

3. Select Windows Media Advanced Streaming Format from the Save as Type list.

4. Type a file name in the File Name box. This name will be used as a base for all three files.

5. Click OK.

6. If the project contains audio data, the Microsoft Audio Encode Options dialog box opens.

7. Select options.

8. Click OK.

The audio is compacted and exported to a file with the extension `.wma`.

To Export a Project in MP3 Format

1. Choose *Tools-Mixdown Audio-Export to File(s)* to display the Export Audio dialog box.

2. Select MP3 from the Save as Type list.

3. Type a file name in the File Name box.

4. Click OK.

5. The Cakewalk MP3 Encoder dialog box opens.

6. Select options.

7. Click OK.

The audio is compacted and exported to a file with the extension `.mp3`.

10 Using Instrument Definitions

Instrument definitions are a powerful feature of Pro Audio that gives you greater access to the features and capabilities of your MIDI instruments. An instrument definition is a file that contains information about the banks, patches, controllers, and other features of an instrument. Instrument definitions for many popular MIDI instruments are included with Pro Audio or available on the Cakewalk web site (www.cakewalk.com). If an instrument definition is not available for your instrument, and you are familiar with MIDI and how it works, you can use Pro Audio to create your own instrument definition.

Most MIDI instruments available today are General MIDI (GM) compatible, which means that they come with the standard set of sounds or patches defined by the GM standard. Pro Audio generally assumes that your MIDI instruments are GM compatible. The lists of patches and controllers that you normally see displayed throughout Pro Audio are drawn from the GM specification.

At the same time, many MIDI instruments provide additional sounds, controllers, and other capabilities beyond those required by the GM standard. In addition, some older MIDI instruments are not GM compatible. If you are using one of these instruments with Pro Audio, you can use instrument definitions to make sure that the lists of banks, patches, and so on are appropriate for the equipment you have available.

Instruments

In This Chapter

Assigning Instruments

Pro Audio lets you assign a MIDI instrument definition to each available MIDI port and channel. The assignments you make determine the MIDI bank names, patch names, note names, and controller names that you see during your Pro Audio session.

Suppose that you have a Roland GS-compatible synthesizer attached to MIDI port 1. By assigning all 16 channels of MIDI port 1 to the Roland GS instrument definition, you ensure that the bank, patch, note, and controller name lists you see displayed in Pro Audio are the ones that match your synthesizer.

Often, you want to assign a different instrument to channel 10, which is usually used for percussion. For example, you might assign the Roland GS instrument definition to channels 1 through 9 and 11 through 16, but you would most likely want to assign the Roland GS Drumsets instrument definition to channel 10. If you have several MIDI ports, with a different instrument attached to each one, you would normally assign a different instrument to each MIDI port.

For convenience, you can assign a block of channels to one instrument and then change the assignment of one or more of those channels without changing the others. For example, you can highlight all 16 channels of the first MIDI port and assign them to the Roland GS instrument definition. Then, you can highlight channel 10 of the first MIDI port and assign it to the Roland GS Drumset instrument definition. Channels 1 through 9 and 11 through 16 on the first MIDI port will stay assigned to Roland GS.

You might also want to split channels to different instruments if you have several instruments attached to a single MIDI port. For example, you might have a Roland synth receiving on MIDI channels 1 through 9, a Roland drum machine receiving on channel 10, and a basic GM-compatible synth receiving on channels 11 through 16. In this case, you'd use three different instrument definitions for your one and only MIDI port.

To Assign Instruments to MIDI Ports and Channels...

1. Choose *Tools-Instruments* to display the Assign Instruments dialog box.
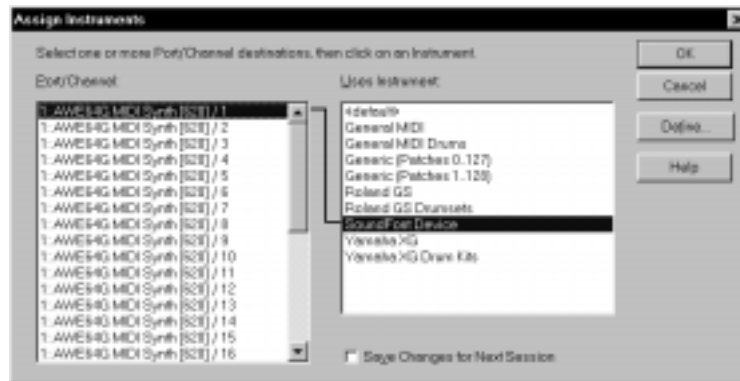
2. Select one or more MIDI ports and channels from the Port/ Channel list (use Shift-click and Ctrl-click to select multiple ports and channels).

3. Choose the instrument to which the selected ports and channels should be assigned from the Uses Instrument list. A black line connects the two lists.

4. To save these changes permanently, check the Save Changes for Next Session box.

5. Click OK when you are done.

From now on, the bank, patch, controller, and note names from the assigned instrument are used throughout Pro Audio.

To Clear Instrument Assignments...

1. Choose *Options-Instruments* to display the Assign Instruments dialog box.

2. Select the MIDI ports and channels whose assignments you want to remove from the Port/Channel list.

3. Choose <default> from the Uses Instrument list. A black line connects the two lists.

4. Click OK when you are done.

From now on, the default bank, patch, controller, and note names are used throughout Pro Audio.

Importing Instrument Definitions

When you install Pro Audio, a few common instrument definitions are already set up for you and ready to use. Pro Audio also includes several hundred additional instrument definitions that you can import.

These instrument definitions are stored in files, organized largely by manufacturer. For example, all the instrument definitions for Roland gear are stored in the *roland.ins* file; all the instrument definitions for Yamaha gear are stored in the *yamaha.ins* file. The file MISC.INS contains miscellaneous instrument definitions. If you don't see a file for the manufacturer of your instrument, look in this file to see if it contains the instrument you are looking for.

If Pro Audio does not include an instrument definition for your MIDI instrument, you can find additional and updated instrument definitions on the Downloads section of the Cakewalk World Wide Web site (www.cakewalk.com). Simply download the files to your Pro Audio folder, unzip if necessary, and import the instrument definitions as described below.

When you import an instrument definition, it is added to the master instrument definition file *master.ins*. The contents of this file determines the list of instruments that appear in the Assign Instruments dialog box.

To Import Instrument Definitions...

1. Choose *Options-Instruments* to display the Assign Instruments dialog box.

2. Click Define to display the Define Instruments and Names dialog box.

3. Click Import to display the Import Instrument Definitions dialog box.

4. Choose the file that contains instrument definitions for your manufacturer, and click Open. Pro Audio displays a list of all the instrument definitions in the file.

5. Choose one or more instruments from the list, and click OK.

6. Click Close to close the Define Instruments and Names dialog box.

The instrument definitions you imported should now appear in the Uses Instrument list in the Assign Instruments dialog box.

Creating Instrument Definitions

Pro Audio lets you create and edit instrument definitions. To create an instrument definition, you must answer these types of questions:

- What are the names of the patches in each bank?

- Which note names should be used for each patch?

- What are the names of the MIDI Controllers for this instrument?

- Which RPN and NRPNs are available on the instrument?

- Which Bank Select method does the instrument use?

To collect this information, you need the MIDI documentation for your instrument.

You define instruments in the Define Instruments and Names dialog box, shown below:

The Instruments tree   The Names tree
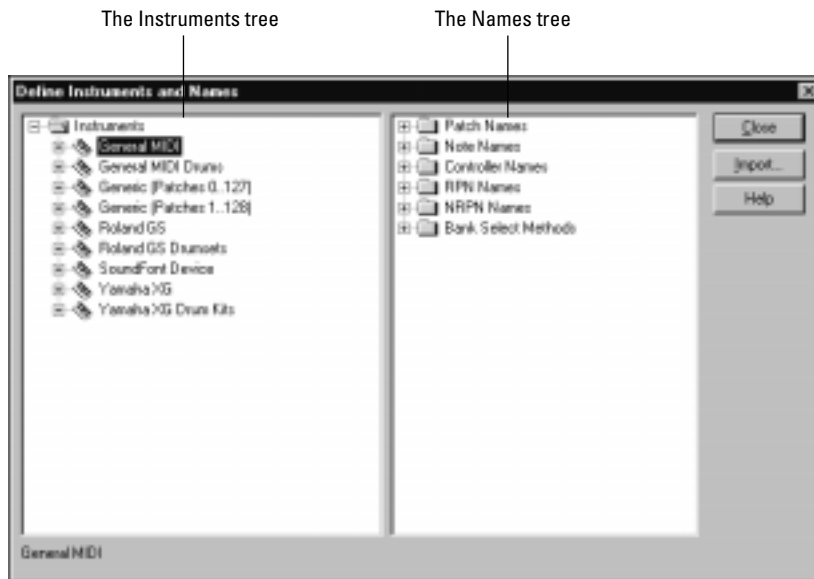
The Define Instruments and Names dialog box contains two trees:

- The Instruments tree lists all defined instruments and their characteristics

- The Names tree shows all the resources you use to define an instrument

You expand or collapse the folders and lists in each tree by clicking on the + or – key shown to the left of each item. You can also right-click on an item and choose **Expand** or **Collapse** from the menu, or double-click on an item to expand or collapse it.

To define an instrument, you drag resources from the Names tree to the appropriate branches on the Instruments tree. Each resource is color-coded—for example, you can only drag a Names list to an Instrument tree branch of the same color.

Here's a general outline of the steps you must follow:

- Create a new instrument
- Create any new name lists that are required for the instrument
- Drag name lists and other resources to each instrument
- Save the instrument definition

There are six components to an instrument definition:

- Method for bank selection
- Patch names, such as Piano and Bass
- Note names, which are most frequently used to name drum notes, such as kick or snare
- Controller names, like volume and pan
- Names for Registered Parameter Numbers (RPNs)
- Names for Non-Registered Parameter Numbers (NRPNs)

The instrument definitions organize all names (patches, notes, controllers, RPNs, and NRPNs) into lists. You may be able to define a new instrument using existing name lists. For example, two models of synthesizers made by a particular manufacturer may have identical patch name lists but use different NRPNs. In this case, you can use the same patch lists for both instruments, but you would need to use a different NRPN list (or perhaps create a new NRPN list) for the second synth.

If you want your changes to be remembered the next time you run Pro Audio, make sure the Save Changes For Next Session option in the Assign Instruments dialog box is checked before clicking OK. Otherwise, to make only temporary changes, be sure to remove the check from that option.

To Create a New Instrument...

1. Right-click on the word Instruments at the top of the Instrument tree, and choose **Add Instrument** from the menu.

2. Type a name for the new instrument and press Enter.

The new instrument is provided with default settings for all of its characteristics.

To Rename an Instrument...

1. Right-click on an Instrument name and choose **Edit** from the menu.

2. Type the new name and press Enter.

To Delete an Instrument...

1. Right-click on an Instrument name and choose **Delete** from the menu.

2. Confirm that you want to delete the instrument.

To Save an Instrument Definition...

1. Click Close to close the Define Instruments and Names dialog box.

2. Click OK.

Pro Audio will save the instrument definition in the *master.ins* file.

To Export an Instrument Definition...

1. Right-click on the instrument name and choose Export from the menu to display the Export Instrument Definition dialog box.

2. Enter a file name and click Save.

The instrument definition is saved in a file.

Instruments

Creating Lists

You can create and edit the various lists that make up each instrument definition. Patch name, note name, and controller name lists can contain up to 128 entries, numbered 0 through 127. RPN and NRPN name lists can contain up to 16,384 entries, numbered 0 through 16,383.

To Manage Name Lists...

1. To create, edit, or work with name lists, follow the directions in the table:

To do this...	Do this...
Create a new name list	Highlight a name list and press the Ins (Insert) key; highlight the folder and press Shift-Insert; or right-click on any folder or name list and choose **Add Names List** from the menu. Then enter the name of the list.
Delete a name list	Highlight the names list and press the Del (Delete) key; or right-click on the name list and choose **Delete** from the menu. You will see a warning if the list is used by any instrument definition. If you delete the list anyway, the instrument definition will change automatically.
Add the next item in a name list	Highlight a name and press the Ins key, or right-click on a name and choose **Add Name** from the menu. Then enter the name.
Add a name anywhere in a list	Highlight the name of a list and press Shift-Insert, or right-click on the name of a list and choose **Add Name** from the menu. Then enter the name.
Delete names from a list	Highlight the Names List or Name, and press Del. You can also right-click, then choose **Delete**.
Edit a name in a list	Highlight the name or name list and press F2, or right-click and choose **Edit** from the menu. Then enter the new name.

Copying Name Lists

You can easily create new lists that are similar to other lists. For example, suppose you want to create a new patch name list called NewList that is almost identical to the General MIDI patch list, but with one or two small changes. Here's how you proceed:

- Create a new patch name list called NewList.

- Drag the new list branch onto the General MIDI branch. You will be asked if you want to base NewList on the General MIDI list.

- Click OK. NewList will now be listed under the General MIDI branch. Any patch names that exist in the General MIDI list apply to NewList, too.

- Add new patch names to NewList. These names will override those in the list on which NewList is based.

If you change your mind about NewList and want to make it a stand-alone, separate list, simply drag it to the Patch Names root folder.

Assigning the Bank Select Method

Your synthesizer uses one of four bank select methods to switch back and forth between banks of sounds. To find the method used for your instrument, check the instrument's *User's Guide* or the manufacturer's web site. The four methods are as follows:

Method...	Used for...
Normal	Instruments that respond to Controller 0 or Controller 32 bank select messages
Controller 0 only	Instruments that only respond to Controller 0 bank select messages
Controller 32 only	Instruments that only respond to Controller 32 bank select messages
Patch 100..127	Instruments that let you change banks by sending patch changes between 100 and 127

The bank select method you choose affects the bank numbers that you assign to each patch list, as described in the following section. Here's how you compute the bank numbers:

Bank select method...	To compute the bank number...
Normal	Take the value of Controller 0, multiply it by 128, and add the value of Controller 32 to derive the bank number. A synthesizer manufacturer may refer to Controller 0 as the MSB (Most Significant Byte) and to Controller 32 as the LSB (Least Significant Byte).
Controller 0 only	The value of Controller 0 is the bank number.
Controller 32 only	The value of Controller 32 is the bank number.
Patch 100..127	Take the patch number and subtract 100 to derive the bank number.

Here is an example of the Normal bank select method. According to the documentation for the Roland JV-1080 synthesizer, the PR-A Bank has a Controller 0 value of 81 and a Controller 32 value of 0. You compute the bank number that you enter in the instrument definition as follows: (81 x 128) + 0 = 10,368.

To Change the Bank Select Method...

1. Highlight and expand the instrument in the Instrument tree.

2. Expand the Bank Select Method branch in the Names tree.

3. Drag the desired bank select method from the Names tree to the Instrument tree.

Assigning Patch Names

A MIDI instrument can have up to 16,384 banks of 128 patches each. Patches can have names, like "Piano" for patch number 0, "Bass" for patch number 1, and so on. Normally, each bank contains a different set of patches, so each bank needs a separate patch name list. Most synthesizers start with a patch number of 0.

You can assign a patch name list to each bank. You can also assign a default patch name list to the instrument, which is used for all banks for which you haven't assigned a specific list. The previous section describes

how to compute the bank numbers to which each patch name list is assigned.

Each bank can also be assigned a special Drum flag, which indicates that all patches in that bank contain drum sounds. If you set this flag, the Piano Roll view will display drum notes as diamonds, and the Staff view will use percussion notation.

To See the Assignment of Patch Name Lists to Banks...

1. Expand the instrument definition by clicking the + sign next to the instrument name.

2. Expand the Patch Names for Banks folder by clicking the + sign. The list expands to show the bank numbers and the patch name list that is assigned to each bank.

Instrument name

The * indicates that this patch list is the default

There are three defined banks

This is the name of a patch name list
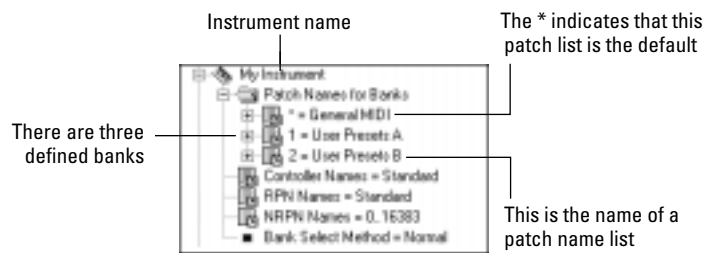
To Add a Bank or Change the Patch Names for a Bank...

1. Drag a patch name list from the Names tree to the Patch Names for Banks folder.

2. Enter a bank number, or enter –1 to indicate that this list of patch names should be used as the default.

3. Pro Audio displays the updated banks and patch name lists. If necessary, Pro Audio adds a new bank to the instrument definition.

To Remove a Bank or Patch Name List...

1. Highlight the bank and patch names list in the Instrument tree.

2. Press the Del key, or right-click on the bank name and choose **Delete** from the menu.

To Set or Clear the Drum Flag...

1. Right-click on the bank in the Instrument tree, and choose **Drums** from the menu.

Assigning Note Names

Each patch may have a list of up to 128 names for notes. Usually, note names are labels for percussion instruments. For example, the pitch C3 may really be "Kick Drum," and D3 may be "Snare." Because a drum machine may provide different drum kits for each patch, Pro Audio lets you specify a different list of note names for each patch. The Piano Roll and Event List views show you these note names.

You can assign a note name list to each patch. You can also assign a default note name list to the instrument, which is used for all patches for which you haven't assigned a specific note name list.

Each patch can also be assigned a special Drum flag, which indicates that this patch contains drum sounds. If you set this flag, the Piano Roll view will display drum notes as diamonds, and the Staff view will use percussion notation.

There are several standard note name lists provided with Pro Audio:

Note name list...	Contents...
0..127	The numbers 0 through 127
Diatonic	The default MIDI note names (like C4, E5, and so on)
General MIDI Drums	The default instrument names for the General MIDI drum patch

To See the Assignment of Note Name Lists to Patches...

1. Expand the instrument definition by clicking the + sign next to the instrument name.

2. Expand the Patch Names for Banks folder by clicking the + sign.

3. Continue expanding the tree by clicking the + sign, until the tree is fully expanded.

Instrument name

Bank

The * indicates that
this note name list is
the default

This is the name of
a note name list

Note name lists are
defined for three
different patches
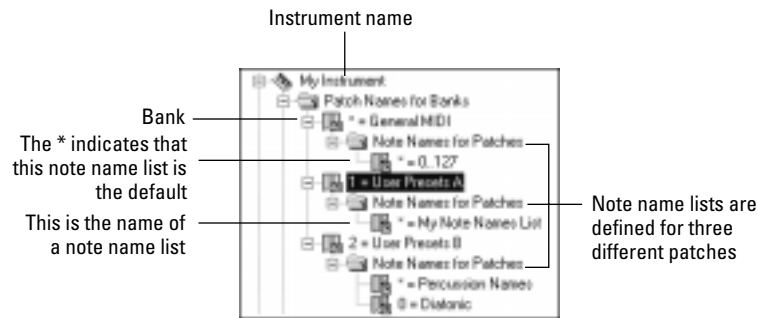
To Change the Note Names for a Patch...

1. Drag a note name list from the Names tree onto the Note Names
    for Patches folder.

2. Enter a patch number, or enter –1 to indicate that this list of note
    names should be used as the default.

3. Pro Audio displays the updated patch and note name lists. If
    necessary, Pro Audio adds a new patch to the instrument
    definition.

To Remove a Note Name List...

1. Highlight the patch in the Instrument tree.

2. Press the Del key, or right-click on the note name list and choose
    Delete from the menu.

To Set or Clear the Drum Flag...

1. Right-click on the patch in the Instrument tree, and choose
    Drums from the menu.

Assigning Controller, RPN, and NRPN Names

Pro Audio lets each instrument have its own lists of controller names,
RPN names, and NRPN names. There is always exactly one list of each
type per instrument.

Instruments

To See the Controller, RPN, and NRPN Name Lists…

1. Expand the instrument definition by clicking the + sign next to the instrument name.

Instrument name

Controller name list
RPN name list
NRPN name list
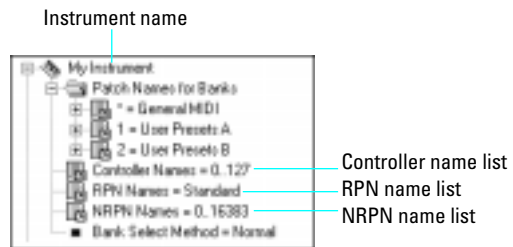
To Change the Controller, RPN, or NRPN Name List…

1. In the Names tree, expand the branch containing the Controller name lists, RPN name lists, or NRPN name lists.

2. Drag the desired name list from the Names tree onto the corresponding branch of the Instrument tree.

Pro Audio displays the updated Controller, RPN, or NRPN name lists.

11 Working with StudioWare

StudioWare panels are software interfaces to external MIDI devices such as samplers, keyboards, automatable mixers, and effects units. These interfaces allow you to manipulate the controls on any external MIDI device from graphical controls on your screen. The changes you make to these controls can even be recorded and then played back as part of your project.

Pro Audio includes a wide variety of StudioWare panels for popular MIDI devices, with new panels constantly under development here at Cakewalk, by equipment manufacturers, and by Pro Audio users. Check the Cakewalk web site (www.cakewalk.com) from time to time for new and updated StudioWare panels.

With Pro Audio, you have the ability to design and create your own StudioWare panels or to customize existing ones for your own use. This means you can create your own customized software studio that integrates the power of Pro Audio with all your studio gear.

In This Chapter

StudioWare

StudioWare Panels

Pro Audio comes with a variety of StudioWare panels. Some are designed to control a specific external MIDI device, while others are useful with a variety of devices. Here is a listing of some of the panels that are included with Pro Audio:

Panel name...	What it's for...
ART SQX20	Provides control for the ART SGX 2000 Express guitar preamp/processor
AWE	Controls the wavetable synthesizer on SoundBlaster AWE sound cards
EMU Orbit	Provides basic control of the EMU's Orbit synthesizer
General MIDI	Provides parameters and control for any General MIDI compatible synthesizer
Mackie OTTO 1604	Fader and Mute control designed for the Mackie 1604 mixer
MMC	MIDI Machine Control panel, providing track arming and transport control for any device that responds to MMC commands
Novation Bass Station BS1	Panel for controlling the settings of the Novation BassStation
Novation Bass Station Rack BSR1	Panel for controlling the settings of the Novation BassStation rack version
Novation DrumStationRack DRM-1	Panel for controlling the settings of the Novation DrumStation
Novation Super Bass Station Rack	Panel for controlling the settings of the Novation SuperBassStation rack version
Roland GS	Control panel providing parameter manipulation for any GS-compatible synth
Roland VS-880	Provides parameter and transport control for the Roland VS-880 digital audio workstation
Session 8	Provides control for the Digidesign Session 8

Tascam RC-808	Control Interface modeled after the Tascam RC-808 remote control unit, used with the DA-38, DA-88, and DA-98 multitrack recorders
Yamaha ProMix 01	Provides parameter control for the Yamaha ProMix digital mixer
Yamaha 03D	Provides parameter control for the Yamaha 03D digital mixer
Roland UA-100	Provides parameter control for the Roland UA-100 audio canvas

You can also create a basic StudioWare panel that contains a standard set of controls for selected tracks in a project. This panel will provide functionality similar to that provided by the Console view.

When you open or create a StudioWare panel, it is configured to be part of the current project. You can open several different panels and use them all with a single project. You can also open several different copies of the same panel and link each one to a different open project.

To Open a StudioWare Panel...

1.   Choose **File-Open** to display the Open File dialog box.

2.   Choose StudioWare from the Files of Type list.

3.   Choose a StudioWare file and click Open.

Pro Audio opens and displays the StudioWare panel.

To Create a New Panel...

1.   Select one or more tracks from the Track view.

2.   Choose **File-New** to display the New File dialog box.

3.   Choose StudioWare Panel from the list.

4.   Click OK.

Pro Audio displays a StudioWare panel with a set of standard controls for each selected track. You can also create a new panel by right-clicking on the selected tracks and selecting **StudioWare** from the menu.

StudioWare

Using Panels

Every StudioWare panel is made up of a collection of controls and other information displays. The controls are software representations of the knobs, buttons, and sliders on an external MIDI device. By moving the controls on the screen, you adjust the controls on the external MIDI device. If you want, you can also configure the StudioWare panel so that moving the controls on the external device adjusts the controls on your computer screen. Some StudioWare panels contain controls that perform other functions within Pro Audio, such as changing track parameters or running CAL programs.

Because StudioWare panels can be used to control many different types of devices, and because each and every panel can be tailored for a specific application and hardware environment, it is impossible to explain here all the different ways to use a particular panel. Instead, this section tells you how to use the different types of controls and how to record the changes you make to each control as part of your project.

There are three types of controls in most StudioWare panels: buttons, knobs, and sliders. In addition, panels may contain LED indicators, level meters, text, and bitmap images. The appearance of controls and other displays may vary greatly from panel to panel. They may be of very different sizes, and they may be designed with custom styles, bitmaps,

and colors. In addition, sliders and meters may be laid out either
horizontally or vertically.
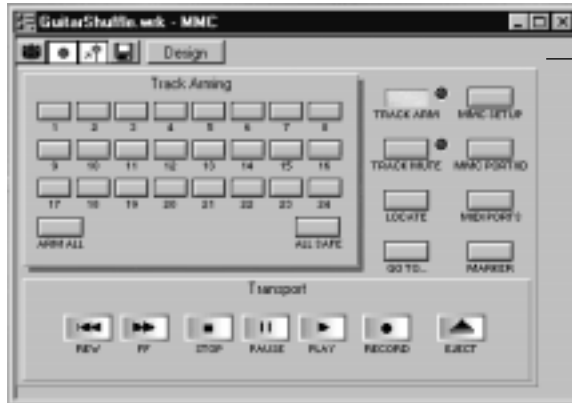
MMC

General MIDI

There are a variety of ways to adjust the values of buttons, sliders, and knobs:

To change this...	Do this...
The status of a button	Click on the button
The value of a slider	Click on the desired slider position to move the slider to that position, or drag the slider to the desired position
The value of a knob	Click along the outer edge of the knob to move the knob to that position, or drag the outer edge of the knob in a circular motion to set the desired position

To change the value of a knob or slider using the keyboard, you must first select the control:

• To select a control that has a numeric value display or label, click on the value or the label.

• To select a control without a numeric value display, click on the control, being careful to click at the current control position. If you do not click at the current control position, the control will change values as a result of the mouse click.

To adjust a knob or slider using the keyboard:

• Press the - and + keys to decrease or increase the value of the selected control by the smallest amount

• Press the [and] keys to decrease or increase the value of the selected control by steps of 10

Grouping Controls

Pro Audio lets you create groups of StudioWare controls. When several controls are in a single group, you can move a single control and have the remaining controls in the group adjust automatically. This is useful for many different mixing and crossfade applications.

When you create a group of controls, each control in the group has a starting and an ending value. Here's how these values are used:

• When you move any control in the group to its starting value, all controls in the group are set to their starting value

• When you move any control in the group to its ending value, all controls in the group are set to their ending value

• When you position any control in the group somewhere between its starting and ending value, all controls in the group are set to the same relative position between their starting and ending value

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The initial range for each control is set based on the position of the controls at the time you group them.

You can adjust the range for any individual control, even if it is part of a group, simply by holding the Shift key while you move the control. When you adjust an individual control by holding the Shift key, its maximum or minimum is adjusted, depending on whether the entire group is closer to its minimum or maximum value.

To Create a Group of Controls...

1.   Select any control by clicking on it with the mouse.

2.   Hold down the Ctrl key and click on one or more additional controls.

Pro Audio creates a group from the selected controls.

To Remove Controls from a Group...

1.   Hold down the Ctrl key and click on any control in the group.

Pro Audio removes the control from the group.

To Adjust a Single Control in a Group...

1.   Hold down the Shift key and drag the control to a new value.

The range for the control is adjusted so that its current position corresponds with the current position of other controls in the group.

Example: To Set Two Faders for a Crossfade...

1.   Move the two faders to their midpoint.

2.   Click on the first fader, and then Ctrl-click on the second to create a group.

3.   Move both faders to their highest position.

4.   Shift-drag the second fader to its lowest position.

5.   Drag the first fader to its lowest position.

6.   Shift-drag the second fader to its highest position.

These two controls are now grouped so that they move in opposite directions.

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The minimum and maximum values of the faders look like this:

Fader...	Starting value...	Ending value...
#1	0	127
#2	127	0

To set faders that are always the same distance apart, set the ranges something like this:

Fader...	Starting value...	Ending value...
#1	0	63
#2	64	127

To set faders to move over different ranges of values, set them something like this:

Fader...	Starting value...	Ending value...
#1	0	127
#2	0	100

Recording Control Movements

You can move the controls in a StudioWare panel while playing back a song to adjust the levels or other MIDI activity that the panel is designed to accommodate. In addition, you can record changes that you make to the controls in a panel so that these changes become a part of your project. Recording changes so that they play back automatically is known as **automation**.

There are two general approaches to recording control movements, as indicated in the following table:

Approach...	How it works...
Snapshot	You set all the controls to the values you want, and then create a snapshot of these settings at a particular Now time. When you play back the project later, all the controls will snap back to these settings when you reach the appropriate Now time.
Real-time recording	You move controls in any way you like, recording the series of changes you make so they become part of your project. When you play back the project later, the controls move exactly as you recorded them.

The first approach is useful, for example, when your project contains a variety of distinct sections and you want to make a sudden change in one or more settings between the sections.

The latter approach is most useful when you want to create smooth transitions from one section to another. For example, you could slowly add modulation to a MIDI piano or move the faders on a digital mixing console. Once you record these changes, they will play back along with your project automatically.

StudioWare lets you record and re-record automation data as many times as necessary. When you record new movements for a control, any old events for that control are replaced by the newer ones. Movements of other controls are unaffected. You can re-record moves again and again until you've got the movement exactly the way you want it. You can also edit automation data using the Controllers pane in the Piano Roll view.

There are three tools in the StudioWare toolbar that are used to control recording and automation:

Icon...	Tool...	What it's for...
	Update	Makes the controls in the panel update automatically during playback or when MIDI data is received by the panel

	Snapshot	Records a snapshot of the current position of all controls
	Record	Activates real-time recording of all control movements

Most StudioWare panels are designed to both send and receive MIDI data. This means two things:

- If you move the controls on your external MIDI device, the StudioWare panel will be notified of the changes

- When you play back a project containing automation data, the StudioWare panel is notified of the automation changes

The Update button in the StudioWare toolbar indicates whether these changes are played back visually on the StudioWare panel. Press this button to make sure that automation parameters and changes made on the external MIDI device are displayed in the StudioWare panel. Turn this option off if you do not want to see these changes.

If you are recording a snapshot while playback is in progress, you should probably disable Update. Otherwise, some of the controls may move as a result of previously recorded automation events, even while you are trying to position them correctly.

When you are recording real-time control movements, you probably want Update enabled, so that the controls will show the events that have already been recorded.

If you record automation data on a track that contains linked clips, Pro Audio automatically unlinks the clips so that the automation data do not apply to other instances of the linked clip. As an example, suppose you have four repetitions of a particular riff, stored in four linked clips that play in sequence. When you record a fade-out over these four clips, Pro Audio automatically splits the clips into four independent clips, each with automation data representing some portion of the fade.

If you record a snapshot of control positions on a track that contains linked clips, the clips remain linked, and the snapshot applies to all copies of the linked clip.

If you are not happy with the automation data you recorded, you can always use the ***Undo*** command to remove it.

The automation data you record using a StudioWare panel can be displayed and edited using either the Controllers pane in the Piano Roll view or the Event List view. For more information on the Controllers pane, see "Controllers, RPNs, NRPNs, and Automation Data" on page 6-

35. For more information on the Event List view, see "The Event List View" on page 6-43.

To Record a Snapshot While Playback Is Stopped...

1. Set the Now time to the point in the project where you want the settings to take effect.

2. Move the controls to the settings you desire.

3. Click ▣.

Pro Audio records a snapshot of the current control settings.

If the Now time is the very beginning of the project, then the snapshot will change the track parameters to match the controls in the panel instead of recording automation events.

To Record a Snapshot While Playback Is in Progress...

1. Make sure the ▦ button in the StudioWare toolbar is not pressed so that Update is disabled.

2. Change the Now time to a few bars or seconds before the time you wish to take the snapshot.

3. Start playback.

4. When you have reached the appropriate time, click on the Snapshot button.

Pro Audio records a snapshot of the current control settings.

To Record Control Changes in Real Time...

1. Make sure the ▦ button in the StudioWare toolbar is pressed so that Update is enabled.

2. Make sure the ▣ button in the StudioWare toolbar is pressed so that recording is enabled.

3. Set the Now time to a few bars or seconds before the time at which you want to record control movements.

4. Click ▶ or press the Space bar to start playback. (Note: Do not press the Record button in the Transport toolbar!)

5. Adjust the controls as you wish while playback is in progress. Each time you adjust a control, the Record tool ▣ is activated.

6. When you are done, click ![] or press the Space bar to stop playback.

7. Click the ![] button in the StudioWare toolbar to turn off real-time recording.

Pro Audio records the control changes that you entered while playback was in progress.

Control Settings

The controls in a StudioWare panel are designed to send and receive various types of MIDI information. This information can be transmitted to two possible destinations:

• A specific track in your project

• A MIDI output port

When you want to record the movements of controls within a panel, you must make sure that MIDI data from the control are directed to a track and not to a MIDI port. To find out where the data from a control are headed, be in design mode, right-click on the control to display the Control (Widget) Properties dialog box, and check the list:

Data from this control are routed to a track and can be recorded

Data from this control are routed to a MIDI port and cannot be recorded.

StudioWare Panel Drawing Speed

Some StudioWare panels use bitmap graphics to enhance their appearance. These graphics can slow down the speed with which a panel is displayed on some slower PCs. You can turn off these bitmap graphics by adding this line to the [WinCake] section of the *cakewalk.ini* file, as follows.

PanelsShowWidgetBitmaps=0

To turn bitmap graphics on again, change the entry to:

PanelsShowWidgetBitmaps=1

For more information about the *cakewalk.ini* file, see *Appendix E: Initialization Files*.

Designing and Implementing Panels

StudioWare allows you to create your own custom panels for almost any external MIDI device. You can also control other MIDI software programs if you use a MIDI loopback driver. Once you create and save a StudioWare panel, you can:

• Use it with any of your projects

• Distribute it to other Pro Audio users

• Submit it to Cakewalk so we can post it on our World Wide Web site and include it in future releases

You are free to embed your name, copyright, or other credits into the StudioWare panel, and you can even password-protect your panels to prevent other users from changing them.

To design a StudioWare panel, you need the following:

• A good working knowledge of the device for which you are creating a panel

• The MIDI implementation guide for the device, usually found in the back of the user's guide

• The System Exclusive implementation guide for the device, also usually found in the back of the user's guide

In general, you follow these steps to create a StudioWare panel:

• Create a new panel and enter Design mode

• Add elements (called **widgets**) to the panel and arrange them the way you want

• Change the settings for each widget so that it controls the external MIDI device or displays the information you want

• Customize the appearance of the panel

Each of these steps is discussed in the sections that follow. Note that widgets have a large number of properties, some of which determine the appearance of the widget, and some of which determine how it interacts

with an external MIDI device. These properties are discussed in the sections that follow.

While you work on your StudioWare panels in Design mode, remember that you can use the **Undo** command when you make a mistake and want to correct it quickly.

Creating a New Panel

When you create a new StudioWare panel, Pro Audio always creates a standard set of widgets for each selected track in the current project. The standard widgets are different for MIDI and audio tracks. Once you create the initial panel, you enter Design mode by pressing the [Design] button on the StudioWare toolbar. Design mode lets you add, resize, delete, or change other characteristics of each widget. While you are in Design mode, you cannot adjust the widgets the way you do when you are using a panel (that is, you cannot turn a knob or change the level of a slider).

Click to enter or leave Design mode

Additional tools for working in Design mode

After you create or modify a panel, you should save your work by saving the StudioWare panel in a StudioWare file. You save a StudioWare panel by clicking the [icon] button in the StudioWare toolbar. StudioWare panel files have an extension of *.CakewalkStudioWare*. Pro Audio normally stores StudioWare panels in a particular folder. To change this folder, choose **Options-Global** and click the Folders tab.

StudioWare panels can also be stored as part of a project, bundle, or template file. When you save a project or bundle file while a StudioWare panel is open, the StudioWare panel becomes part of the file layout. For more information on layouts and template files, see Chapter 12, *Using Layouts and Templates*. For more information on bundle files, see "Backing Up Projects with Digital Audio" on page 13-10.

To Start Designing a Panel...

1. Create a new project using the **File-New** command.

2. Choose **File-New** to display the New dialog box.

3. Choose StudioWare Panel from the list and click OK. Pro Audio creates a standard StudioWare panel.

4. Stretch the panel window to the right until the Design mode button [Design] is visible.

5. Click the [Design] button to enter Design mode.

Pro Audio displays all the design tools in the StudioWare toolbar.

To Edit an Existing Panel...

1. Choose *File-Open* to display the Open dialog box.

2. Choose StudioWare from the Files of Type list.

3. Choose the panel you want to modify and click OK. Pro Audio opens and displays the panel.

4. Click the [Design] button to enter Design mode.

To Save a StudioWare Panel...

1. Click the [■] button in the StudioWare toolbar to display the Save StudioWare dialog box.

2. Enter a name for the panel.

3. If desired, enter a password in the Password box. If you use a password, be sure to write down your password and keep it in a safe place. If you forget the password, you will not be able to open the panel in design mode.

4. Click OK.

Pro Audio saves the StudioWare panel in a file by itself.

To Save a StudioWare Panel in a Project, Bundle, or Template...

1. Choose *File Save* to display the Save As dialog box.

2. Choose Normal (project file), Template, or Bundle from the Save as Type list.

3. Enter a name for the file.

4. Click Save.

Pro Audio saves the StudioWare panel as part of the project, bundle, or template file.

StudioWare

To Leave Design Mode…

1.   Click the [Design] button to leave Design mode.

All the design tools will be hidden, and you can now use the panel to control the MIDI device.

Adding and Arranging Widgets

You add widgets to a StudioWare panel by choosing one of the design tools in the StudioWare toolbar and then clicking where you want to add the widget.

To arrange or edit widgets, you must select them using the Select tool [ ]. You select a widget by clicking on it with the Select tool. To select additional widgets, hold down the Shift key while selecting. To toggle the selection status of a widget, hold down the Ctrl key while selecting. When you use one of the design mode tools to add a new widget, the Select tool is chosen automatically after the widget is added to make it simple for you to edit the widget.

When you select a widget, a rectangular border is displayed to indicate its dimensions. When several widgets are selected you can resize or move them as a group, but you can only alter the properties and visual appearance of the one most recently selected. One exception: you can change the color or bitmap for all selected widgets in a single step.

Like many other views, the StudioWare view has a snap-to grid option. When this option is enabled, widgets that you move using the mouse will snap automatically to a point on the grid. To enable the snap-to grid, click the [ ] button in the toolbar. To change the grid size, Shift-click on the [ ] button, and enter the desired grid size, in pixels, in the Snap to Grid dialog box. The snap-to grid option is ignored when you move widgets with the keyboard.

The *Cut*, *Copy*, *Paste*, and *Delete* commands all work in the normal fashion. You can use these commands to cut or copy widgets within a single panel or between panels. When you paste widgets into a panel, they will appear at their original locations. The widgets that are pasted are automatically selected so you can move them easily after the pasting. To copy and paste widgets between panels, both panels must be in design mode.

To Move Widgets Using the Mouse...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select one or more widgets to be moved.

3. Position the cursor over one of the widgets, so that it looks like this: 🔁.

4. Drag the widget to a new position.

Pro Audio repositions the widget(s).

To Move Widgets Using the Keyboard...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select one or more widgets to be moved.

3. Position the cursor over one of the widgets, so that it looks like this: 🔁.

4. Press the arrow keys on the keyboard to move the widget one pixel at a time in any direction.

Pro Audio repositions the widget(s).

To Resize Widgets Using the Mouse...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select one or more widgets to be resized.

3. Position the cursor over any edge or corner of one of the widgets, so that it looks like this: ↕ or ↔.

4. Drag the corner or edge of the widget to change its size.

Pro Audio draws the widget in its new size.

To Resize Widgets Using the Keyboard...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select one or more widgets to be resized.

3. Position the cursor over any edge or corner of one of the widgets, so that it looks like this: ↕ or ↔.

4. Press the arrow keys on the keyboard to resize the widget one pixel at a time.

Pro Audio draws the widget in its new size.

To Delete Widgets...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select one or more widgets.

3. Press the Del (Delete) key or choose *Edit-Cut*.

To Copy Widgets...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select one or more widgets.

3. Press and hold the Ctrl key.

4. Position the cursor over one of the widgets, so that it looks like this: ↕ or ↔.

5. Drag a copy of the widgets to a new position.

Pro Audio makes a copy of the selected widgets.

Using Clusters

The cluster is a special type of widget that you can use to organize other widgets. The cluster widget is very useful for organizing large, complicated panels. When you place widgets in a cluster, you can:

•   Move all the widgets in a cluster just by moving the cluster widget

•   Copy, paste, or delete all the widgets in the cluster in a single step

•   Hide the widgets in a cluster based on the settings of other widgets

A cluster widget is simply a rectangular container region. When you place any other type of widget so that its upper-left corner is inside the cluster, that widget becomes a part of the cluster. You can either place a new widget inside the cluster or move an existing widget into the cluster rectangle; either action makes the widget a part of the cluster.

You can also nest clusters, so that cluster A contains cluster B, and so on. To create a nested cluster, you must create a new cluster B that is located inside A. You can do this in two ways: using the Cluster tool 📰, or by Ctrl-dragging an existing cluster (making a copy of that cluster) inside the outer cluster A. *You cannot move one existing cluster inside another cluster to create nested clusters.*

When you first insert the cluster, it will be displayed as a shaded rectangle, like this:

This shading indicates that the cluster is empty, or inactive. The cluster will retain this appearance until you place another type of widget inside it. Placing a nested cluster inside the original is not sufficient; you must put one of the other types of widgets in the cluster to activate it.

For information about how to hide and show a cluster of widgets, see "Hiding Clusters" on page 11-35.

To Add a Cluster Widget...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Click 📰 in the StudioWare toolbar.

3. Click the mouse anywhere in the panel. Pro Audio adds a cluster widget and displays it as a shaded rectangle.

4. Resize the cluster widget as desired.

You can now place other widgets inside the cluster.

Functional Settings

Every widget can be programmed to take certain actions when it is manipulated by the panel user. Widgets can send MIDI messages to a port, record MIDI events in a track, change the value of variables (called **aliases**) that control the operation of the panel, and so on.

These functional settings are determined by setting the parameters of the widget. Here are the widget parameters that affect the operation of the panel:

Parameter...	What it's for...
Automate in Track	If checked, movements of this widget are stored in the designated track number. You can specify the track number or choose an alias whose value is the track number. See "Using Aliases for Track and Port Numbers" on page 11-35, for more information.
Direct to Port	If checked, movements of this widget are sent directly out a MIDI or audio port. You can choose a MIDI or Audio port explicitly or choose an alias whose value is the MIDI port number. You can also indicate audio ports using aliases with negative values (e.g., -1 for the first audio port, -2 for the second audio port). See "Using Aliases for Track and Port Numbers" on page 11-35, for more information.
Primary Action	The type of message or event that is generated by the widget when it is manipulated. See "Primary Action" on page 11-22 for more information.
Alias	A user-defined symbolic name that is used to store the widget's value. Aliases can be used to link widgets together in many interesting ways. See "Alias" on page 11-28 for more information.
Min, Max	The minimum and maximum allowable values for the widget.
Initial	The initial value for the widget when the panel is opened.
Spring-Loaded	If checked, the widget will return to its initial value after it is moved with the mouse.

To Change a Widget's Functional Settings...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Double-click on a widget, or right-click and choose **Properties** from the menu.
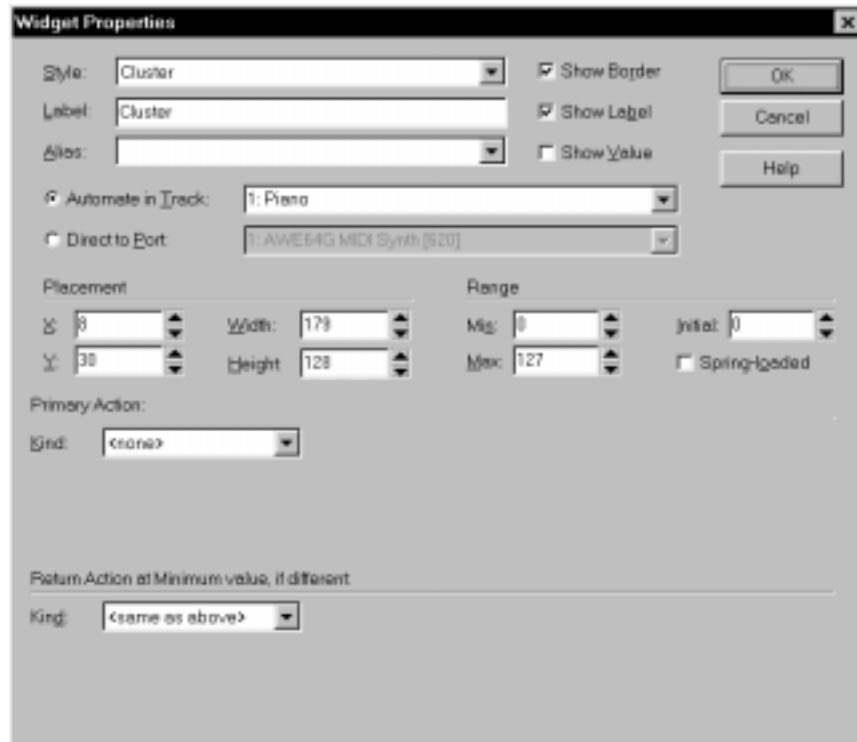
3. Choose either the Automate in Track or Direct to Port option.

4. Choose the Track or Port number from the drop-down list.

5. Choose a Primary Action from the list, and then fill in the required fields for that action type according to the instructions in the following section.

6. If desired, enter an alias for the widget.

7. Click OK when you are done.

Pro Audio modifies the widget settings as you indicated.

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Primary Action

This section of the widget properties selects the type of data that the widget will generate. Widgets can send the following types of MIDI information to a track or port:

- Notes
- Controllers
- Patch Changes
- Pitch Wheel events
- Key Aftertouch
- Channel Aftertouch
- Registered Parameter Number (RPN) events
- Non-Registered Parameter Number (NRPN) events
- System Exclusive Banks & Data
- MCI commands

In addition to the above, widgets can generate the following special types of events:

- Bindings
- CAL Programs
- Track Parameters

Depending on the primary action you assign to the widget, you must provide additional information about the event you want to generate when the control is moved. The additional information can take several forms. For more information about aliases, calculated expressions, and assignment, see "Advanced Panel Design" on page 11-32.

The tables that follow describe the information you need to provide for each primary action type:

Note

Data field...	Range of values...
Key	0-127, simple alias, calculated expression, assignment. Note that you cannot enter note names (like C2 or G5). You must use the note number.
Velocity	0-127, simple alias, calculated expression, assignment.
Channel	1-16, simple alias, calculated expression, assignment.

The widget sends a MIDI note every time its value changes. Key defines the MIDI note number sent by the widget.

Controller

Field...	Range of values...
Number	Controller drop-down list, 0-127, simple alias, calculated expression, assignment
Value	0-127, simple alias, calculated expression, assignment
Channel	1-16, simple alias, calculated expression, assignment

The widget sends a MIDI controller number and value. The list of available controllers is determined partly by the instrument definitions in the Assign Instruments dialog box, which you access by choosing *Options-Instruments*.

Patch Change

Field...	Range of values...
Bank	Bank drop-down list, 1-16383, simple alias, calculated expression, assignment
Patch	Patch drop-down list, 0-127, simple alias, calculated expression, assignment
Channel	1-16, simple alias, calculated expression, assignment

The widget sends bank and patch changes. The list of available patches is determined partly by the instrument definitions in the Assign Instruments dialog box, which you access by choosing ***Tools-Instruments***.

Pitch Wheel

Field...	Range of values...
Amount	-8192 through 8191, simple alias, calculated expression, assignment
Channel	1-16, simple alias, calculated expression, assignment

The widget sends Pitch Wheel messages. You may want to check the Spring Loaded option so that the pitch will return to its center position when you release the widget.

Key Aftertouch

Field...	Range of values...
Key	0-127, simple alias, calculated expression, assignment
Pressure	0-127, simple alias, calculated expression, assignment
Channel	1-16, simple alias, calculated expression, assignment

The widget sends aftertouch messages for individual notes. This may be useful if your synthesizer receives (but doesn't send) MIDI Key Aftertouch, as is true of synthesizer modules. Key defines which note the message will be sent to. Pressure sets the amount of aftertouch.

Channel Aftertouch

Field...	Range of values...
Pressure	0-127, simple alias, calculated expression, assignment
Channel	1-16, simple alias, calculated expression, assignment

The widget sends channel aftertouch messages. Many synthesizers receive only channel aftertouch, which affects all notes on a MIDI channel. You set the amount of this aftertouch here.

RPN and NRPN

Field...	Range of values...
Number	RPN drop-down list, 1-16383, simple alias, calculated expression, assignment
Value	1-16383, simple alias, calculated expression, assignment
Channel	1-16, simple alias, calculated expression, assignment

The widget sends RPN or NRPN numbers and values.

Sysx Bank

Field...	Range of values...
Bank	0-255, simple alias, calculated expression, assignment

The widget sends System Exclusive messages. The StudioWare view allows you to define Sysx messages that tell Pro Audio how to package data values into a Sysx message for transmission or recording and also how to extract data values from an incoming or previously recorded Sysx message.

You can use Sysx Bank events to transmit one of the song's 256 banks (numbered 0 through 255) of System Exclusive data. These banks can be recorded, viewed, and edited in the Sysx view, and each bank can contain one or more very large System Exclusive messages. Type the number of the bank in the Bank field.

Sysx Data

Field...	Range of values...
Data	Sysx Data (up to 255 bytes), simple alias, calculated expression, assignment

You can also use Sysx Data events, which can each contain a single System Exclusive message. This message can be up to 255 bytes long. Each song can contain a virtually unlimited number of Sysx Data events. You can view and edit bytes of recorded Sysx data in the Event List view.

If you choose Sysx Data, the Data field lets you type in the hexadecimal bytes of the Sysx message that the widget will send. You can also enter an alias or an expression in place of any byte in the Sysx message, but the alias or expression must be surrounded by parentheses. (See "Alias Formulas" on page 11-32 for more about aliases and expressions.) When the message is sent or recorded, the current value of the alias or expression will be inserted into that byte slot in the message.

Furthermore, an alias reference in the body of the Sysx message will create a two way connection between that alias and the message. The alias value will update in response to a matching message that has been received at an input port or that is being played back from a song in Pro Audio.

This is similar to the syntax used by Pro Audio for defining Dump Request Macros, where a combination of literal hex bytes and symbolic names specify how a particular Sysx message should be generated. You can enter a byte of a message as either a hexadecimal or decimal constant or as a symbolic alias name.

Note:
Pro Audio cannot tell whether F0 means the number hex 00F0 or the alias F0. So you must type the prefix $ or 0x in front of any hex byte (e.g.: 0xF0) so that it won't be interpreted as an alias name by Pro Audio. A number without a leading prefix is assumed to be decimal, so 10 is ten, but $10 or 0x10 is sixteen.

MCI Command

Field...	Range of values...
Command	MCI text string, simple alias, calculated expression, assignment

The widget sends MCI (Media Control Interface) commands, which belong to Microsoft's multimedia control language. If the text is longer than a single line of text, each line will be sent as its own MCI command. MCI allows single commands of up to 256 bytes long.

Binding

Field...	Range of values...
Verb	Binding verb drop-down list

Binding verbs let the widget directly trigger any Pro Audio command or respond to open dialog boxes. For example, you could link one button to the ***Edit-Undo*** command, another to the ***Go-Previous Measure*** command, and another to the ***File-Open*** command.

CAL Program

Field...	Range of values...
Program	CAL program up to 32768 characters long, reference to external CAL program (see text below), simple alias, calculated expression, assignment

The widget runs a short CAL program (which you enter into the Program field) each time the widget is manipulated. The CAL program can be one of two things:

- A stand-alone CAL program, which you type directly into the dialog box or copy and paste from the CAL View

- A short program that invokes another, existing CAL routine. You can do this using the include statement, as follows:

  (do (include "ProgramName.cal"))

where *PROGRAMNAME.CAL* is the file name of the CAL routine.

The latter method allows several panels or widgets to share the same CAL program. If you change the CAL program, all panels automatically use the updated version. In addition, you can use this method to attach long CAL programs to a widget. If you use this method, the StudioWare panel and the CAL program file must be stored in the same directory. Otherwise, Pro Audio won't know where to look for the CAL program when you activate the widget.

Track Parameter

Field...	Range of values...
Parameter	Track parameter drop-down list
Value	Numeric value, simple alias, calculated expression, assignment

The widget changes a track parameter such as Mute, Solo, Arm, Channel, Port, or Volume. You cannot change the Name or Size parameters from a widget. Note also that you cannot record track parameters using the snapshot or real-time recording functions. Changing the track properties affects every event in the track.

Alias

The alias is a user-defined symbolic name that expresses the widget's value. By using the same alias for several widgets, you can link the operation of these widgets. For example, if a slider and a meter share the same alias, adjustments that are made to the slider will change the current value on the meter. If a slider and a knob share the same alias, adjusting the knob will cause the slider to move, and moving the slider will cause the knob to move.

There are some important rules for alias names:

- They must start with a letter.

- They can contain only letters, numbers, and the underscore symbol (_).

- They cannot contain blank spaces.

- Names are case-insensitive. There is no difference between VOLUME, Volume, and volume.

For more information on aliases, see "Advanced Panel Design" on page 11-32.

Customizing the Appearance of a Panel

There are a large number of widget settings that affect the appearance of StudioWare widgets, as indicated in the following table:

Setting...	What it's for...
Style	The type of widget: knob, slider, button, LED, meter, text, cluster, or image; when you change the style of a widget, its other properties stay intact.
Label	A text name for the widget. For convenience, you should keep widget labels short. Labels can also be used to show values; see "Widget Tips and Tricks" on page 11-37, for more information.
Border	If checked, a border is displayed around the widget.
Show Label	If checked, the widget label is displayed in the panel directly below the widget (for cluster widgets, the label appears at the top of the widget).
Show Value	If checked, the value of the widget is displayed in the panel directly above the widget.
X, Y	The X and Y position of the upper-left corner of the widget (in pixels).
Width, Height	The width and height of the widget (in pixels).

The X, Y, width, and height parameters provide another way to position widgets inside a panel. Note that the Show Label and Show Value options use up some of the space allocated to a widget. This means that enabling one or both of these options on an existing widget will shrink the knob or slider to allow room for the text.

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In addition, you can import your own bitmap artwork to customize the appearance of widgets in a panel. Some widgets require only a single bitmap, while some require two, as indicated in the following table:

Type of widget...	Background bitmap...	Foreground bitmap...
Cluster	Wallpaper for the entire cluster	Unused
Button	Up position of the button (drawn with transparent background)	Down position of the button (drawn with transparent background)
Knob	Knob image, stretched to fill the widget's area	Knob pointer, at original scale (drawn with transparent background)
Slider	Slider background, stretched to fill the widget area	Slider thumb, at original aspect ratio
LED	Indicator, when OFF (drawn with transparent background)	Indicator, when ON (drawn with transparent background)
Meter	Dark part of meter, stretched to fill the widget area	Lit part of the meter
Text	Unused	Unused
Image	Displayed image, tiled to fill. If a foreground bitmap is assigned, the background bitmap is ignored	Displayed image, stretched to fill

There are three bitmap options for a widget:

Option...	How it works...
Default	The standard (default) StudioWare bitmaps are used
None	No bitmaps are used
Custom	You assign custom foreground and background bitmap images (in *.bmp* or *.dib* format) to the widget

As indicated in the above table, some widget bitmaps are drawn with a transparent background. For these bitmaps, any pixels that match the upper-left most pixel in the image will be transparent, showing through to whatever is behind them. You can use this effect to design widget artwork that is not strictly rectangular in shape, like knobs that are round. If you try to use the transparent color in your bitmaps, your widgets may show unintended transparent areas. Be sure to choose a transparent color that you don't need to draw with. To draw a perfectly rectangular bitmap, you can simply add an extra row of pixels across the top of the bitmap in an unused color.

You can also assign colors to certain types of widgets. These colors are used to draw the corresponding control element when you choose None as the bitmap option. Text widgets display their text using the foreground color when the widget's alias is not equal to its minimum range value and the background color when the two values are equal.

To Change a Widget's Appearance...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Double-click on a widget, or right-click and choose **Properties** from the menu.

3. Enter the settings you want as shown in the above table.

4. Click OK when you are done.

Pro Audio modifies the widget settings as you indicated.

To Use Custom Bitmaps...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Right-click on a widget, and choose **Foreground Bitmap** or **Background Bitmap** from the menu.

3. Choose the bitmap file you want to attach, or choose Default or None.

4. Click OK when you are done.

Pro Audio imports the bitmap and attaches it to the widget.

To Assign Colors to Widgets...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Make sure that you have chosen None for both the foreground and background bitmap.

3. Right-click on a widget, and choose **Foreground Color** or **Background Color** from the menu.

4. Choose the color you want to use.

5. Click OK when you are done.

Pro Audio assigns the color to the widget.

Advanced Panel Design

StudioWare allows you to create very sophisticated and complex panels. This section covers advanced panel design capabilities.

Alias Formulas

You can use aliases, or formulas using aliases, to manage interactions between the widgets in a panel. You can enter formulas anywhere that you would normally choose an alias name. There are three different options, described below.

Simple Alias: Enter a name into the Alias field to represent the numeric value of the widget. Moving the widget causes the alias to take on the new value immediately, and if the alias should change in value for some other reason, the widget will automatically update to the new position and transmit/record fresh MIDI data. This makes a two-way connection between the widget and the rest of the system, because data values can flow both into and out of the widget through the alias. If two widgets have the same alias, they will always have the same value as well.

Tip:
You can force an alias to work only one way by putting parentheses () around the name in the Alias field. The widget will then receive values from other widgets with the same alias, but won't send data to those widgets.

Calculated Expression: Enter a computational expression that refers to other aliases, such as VocalLevel + 18. This allows one widget to take on a value that is determined by (but not necessarily identical to) the value of one or more other widgets. Expressions of this form are not inverted, so this defines a one-way relationship between the other aliases and the widget. Activating this widget will have no effect on any alias value and, therefore, no effect on other widgets.

Assignment: Enter an assignment statement, such as OverdubLevel = VocalLevel + 18. This is a combination of the above two methods. The alias OverdubLevel behaves like a normal two-way alias, but if the value of the expression ever changes, the alias and the widget will both take on the new value immediately. This provides a two-way connection between the widget and the alias and a one-way relationship from any aliases referenced in the expression to the widget alias.

All computations are performed using signed 32-bit integer quantities. The only exceptions are the bitwise AND, OR, and XOR operations, which use unsigned 32-bit integer computation.

Expressions and formulas are written in a syntax that is adapted from the C programming language. They can be used to perform calculations, make decisions, and pack and unpack data values in MIDI messages. The following operators are currently defined:

Operator...	Meaning...
+	addition
-	subtraction
*	multiplication
/	division
%	modulus
&	bitwise AND
|	bitwise OR
~	bitwise exclusive OR (XOR)
( )	parentheses for controlling the order of evaluation
? :	conditional operator
==	equality

!=	inequality
<	less than
<=	less than or equal to
>	greater than
>=	greater than or equal to

Some examples of operator usage are:

Formula...	Example...
x = y	Alias x is assigned the value of alias y whenever the value of alias y changes
x = y + 2 * z	Alias x is assigned the value of alias y plus 2 times the value of alias z whenever either y or z changes
x = (y + 2) * z	Alias x is assigned the value of alias y plus 2, then multiplied by the value of alias z whenever either y or z changes
x = y | z	Alias x is assigned the value of alias y bitwise OR the value of alias z whenever either y or z changes. If y==0xF0 and z==0x07, then x is set to 0xF7
x >= y ? x : y	If x is greater than or equal to y, use x; otherwise, use y
x == y ? 1 : $F0	If x is equal to y, use 1; otherwise, use $F0 (hexadecimal), or 240 (decimal)
LUCK ? 7 : 11	If the value of alias LUCK is YES or non-zero, use 7; otherwise, use 11
A ? x : (B ? y : z)	If A then use x, else if B then use y, else use z

Using Aliases for Track and Port Numbers

By using aliases for track or port numbers, you can create a panel in which one widget determines the destination for MIDI information sent by another widget. For example, you could create a panel like this one:

In this panel, the knob is used to change the track number from 1 through 8, while the slider is used to control the volume of the current track. To implement this panel, the knob is assigned minimum and maximum values of 1 and 8 and is assigned the alias TRACKNO. The slider widget's Automate in Track parameter is also set to TRACKNO, so that the slider's messages are sent to the correct track.

You can redirect widget messages to different MIDI ports using this same method by setting the Direct to Port parameter of a widget to a specific alias value.

Hiding Clusters

Aliases can be used to hide and show clusters of widgets. Here's how:

- Assign an alias name to the cluster widget

- Assign a minimum value to the cluster widget

- Use some other widget in the panel (like a button) to change the value of the alias

Whenever the value for the alias exceeds the minimum value for the cluster widget, the cluster is displayed. When the value for the alias is below the minimum value for the cluster widget, the cluster is hidden.

Four important tips:

- When a cluster is hidden, its widgets still function

- To make sure a cluster is always visible, do not give it an alias

- Make sure you follow the rules for naming aliases

- If a cluster has a shadow on the right and bottom edges, it is a pop-up cluster that will be hidden when the alias drops below the minimum value

Also, note that when you set the alias and minimum value for a cluster, the cluster will seem to disappear. This is perfectly normal; until the alias reaches the minimum value, the cluster will remain invisible. To avoid this, set the cluster's initial value equal to its maximum value before leaving the Widget Properties dialog box.

Grouping Widgets

An earlier section of this chapter showed how to create groups of faders, knobs, and buttons on the fly while using a StudioWare panel. When you are in Design mode, you can create and delete groups in several other ways.

In Design mode, you can also create **radio groups**. You typically use radio groups for sets of buttons in which only one can be pressed at a time, like the preset buttons on some car radios.

Note that grouping widgets that are linked by aliases may cause your groups or linkages to behave in an unexpected manner. You will need to be conscious of any existing groups or alias links when you set up either type of relationship.

To Create a Group...

1. Make sure the [Design] button is pressed so you are in Design mode.

2. Select two or more widgets that you want to group.

3. Right-click on one of the widgets and choose **Group** from the menu.

When you leave Design mode, the widgets are grouped together.

To Remove a Widget from a Group...

1. Select the Widget you want to remove. Make sure no other widgets are selected.

2. Right-click on the widget and choose **Group** from the menu.

The widget is removed from the group.

To Create a Radio Group...

1. Leave Design mode and move all desired widgets to their reset or default positions.

2. Re-enter Design mode.

3. Select all of the widgets that you want to group.

4. Right-click on one of the widgets and choose **Radio Group** from the menu.

When you leave Design mode, moving any widget in the radio group will move all other group members to their reset or default positions.

To Remove a Widget from a Group...

1. Select the widget you want to remove. Make sure no other widgets are selected.

2. Right-click on the widget and choose **Radio Group** from the menu.

The widget is removed from the group.

Widget Tips and Tricks

When you place an image widget into a panel, it may seem tricky to get the widget size exactly the way you'd like. The best way to resolve this is to use any bitmap drawing program to find out the exact height and width of the image in pixels. Then, after you create the image widget in StudioWare, enter these values in the Widget Properties' Width and Height fields. Your image will appear at its original size, eliminating any guesswork.

You may notice that horizontal sliders use the same thumb as vertical sliders. If you arrange your sliders to be displayed horizontally, you should right-click on the slider, choose **Foreground Bitmap**, and then click the None option. This will maker the slider's thumb fit better into the horizontal slider. Change the setting back to Default if you want to make the slider vertical again.

You can display the actual value of an alias in almost any format, by using a text widget. To do so, you create a string for the Label field of the

text widget that contains some special characters, as listed in the following table:.

Special characters...	How they are used...
%d	These characters are replaced by the value, displayed in decimal form.
%x	These characters are replaced by the value, displayed in hexadecimal form.
%04d	These characters are replaced by the value, displayed in decimal form, with exactly four digits displayed. The 0 indicates that the following number 4 is the desired number of digits.

The format strings are similar to those defined in the C computer language. Here are a few examples, given an alias value of 23:

Label...	Display...
%d	23
Volume = %d	Volume = 23
Device ID = 0x%02x	Device ID =0x17 (this is hexadecimal)
I have %05d widgets!	I have 00023 widgets!

Tutorial—Creating a Panel

In this section, we will create a panel from scratch in order to illustrate the process. The sample panel will control three specific parameters found on any General MIDI device—volume, modulation, and sustain—and add a few other widgets to display their values. To demonstrate how this panel works, you will need to have at least one track of MIDI data assigned to a General MIDI-compliant device in the Track view of the current song.

Starting Out

First, let's create a standard panel and then remove all of its widgets.

1. With the one General MIDI assigned track selected, create a new panel (choose **File-New**, pick StudioWare Panel from the list, and click OK).

2. Click [Design] to enter Design Mode.

3. All five visible widgets are part of a single cluster. To select the cluster, click on the track name at the top of the cluster.

4. Press the Del key to delete the cluster.

This will give us a starting point for our new panel.

All the widgets are deleted, leaving only a shaded rectangle behind. That rectangle is the main workspace of the panel, which can be resized in the same way as any other widget. It will automatically resize to include any widgets you add.

Adding a Pop-Up Cluster

Next, let's place one of each type of widget in our new panel. We'll start with a cluster widget, and then place other widgets insider the cluster.

1. Click ▦ in the StudioWare toolbar to select the Cluster tool.

2. Click the mouse anywhere within the panel window to add a cluster widget.

3. Drag the corners or edges of the cluster widget to adjust its size.

The new cluster widget should look something like this:

Now, let's name the cluster and set up an alias, so we can hide and show the cluster when we want to.

1.   Right-click on the cluster, and choose **Properties**.

2.   Enter Controllers in the Label field.

3.   Enter CONTopen in the Alias field.

4.   Enter a Minimum value of 126.

5.   Enter an Initial value of 126.

6.   Click OK.

If you've done everything correctly, the cluster widget will disappear. When the value of CONTopen reaches 127, the cluster will be displayed again.

Now, let's add a button widget that will control the display of the hidden cluster. We want to place this button outside the cluster we just created.

1.   Click in the StudioWare toolbar to select the Button tool.

2.   Click somewhere outside the cluster widget.

3.   Right-click on the new button, and choose **Properties**.

4.   Choose CONTopen from the Alias list. Verify that the default Maximum value is 127.

5.   Click OK when you are done.

Now, when the button is pressed, the value of CONTopen will be set to 127, and the cluster widget will be displayed. To verify this:

1.   Click to leave Design Mode.

2.   Click on the button. The cluster should appear.

3.   With the cluster still visible, click to re-enter Design Mode.

Controlling MIDI Sustain and Modulation

Now, let's add a button inside our cluster that will turn on the sustain of the MIDI track.

1.   Click in the StudioWare toolbar to select the Button tool.

2.   Click inside the cluster.

3.   Right-click on the new button, and choose **Properties**.

4.   Enter Sustain in the Label field.

5.   Enter SUSTAIN in the Alias field.

6.   Make sure that the values in the Range fields are 0 for the Minimum and 127 for the Maximum (the legal range for MIDI controllers) and that the Initial value is set at 0.

7.   Choose Controller from the Kind list.

8.   Enter 64 in the Number field. This is the controller number for Modulation in the General MIDI specification.

9.   Enter SUSTAIN in the Value field. This will link the controller value to the value of the button.

10. Check the Automate in Track option, and enter a track number in the field.

11. Click OK when you are done.

Note that you could have entered an alias for both the channel number and track number fields, so that another widget in the panel could be used to determine which channel or track would receive the controller messages.

 Now let's add a knob to control MIDI modulation.

1.   Click in the StudioWare toolbar to select the Knob tool.

2.   Click inside the cluster.

3.   Right-click on the knob and choose **Properties**.

4.   Enter Modulation In the Label field.

5.   Enter MODlevel in the Alias field.

6.   Make sure that the values in the Range fields are 0 for the Minimum and 127 for the Maximum (the legal range for MIDI controllers) and that the Initial value is set at 0.

7.   Choose Controller from the Kind list.

8.   Enter 1 in the Number field. This is the controller number designated for Modulation in the General MIDI specification.

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9. Enter MODlevel in the Value field. This will link the controller value to the value of the knob.

10. Check the Automate in Track option, and enter a track number in the field.

11. Click OK when you are done.

Now that we have a knob to control the modulation, let's create a more visual representation of the modulation level by adding a meter to the panel.

The meter widget shows the value that is represented by its alias. Meters can be resized so that they are vertical or horizontal, depending on their longest dimension.

We will place a meter inside our cluster, right beside the Modulation knob that we created. This meter will need the same alias as the knob in order to reflect that widget's value. To do so:

1. Click ▣ in the StudioWare toolbar to select the Meter tool.

2. Click somewhere beside the knob, but inside the cluster.

3. Move and resize the meter so that it is tall and thin, about four times the height of the knob.

4. Right-click on the meter and choose **Properties**.

5. Enter Mod. Level in the Label field.

6. Choose MODlevel from the Alias list.

7. Click OK when you are done.

Now the meter is linked to the knob. To verify this:

1. Click [Design] to leave Design Mode.

2. Adjust the knob. The value indicated by the meter should track the changes you make.

3. Click [Design] to re-enter Design Mode.

Volume Control and Indicators

Now let's add one more control that changes the volume of the track. We'll also add some LED indicators that light up at minimum and maximum volume.

1. Click ⊞ in the StudioWare toolbar to select the Slider tool.

2. Click somewhere in the Controller cluster.

3. Resize the slider so that it is tall and thin.

4. Right-click on the slider and choose ***Properties***.

5. Enter Volume in the Label field.

6. Enter Volume in the Alias field.

7. Choose Controller from the Kind list.

8. Enter 7 in the Number field, or choose Volume from the drop-down list.

9. Enter Volume in the Value field. This links the controller value to the alias of the widget.

10. Click OK when you are done.

Now for the LEDs:

1. Click ▣ in the StudioWare toolbar to select the LED tool.

2. Click somewhere above the volume slider.

3. Right-click on the LED and choose ***Properties***.

4. Enter Maximum in the Label field.

5. Enter Volume in the Alias field.

6. In the Range fields, enter 126 as the minimum and 127 as the maximum. This sets the LED to light up at any value higher than 126. Also, set the Initial value to 126.

7. Check the Show Label option, so the name of the LED will be displayed.

8. Click OK when you are done.

Now, follow these similar steps for the Minimum Volume LED:

1.	Click ▣ in the StudioWare toolbar to select the LED tool.

2.	Click somewhere below the volume slider.

3.	Right-click on the LED and choose ***Properties***.

4.	Enter Minimum in the Label field.

5.	Enter Volume in the Alias field.

6.	In the Range fields, enter 1 as the minimum and 0 as the maximum. This sets the LED to light up at any value lower than 1.

7.	Check the Show Label option, so the name of the LED will be displayed.

8.	Click OK when you are done.

Adding Labels and Images

A text widget can display labels or numeric values. Let's add a couple of text widgets, one that serves as your own personal copyright notice, and one that displays the volume level in a formatted string.

1.	Click ▣ in the StudioWare toolbar to select the Text tool.

2.	Click near the bottom right of the panel.

3.	Right-click on the text widget and choose ***Properties***.

4.	Enter Copyright 1998 by [your name] in the Label field.

5.	Make sure the Alias field is empty.

6.	Click OK when you are done.

Now for the formatted string:

1.	Click ▣ in the StudioWare toolbar to select the Text tool.

2.	Click anywhere in the panel.

3.	Right-click on the text widget and choose ***Properties***.

4.	Choose Volume from the Alias list.

5.   Enter The Volume is %d in the Label field.

6.   Click OK when you are done.

From now on, when you adjust the volume using the slider, the text string will be updated automatically. The %d is replaced by the actual value of the Volume alias.

Finally, let's insert a bitmap image into our panel to finish it off.

1.   Click in the StudioWare toolbar to select the Image tool.

2.   Click anywhere in the panel.

3.   Right-click on the image widget and choose **_Foreground Bitmap_**.

4.   Enter the name of the bitmap file you want to use and click OK.

The image is automatically stretched or shrunk to fit within the defined area of the widget. You can increase or decrease the size of the widget just like any other widget. If you set the background bitmap and leave the foreground bitmap unassigned, the bitmap will be tiled across the image widget like wallpaper.

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12 Using Layouts and Templates

A **layout** is the current arrangement of all the views that pertain to a particular project. The layout of each project is stored automatically as part of every project file. In addition, you can save the current layout or load any saved layout and apply it to the current project. You might want to create a layout so you can easily arrange the views in a convenient size and position on the screen.

A **template** is a special file that is used as a pattern to create other, similar files. You might create a template file that defines a particular musical ensemble (say, a string quartet) or a particular studio configuration (MIDI instruments, audio ports, and so on). Templates make it fast and easy to create and configure new projects.
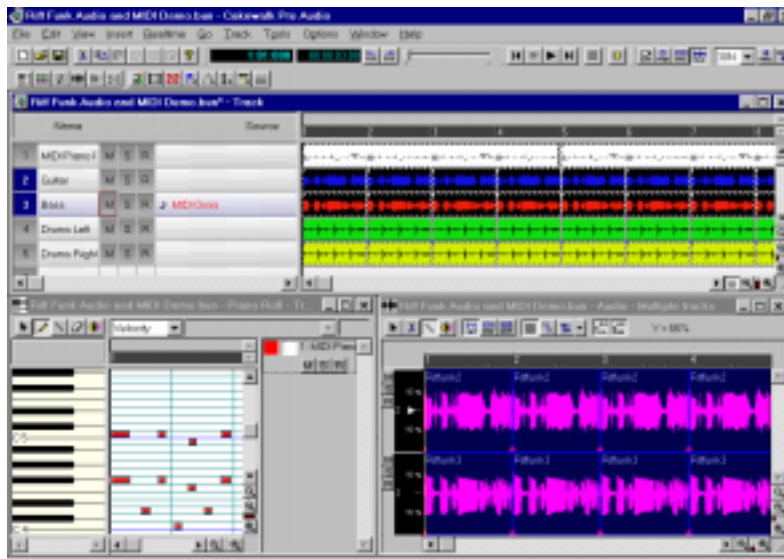
In This Chapter

Layouts & Templates

Note that toolbars are not part of a file layout or template. The toolbar arrangement you choose is stored automatically from session to session.

Layouts

The layout of the views that are displayed for a project is stored automatically in the project file when you save the project. By default, the layout of all the views is restored when the file is opened.

In addition, you can save the current layout in a separate list—the global layout list. Once you have saved the layout in this list, you can apply it to any open project. The global layout list can contain as many layouts as you want. Layouts in the list can be updated, renamed, and deleted.

Layouts are stored in a folder on your hard disk. To change the default folder for layouts, choose **Global-Options** and click the Folders tab.

There are two options that control how layouts are used, as described in the following table:

Option...	Meaning...
Close Old Windows Before Loading New Ones	If checked, Pro Audio will close all the views of the current project before applying the layout. If you leave this option unchecked, existing views remain open and additional views are created according to the settings in the layout.
When Opening a File, Load Its Layout	If checked, the views of a project are automatically arranged according to the stored layout when the project file is opened. If this option is not checked, only the Track view (and File Info view, if applicable) are displayed when the project file is opened.

To Create or Save a Layout...

1. Arrange the views for the current project the way you want.

2. Choose *View-Layouts* to display the Window Layouts dialog box.

3. Click Add to display the New Global Layout dialog box.

4. Enter a name for the layout, and click OK. The layout is added to the list.

5. Click Close to exit the Window Layouts dialog box.

To Update a Layout...

1. Arrange the views for the current project the way you want.

2. Choose *View-Layouts* to display the Window Layouts dialog box.

3. Choose the layout you want to update from the list.

4. Click Add to display the New Global Layout dialog box.

5. Leave the layout name unchanged, and click OK.

6. Click OK to confirm that you want to update the layout.

7. Click Close to exit the Window Layouts dialog box.

To Load a Layout...

1. Choose *View-Layouts* to display the Window Layouts dialog box.

2. Choose the layout you want from the list.

3. Click Load.

Views of the current project are arranged according to the layout settings.

To Delete a Layout...

1. Choose *View-Layouts* to display the Window Layouts dialog box.

2. Choose the layout you want to delete from the list.

3. Click Delete.

4. Click OK to confirm that you want to delete the layout. The layout is removed from the list.

5. Click Close to exit the Window Layouts dialog box.

Layouts & Templates

To Rename a Layout...

1. Choose **View-Layouts** to display the Window Layouts dialog box.

2. Choose the layout you want to rename from the list.

3. Click Rename to display the Rename Existing Layout dialog box.

4. Enter a new name for the layout, and click OK. The layout is renamed in the list.

5. Click Close to exit the Window Layouts dialog box.

To Set Layout Options...

1. Choose **View-Layouts** to display the Window Layouts dialog box.

2. Check the options you want.

3. Click Close.

Templates

Template files make it easy to create new projects with certain predefined settings. To create a template file, create a new project file and arrange the project settings the way you want, then save the project as a template file. Template files have a file extension of *.tpl*. When you create a new project, you can use the template as the basis for the new project. Pro Audio looks for template files in a particular folder on your hard disk. By default, this folder is the program folder. To change the template directory, choose **Global-Options** and click the Folders tab.

Every time you start Pro Audio, a new, empty project is displayed. If you want, you can determine the settings for this default project by creating and saving a special template file, called *normal.tpl*. If you create or update the *normal.tpl* file, Pro Audio will display this template automatically when the program is started.

As a rule, any parameter that is saved in a project file is also saved in a template file. Following are some useful parameters that are saved in template files:

• Track configuration and track parameters

• Timebase

• Sysx banks

• File information and comments

- Tempo settings

- Meter and key settings

- Clock and synchronization information

- MIDI data

- MIDI In/Out/Thru settings

- MIDI metronome settings

- Selection start and end times

- Record mode and punch-in times

The following parameters are saved globally and are not stored in template or project files:

- Initialization file parameters

- Big Time font settings

- MIDI device settings

- Instrument definitions

- Autosave options

- Key bindings

- Color settings

To Create a Template...

1. Create a new file using the *File-New* command.

2. Set one or more parameters to be the way you want.

3. Choose *File-Save As* to display the Save As dialog box.

4. Choose Template from the Save as Type list.

5. Enter a template file name and click Save.

Pro Audio saves the template file.

To Create a New Project from a Template...

1. Choose *File-New* to display the New Project File dialog box. The list contains the names of all existing templates.

2. Choose a template from the list.

3. Click OK.

Pro Audio creates the new project and displays it in the Track view.

Template Example: Three MIDI Instruments

Suppose that your system has only a single MIDI port but you own three different synthesizers:

- One synthesizer set to receive on channels 1 through 8

- A general MIDI synthesizer module set to receive data on all 16 channels

- A drum machine set to receive on MIDI channel 10

Here's how you can use a template to make it easy to create new projects that are already configured for the instruments you own.

To Create the Example Template File...

1. Choose *File-New* to create a new project file.

2. Enter 10 in the channel column of track 10. The drum machine responds to channel 10. For consistency, the drums can be placed on track 10.

3. The second synthesizer responds to channels 1 through 8. These can be placed on tracks 1 through 8. Fill the Channel column for each track with the corresponding channel number. You should now have tracks 1 through 8 set to channels 1 through 8.

4. The third synthesizer can respond to 16 MIDI channels, but the only channels left are 9 and 11 through 16. Enter these numbers in the corresponding tracks. You will need to mute the unused channels on the third synthesizer (1 through 8 and 10) so they won't play. These are assigned to the drum machine and the second synthesizer.

5. Name each track and set any track parameters, such as starting patch, volumes, panning, and transposition.

6. If you like, configure other parameters needed in your projects, such as auto-send Sysx banks, tempo settings, and comments.

7. Choose *File-Save*, and save the file as a template named *my3synths*.

Now, each time you want to start working on a new project, you can simply load your template and start recording.

13 Improving Audio Performance

Digital audio files are very large, and the processing of digital audio places a heavy load on a desktop computer. Pro Audio includes a large number of features and advanced settings that help you manage disk space more efficiently and get better performance. This chapter describes these features and settings.

In This Chapter

Audio System Configuration

There are many different types and configurations of audio hardware. Pro Audio can usually automatically detect the type of sound card that you have installed and configure its settings for best performance. Sometimes, though, you may need to change these settings, as described below.

The Wave Profiler

The Wave Profiler is a utility that analyzes all the sound cards in your computer and finds the optimum DMA (Direct Memory Access) settings for communicating with Pro Audio. These settings are used to ensure that a project that contains both MIDI and digital audio plays back both types of material in tight synchronization. If the DMA settings are incorrect, MIDI and digital audio material may not play back correctly.

The Wave Profiler utility runs automatically the first time you run Pro Audio, and you don't need to run it again unless you install a new sound card or an updated driver for an existing sound card. The Wave Profiler determines the correct settings at three sample rates (11 kHz, 22 kHz, and 44 kHz). It assumes that the same settings should be used for the 48 kHz and 96 kHz sample rates. If you find that audio and MIDI don't play in sync at 48 kHz or 96 kHz, you may need to enter the proper settings manually, as described in the next section.

You can also manually configure the DMA settings for your sound card, overriding the settings that were determined by the Wave Profiler. This is not recommended except under special circumstances outlined below.

All sound cards report their approximate position (sample number) in the audio stream (this position is known as the **wave out position**). Because the reported position is not always sample-accurate, Pro Audio may choose to use or ignore this information based on the type of card. If Pro Audio uses the wave out position information, the DMA settings are ignored, and vice versa. Some newer sound cards report themselves as having sample-accurate wave out position reporting. If Pro Audio detects this capability, the wave out position option is enabled automatically. You can always override this setting and force Pro Audio to use or to ignore the wave out position information.

If you experience MIDI and audio synchronization problems during playback, there are several things you can try before contacting technical support:

- Run the Wave Profiler and try the default setting.
- Try using the Wave Out Position for Timing option.
- Try setting the DMA settings manually.

To Run the Wave Profiler...

1. Choose **Options-Audio** and click the General tab.

2. Click Wave Profiler. The Wave Profiler examines each of your sound cards in turn.

If the Wave Profiler cannot identify the card in its database of known cards, it automatically tests the card to identify appropriate settings, and then goes on to the next sound card, if there is one, and displays a message when it is finished. If you receive an error from the Wave Profiler and have problems with synchronization of MIDI and digital audio, contact technical support.

To Manually Change the DMA Settings...

If you still have synchronization problems, check the following Web page: http://www.cakewalk.com/support/docs/dmasettings.htm

OR

If you do not have Internet access, contact technical support.

To Use the Wave Out Position Information...

1. Choose **Options-Audio** and click the Device Profiles tab.

2. Check the Driver reports position with sample accuracy checkbox.

3. Click OK and play your project again.

Configuring Your Audio Hardware

Your computer may have several installed devices that Windows recognizes as sound cards containing audio drivers. Often, these devices will include things like FAX modems and software synthesizers, which you would not want to use for audio input or output. You can use the **Options-Audio** command to choose the audio drivers that you want to use with Pro Audio, and exclude those that you do not wish to use. Note that while some multichannel audio devices have multiple drivers, most audio devices have only a single audio driver.

Pro Audio also allows you to choose the audio device whose clock should be used to control recording and playback timing. Every sound card's clock crystal is slightly different, which causes minor differences in the

actual playback rate on each card. These differences may lead to slight synchronization problems if you use one card for recording and a different one for playback. Therefore, you should choose your highest quality sound card for both record and playback timing.

While you must choose a playback timing master, you can route audio output through any number of devices at once. For example, suppose your computer has both a high-end audio card and a basic built-in sound card. You should choose the high-end sound card as the record and playback timing master. However, using the aux buses in the Console view, you could create a headphone or monitor mix and route it through the built-in sound card. There are several other options you can use to control certain aspects of audio playback, as shown in the table:

Option. . .	How to use it. . .
Simultaneous Record/Playback	Pro Audio tries to determine automatically if your audio hardware supports simultaneous record and playback. If it fails to determine this setting automatically, you can check this option. You can also turn off simultaneous record and playback if this causes problems with your equipment. This option appears on the Advanced tab of the Audio Options dialog box.
Clip Audio Mix Upon Overflow	When this option is enabled, Pro Audio will clip overloaded audio instead of letting it wrap, or overflow. This often reduces the audio artifacts of mixing too hot, and creates a less abrasive type of distortion when you overdrive tracks. You may find it especially useful on guitar-heavy mixes. This option may reduce audio throughput. This option appears on the Advanced tab of the Audio Options dialog box.
Mono	This option forces monaural recording and playback. It is required for full-duplex recording on the Roland RAP-10. This option appears on the General tab of the Audio Options dialog box. This option is useful for simulating an AM broadcast.

To Choose Your Audio Drivers...

1. Choose **Options-Audio** and click the Drivers tab.

2. Choose one or more audio inputs from the Input Drivers list.

3. Choose one or more audio outputs from the Output Drivers list.

4. Click OK when you are done.

Note that when you change this list, audio output and input driver assignments for existing projects may change.

To Choose the Timing Masters...

1. Choose **Options-Audio** and click the General tab.

2. Choose the Playback Timing Master from the list.

3. Choose the same sound card from the Timing Master list.

4. Click OK when you are done.

To Set Other Audio Options...

1. Choose **Options-Audio** and click the Advanced tab.

2. Choose the options you want according to the table that appears above.

3. Click OK when you are done.

Digital Audio Data Management

Digital audio requires a large amount of disk storage. The tables below show the disk space requirement in megabytes for a single minute of digital audio at various sampling rates:

	Mono	
Rate...	**16 bit**	**24 bit**
11 kHZ	1.3	1.9
22 kHz	2.8	3.8
44.1 kHZ	5.0	7.6
48 kHz	5.5	7.6

Mono

Rate...	16 bit	24 bit
96 kHz	11.2	16.5

Stereo

Rate...	16 bit	24 bit
11 kHZ	2.5	3.8
22 kHz	5.0	7.6
44.1 kHZ	10.1	15.1
48 kHz	11.0	16.5
96 kHz	22.0	33.0

Pro Audio stores audio data separately from the rest of your projects, in files placed into a special folder called the **wavedata folder**. These audio files are in the same format as regular Wave files.

Pro Audio stores audio data in a way that conserves disk space. If you copy an audio event from one project to another, for example, Pro Audio doesn't actually make a copy of the audio file, unless the projects use different sampling and bit rates. Instead, it tells both project files that they share the same audio file. If you subsequently edit a portion of the audio in one of the projects, the edited portion is stored in a separate audio file, and the corresponding portion of the original file is no longer shared. On playback, Pro Audio combines all the audio files together as needed to recreate the song.

Suppose you have a song called *mysong.wrk*, which contains several audio events. The audio portion of the project is stored in a number of files with an extension of *.wav*. The exact number of files depends on how many events were recorded, how much editing was performed on the audio portion of the project, whether or not the same audio events are shared by other projects, and other factors.

There are several benefits to this system:

- You can record and edit digital audio without having to enter file names for every piece of audio

- You use much less disk space than would otherwise be required

- You don't have to manually organize and keep track of all your audio files

Pro Audio includes several features and commands to assist in working with digital audio data:

Feature/Command...	What it's for...
Bundle file	A single file that incorporates all project information and audio data. Useful for creating backups of your work or for moving projects from one computer to another.
Clean Audio Disk	Deletes audio files that are not used by any project to free up disk space.
Compact Audio Disk	Compacts all the audio data used by a project into a single file, increasing the efficiency of playback.
Copy and Manage Imported Files	Imported wave files are copied into the wavedata folder and managed automatically.

These features and commands are described in the sections that follow.

Changing the Wavedata Folder

You are permitted to change the location of the folder that is used to store audio data. This may be necessary if, for example, your hard disk is full and you want to move all audio data storage to a different hard disk. We strongly recommend that you do not change the location of the wavedata folder unless absolutely necessary.

If your original wavedata folder contains any audio files with the extension *.wav*, you must manually move these files to the new wavedata folder using the Windows Explorer or some other file management program. Otherwise, you will receive an error message when you open your project files, and the audio portion of your project will be missing.

To Change the Wavedata Folder...

1. Choose **Options-Audio** and click the Advanced tab.

2. Enter the name of the wavedata folder in the Data Directory box.

3. Click OK when you are done.

4. Use the Windows Explorer or some other program to move all audio files from the old wavedata folder to the new wavedata folder.

All audio files will be stored in the new wavedata folder.

Tip:

It is better to first save the project as a bundle file, change the wavedata directory, then open the bundle file. This ensures that all of the audio data is properly moved to the new wavedata directory.

Deleting Unused Audio Files

The **Clean Audio Disk** command is used to delete digital audio files in the wavedata folder that are no longer used by any of your projects. You should use this command from time to time to free up disk space.

This command searches all of your hard disks for project files, and then compiles a list of all the audio files in your wavedata folder that are not in use by any of these projects. You can then choose to delete these audio files. Make sure that all of your important project (.wrk) files are stored on your local hard disk(s) before using this command. If your project files are stored elsewhere (removeable media, etc.), then you risk accidentally deleting important audio files that are associated with your projects.

If you are using another utility program that protects you from accidentally deleting important files (such as Norton Protect), you may need to disable that program. Otherwise, the next time you use the **Clean Audio Disk** command you may once again find these not-quite-deleted files.

To Delete Unused Audio Files...

1. Make sure all project files that contain audio are immediately accessible on a hard disk.

2. If you are running Windows 95, empty the Recycle Bin.

3. Choose **Tools-Clean Audio Disk** to display the Clean Audio Disk dialog box.

4. Click the Find button. Pro Audio searches your hard disk for audio files that appear to be unused by any existing projects, and displays the names of these files in the list.

5. Follow the instructions in the table:

To do this...	Do this...
Listen to a file	Highlight the file name in the list and click Play
Delete a file	Highlight the file name in the list and click Delete
Delete all files	Click Delete All, and click Yes to confirm

6. Click Close when you are done.

Compacting Audio Files

The Compact Audio Data command places all digital audio used in the current project into a single digital audio file. This can improve the efficiency of playback, particularly if you have performed lots of audio editing.

Individual audio events in the project point to specific portions of this single file. Audio events may continue to use the same portion of the audio data file in order to reduce disk usage. When this command has been carried out, all of the original audio files remain in the wavedata folder. To reclaim disk space, use the **Tools-Clean Audio Disk** command.

To Compact Audio Files...

1. Choose *Tools-Compact Audio Data*.

2. Confirm that you want to compact your audio data.

Pro Audio compacts all audio data for the current project into a single file.

Backing Up Projects with Digital Audio

A **bundle file** is a single file that contains all the information—except video—used in a project. A bundle file includes everything that is stored in a normal project file, plus all the digital audio that is used in the project. Use a bundle file when you want to:

• Make a backup copy of a project that contains digital audio

• Transfer a project containing digital audio from one computer to another

Because a bundle file makes an extra copy of all the digital audio in your project, it will require extra disk space. Bundle files are not intended to be your primary means of storing a song. Bundle files have a file extension of *.bun*.

When you open a bundle file, the audio data are placed into the wavedata folder, and the remainder of the song is loaded into memory. Use the *File-Save As* command if you want to save the project as a regular project (*.wrk*) file.

If you close this file without saving it, the audio data are automatically deleted from the wavedata folder. If you save the file as a project (.WRK) file, the audio data are left in the wavedata folder. If you save the project as a bundle file, the audio data are removed from the wavedata folder.

To Create a Bundle File...

1. Choose *File-Save As* to display the Save As dialog box.

2. Choose Bundle from the Save as Type list.

3. Enter a file name and click OK.

Pro Audio compacts all the audio and merges it with the remaining project data in a bundle file.

To Open a Bundle File...

1.   Choose **File-Open** to display the Open dialog box.

2.   Choose a file with a .BUN extension.

3.   Click Open

The file is opened and the audio data placed into the wavedata folder.

Imported Audio Files

By default, Pro Audio will make a copy of any audio data imported via the **Insert-Wave File** command and place the imported audio into the wavedata folder. You can disable this option if, for example, you want to import large quantities of audio data into a project and don't want to consume time and disk space by making copies of the files. Copies are made if the imported audio does not match the current project's sampling and bit rates (and if you edit any of the imported audio data). Automatic handling of imported files is enabled by default. Do not disable this option unless you are prepared to manage the audio files individually.

To Change Handling of Imported Files...

1.   Choose **Options-Audio** and click the Advanced tab.

2.   Check or uncheck the Copy and Manage Imported Files box.

3.   Click OK when you are done.

Imported files will be handled based on the settings you have chosen.

Improving Performance with Digital Audio

When a project contains many tracks of digital audio or when many real-time effects are in use, your computer may have difficulty keeping up during playback. When this occurs, you'll hear portions of the audio drop out, stutter, or pop. In an extreme case audio playback may stop altogether. If you do experience a dropout, a dialog appears with suggestions for fixing the problem.

The maximum number of audio tracks you can expect to play on your computer depends on the audio sample rate, the speed of your hard disk, and the speed of your computer's CPU.

Unfortunately, the effect of your CPU on audio track throughput is much more difficult to quantify. Throughput is affected by the type of chip (e.g., Pentium versus Pentium II or Pentium MMX), clock speed, the number and type of real-time effects in use, cache size and settings, and many other factors. There are a variety of things you can do to increase the number of audio tracks and effects you can play on your computer, as outlined in the following table:

Approach...	How it works...
Avoid compressed disks	If you use DoubleSpace, Stacker, or some other disk compression system, it will slow down playback of audio tremendously. Configure your system so that the wavedata folder is on a hard disk that is not compressed.
Exit other programs	The more programs you have open, the more CPU cycles you are taking away from your project. Exit any programs unnecessary to the task at hand.
Refrain from other activity during playback	If you open and close windows or do lots of editing while playback is in progress, you may steal CPU cycles that would otherwise be used for playback.
Apply some audio effects offline	If you apply real-time effects that you are satisfied with, consider using the Apply Audio Effects button in the Console view to apply those effects offline. Then remove those effects from real-time use and free up lots of CPU power.
Archive unused audio tracks	Audio tracks that are muted continue to place a load on your processor. To lessen the burden and free up cycles to handle more audio, archive all unused audio tracks. See "Silencing Tracks" on page 3-11 for more information.

Mix down your audio tracks	If your project contains many different audio tracks or many real-time effects, you can use the **Mixdown Audio** command to reduce all of this content to a stereo pair of tracks. Having done this, you can archive the original tracks (in case you need them later) and play only the new tracks, lessening the computational burden on your computer. For more information, see "Mixing Down and Distributing Audio" on page 9-29.
Change File I/O Buffer Size in the Options-Audio-Advanced dialog box	Most hard disks work best with the default setting of 128 KB. Yours may work better with 64, 32, or 16. If those values don't help, try 256, 512, or move on to another remedy.
Defragment your hard disk	If your hard disk is fragmented, playback of audio will be slower. Use the Disk Defragmenter to correct the situation.
Turn off the Clip Audio Mix Upon Overflow option in the Options-Audio-Advanced dialog box.	Unless your mix is really distorted, you won't usually need this option.
Turn off the Apply Dither option in the Options-Audio-Advanced dialog box.	Dithering subtly improves your mix, but most people can't hear it. Turn it back on for mastering.
Enable disk caching	By default, Pro Audio bypasses all disk caching, which typically results in better performance with audio data. If your computer has a very large amount of RAM (128 MB or more) and your audio tracks include many repeated sections, enabling caching may improve Pro Audio's audio performance. Choose **Options-Audio** and click the Advanced tab to change the disk cache settings.
Record audio at a lower sampling rate	If you don't require CD quality 44.1 kHz audio, then record your audio at a lower sampling rate of 22.05 kHz or 11.025 kHz. Choose **Options-Audio** to change the sampling rate. This method is useful only before you start work on a project. Once the audio sampling rate for a project has been set, it cannot be changed.

Disable the Display Clip Contents options	Drawing the contents of audio clips in the Clips pane uses some CPU cycles. If you are using a slow machine, you may want to disable this feature. To do so, right-click in the Clips pane, choose **View Options**, and disable the Display Clip Contents option.
Turn off the option to draw audio as it plays	The DrawPlayingAudio setting in the initialization file, if enabled, causes audio waveforms to be drawn as the track or audio scrolls during playback. Disable this option to conserve CPU cycles. To do so, make sure that [DrawPlayingAudio=0] appears in the *cakewalk.ini* file. For more information on initialization files, see *Appendix E: Initialization Files*.

Pro Audio has several new tools to help you identify and correct audio problems, including the CPU meter, the Disk meter, the Dropout indicator, and the Mixing Latency slider.

Status Bar/CPU Meter/Disk Meter

Pro Audio provides the Status bar at the bottom of the screen to show if any track is muted, soloed, or armed. The Status bar also contains the CPU meter, the Disk meter, the Dropout indicator, and a measurement of available hard disk space. If you do not see the Status bar, go to *Options-Global*, select the **General** tab, and make sure **Show Status Bar** is selected. The Status bar contains the following sections:

- The **Status indicator** displays the words Mute, Solo, and/or Arm if any tracks are muted, soloed, or armed. You can usually see the Status indicator even if open windows cover the Track view.

- The **CPU meter** is located on the right end of the Status bar and measures CPU usage. The CPU meter displays the time it takes to process a buffer full of audio data as a percentage of the maximum time available to process that data and maintain uninterrupted playback. There is some tolerance built into the meter, so it's very possible that it will exceed 100% at times (more so during recording than playback). When the meter exceeds 100%, it displays the word "Overload."

- The **Disk meter** measures how much of the available time Pro Audio is using to perform input/output functions on your hard disk. The size of your setup's I/O buffer (listed in the Options-Audio dialog box, in the Advanced tab) determines how much time is allowed to

perform disk operations and maintain uninterrupted playback. When Pro Audio performs disk operations, the Disk meter jumps up in value and shows the percentage of the allowed time Pro Audio is taking to complete each cycle of disk Input/Output.

- The **Dropout indicator** is located on the left side of the Status bar. It displays the word **Dropout** whenever Pro Audio has to omit some audio data in order to play all the tracks. You can choose whether you want playback and recording to stop when this happens by checking or unchecking the Stop On Driver Underrun option in the *Options-Audio* dialog box, in the **Advanced** tab.

- **Hard disk space—**Just to the left of the CPU meter, Pro Audio displays the amount of available disk space in both the number of megabytes and as a percentage of the total.

If you experience a dropout or your CPU or Disk meters are reading high, there are steps you can take to improve your audio performance. For more information, see "Improving Performance with Digital Audio" on page 13-11.

Mixing Latency

Pro Audio has a slider in the *Options-Audio* dialog box, in the **General** tab to set mixing latency. Mixing latency is the amount of time Pro Audio allocates to prepare a buffer full of audio data for playback. Lower latency settings add processing time because of the need to refill the smaller data buffers more often. To use mixing latency settings below 100 msec., always enable **WavePipe™ Acceleration** in the *Options-Audio* dialog box, in the Advanced tab. You may need to use the slider to **increase** mixing latency under the following conditions:

- You use lots of real-time effects, and you hear dropouts. Check the CPU meter for high readings; try increasing the latency.

- Your sound card does not function well at lower latency. Some sound cards just do not function well at lower latency settings. Even though Pro Audio's CPU meter and Dropout indicator report no problems, if you hear dropouts try increasing the mixing latency.

For more information, see the online help.

Queue Buffers

Pro Audio allows you to set the number of queue buffers in the ***Options-Audio*** dialog box, in the **General** tab. A higher number of queue buffers will take longer to fill, and therefore cause an increase in latency. A lower number of queue buffers decreases latency, but may cause "dropouts." The default setting is 4.

For more information, see the online help.

14 Using System Exclusive Data

Pro Audio's System Exclusive (Sysx) librarian provides you with 256 banks in which to hold MIDI System Exclusive messages. A **bank** is a storage area plus some associated parameters such as a destination port and an optional description. Each bank can hold any number of messages; the amount of data it can hold is limited only by available memory. The banks are saved in the Pro Audio song file. Each bank can also be saved as a *.syx* file in the format used by the public domain MIDIEX utility.
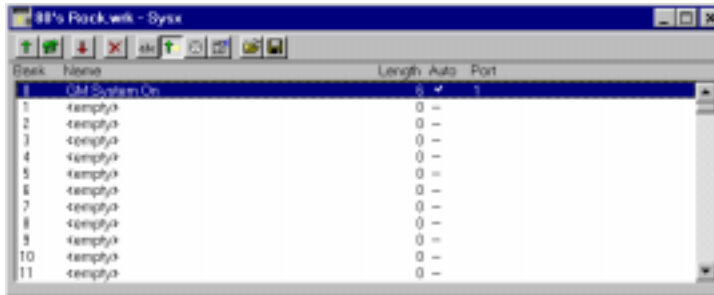
In This Chapter

What Is System Exclusive?

System Exclusive data is MIDI's way of letting each synthesizer manufacturer transmit private data about its products. A System Exclusive message has a manufacturer ID; the rest of the message is completely proprietary and varies for each manufacturer, even for each of its products. Pro Audio does not understand what this data means; it simply can hold onto it for you. You can take snapshots of your equipment's configuration and store them in Pro Audio's System Exclusive banks for transmitting back to the equipment. You may want to do this simply to back up your equipment, much like backing up your computer's hard drive in case something goes wrong. Or you may configure your equipment differently for each song's requirements, which is why storing System Exclusive banks with each Pro Audio project file can be useful. Of course, for merely backing up your equipment, you can have a project containing only System Exclusive data and no notes.

Sysx Events

Pro Audio provides two distinct kinds of Sysx events: **Sysx Bank** and **Sysx Data**.

- **Sysx Bank:** You can use Sysx Bank events to transmit one of the song's 256 banks of System Exclusive data. These banks can be recorded, viewed, and edited in Sysx view, and each bank can contain one or more very large System Exclusive messages. Sysx Banks may also be marked Auto, so that they are sent when the file is loaded rather than during the start of playback (see page 14-6 for more on this.)

- **Sysx Data:** You can also use Sysx Data events, which can each contain a single System Exclusive message up to 255 bytes long. You can view and edit the message bytes in the Event List view.

You can save Sysx Data events in project (*.wrk*) files. Any tracks containing these event types will be discarded if the song is loaded into Pro Audio 5.0 or earlier.

Sysx Bank and Sysx Data events can be recorded in real time. See "Real-time Recording of System Exclusive" on page 14-8 for more information.

Using the System Exclusive View

The System Exclusive window has a list box for the 256 banks, plus buttons. Most of the buttons affect whatever bank you have selected in the list. Certain buttons will be disabled if the selected bank is empty. To open the System Exclusive view, choose the **Sysx** command from the **View** menu.

Here is a description of the buttons in the Sysx view.

Send

Send transmits the current bank's System Exclusive message. If nothing seems to happen, make sure you have correctly set the port (see later in this chapter). This button is disabled if the current bank is empty.

Send All

Send All transmits all nonempty banks.

Receive

Receive dumps data from a synthesizer into the bank. If the bank contains data, Pro Audio asks you whether you want the new data to overwrite the existing data or be appended to it.

When receiving dumps, remember to connect both the MIDI In and Out ports of the synthesizer to the MIDI interface. Also, make sure that your instruments are set up to receive and/or transmit Sysx. Synthesizers that you normally use only to play sounds—for example, sound modules that don't have keyboards—don't need to be hooked up in both directions except for receiving dumps, so it is easy to forget this. (If you will only be *sending* Sysx messages to the device, the normal one-direction hookup is sufficient.)

To Receive System Exclusive Data from a Synthesizer...

1.   Choose **Options-Global** and click the MIDI filter tab, and make sure that the System Exclusive item is checked. If it isn't, Pro Audio won't receive System Exclusive messages.

2. Click ⬇ to open the Receive System Exclusive dialog box.
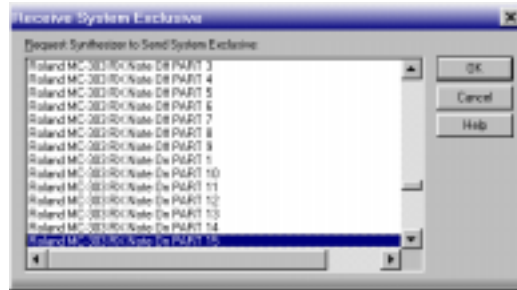
The list labeled Request contains a list of Dump Request Macros (DRMs). Each DRM has a name that describes the synthesizer and type of data that it asks the synthesizer to send. Select your choice and click OK.

The first item in the list—You start dump on instrument—is not really a Dump Request Macro. It tells Pro Audio that you will initiate a dump (or multiple dumps) from the front panel of the synthesizer. You need to do this for synthesizers that are not on the list. Once the bytes received count stops increasing (see Steps 3 and 4), click Done to tell Pro Audio to stop receiving. The currently selected bank now holds the received Sysx data.

Once you've selected a DRM, Pro Audio runs it.

Note:

The Pro Audio librarian may not support synthesizers that require handshaking dump protocols. Some of these synthesizers have a backup protocol where they will do a normal dump if they don't get a handshake. Others do not.

3.   The DRM may prompt you for additional information, which you
      should supply.

      •   **Patch number:** DRMs that are written to request an
           individual patch or configuration give you this prompt, so
           you can specify the one you want to have dumped.
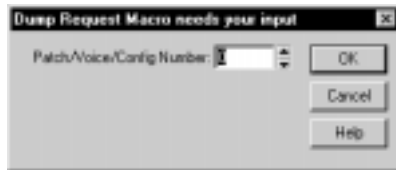
      •   **Channel/unit number:** Most synthesizers have a Sysx
           channel or unit number. This covers the situation in which
           you own two of the exact same synthesizer, and want to do
           Sysx with each independently. Your synthesizer manual
           should describe the factory-set number.
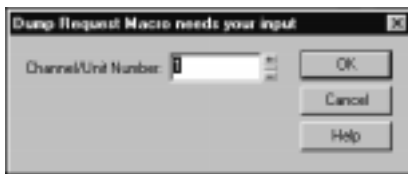
      The DRM transmits a Sysx message that asks the synthesizer to
      dump the data. Pro Audio then waits to get some data dumped
      from the synthesizer. The number of bytes received so far is
      displayed in a dialog box.

4.   After the count stops increasing, click Done.

      If the count stays at zero for more than a couple of seconds,
      something is wrong. The synthesizer may not be hooked up to
      the MIDI interface in both directions, or you may have answered
      a DRM prompt incorrectly. Click Cancel.

      If any data were received, you will see the number of bytes in the
      bank list. At this point, you may want to give the bank a
      descriptive name by clicking .

More about Dump Request Macros

DRMs are defined in your *CAKEWALK.INI* file in the [Dump Request Macros] section. You may add your own DRMs or modify the ones that we have provided. Use the Windows Notepad to edit the file. Comments in the *CAKEWALK.INI* file itself describe how to write DRMs. The specific Sysx messages can be found in the instrument manual, or they can be obtained by contacting the manufacturer. Remember that a DRM must start with F0 and end with F7.

Sometimes you will find that the byte size is different when you use a DRM, as opposed to initiating the dump from the instrument. It is possible the instrument is dumping some additional information when you initiate the dump from the instrument, but you should be able to use either method without any problems.

Please note that many of the DRMs included with Pro Audio have been donated by customers who are using the particular equipment. In some cases, we have not been able to test those DRMs because we do not have access to that equipment. We redistribute such DRMs on an as-is basis. Additional user-supplied DRMs may be available on the Cakewalk web site (www.cakewalk.com).

Name

You may enter a description for a bank by clicking this button. *Names are saved only in .WRK files.*

Auto

The Auto option tells Pro Audio to transmit that bank every time it loads the song file. You might use this option for banks that contain System Exclusive messages that load a set of sounds for a synthesizer at or before the start of a song.

Before transmitting, Pro Audio asks your permission. This is a safety feature for loading a file you have received from someone else; if it happens to contain data for your synthesizer(s), you might lose your patches and configuration information. However, if you don't want to be asked, choose **Options-Global**, click the General tab, and uncheck the box labeled Ask Before Sending Sysx.

Port

Each bank is transmitted to a particular MIDI port, just as a track is. Click this button to change the port.

Edit Bytes

Although Pro Audio is designed mainly to store System Exclusive data for you, you can edit the bytes of shorter messages in hex format (many

of the more popular synthesizers have special patch-editing programs available that let you edit data using sliders and other tools rather than raw hex data).

When you click the Edit Bytes button, Pro Audio converts the binary data into a text representation and pops up the Edit System Exclusive Bytes dialog box, in which you can edit the text. If you make changes and click OK to keep them, Pro Audio tries to convert the text back into binary format. You'll get an error message if the text does not begin with an F0 and end with an F7, which are the System Exclusive begin and end bytes.

Pro Audio may not be able to convert the data to text format. The text representation requires three to four times more memory than the data itself, and the Edit System Exclusive Bytes dialog box can contain roughly as much text as *Notepad*.

Delete

This deletes the selected bank.

Load Bank and Save Bank

You can load and save individual banks to the file format used by the popular public-domain MIDIEX bulk dump utility. The file extension used is *.SYX*. If you try to load to a bank that isn't empty, Pro Audio asks if you want to append or replace. The Load and Save buttons work only with MIDIEX format files, not Pro Audio song files or MIDI files.

Because the file format is the same as MIDIEX, you can load Sysx files you've obtained from friends or web sites.

You may also use this feature to copy a Sysx bank between two Pro Audio song files. Save the bank into a file, load the other Pro Audio song file, then load the bank again. This is also a good way to copy one bank to another in the *same* song file.

Transmitting Banks during Playback

Pro Audio has a special meta-event, Sysx Bank, that lets you play a System Exclusive bank at a specified time in your song. You can use a Sysx meta-event to send any of the 256 available Sysx banks at any time in a sequence. To do this, you have to insert a new event in the Event List using the Insert key on the PC keyboard. Next you have to double-click Event Kind and change it to System Exclusive. In the Values column, select the bank (0-255) that you want to send.

MIDI is a serial data transmission, meaning it can do only one thing at a time. If you try to upload a huge sampler dump during a fast drum solo, playback will noticeably lurch. MIDI must complete the System Exclusive message before it can resume playback. The Sysx meta-event is appropriate only for very short System Exclusive messages. The exact length depends on various factors, such as the speed of your computer but as a rule of thumb, 100 bytes is a likely maximum, and even that may often be too large.

You don't need to use Sysx meta-events for sending System Exclusive information at the beginning of your song. Instead, use the Auto option for System Exclusive banks. Banks that are marked Auto are transmitted automatically by Pro Audio when it loads the song file they are stored in. Use the Sysx meta-event only when you need to change a synthesizer setting during the middle of the song.

Real-time Recording of System Exclusive

You can record short System Exclusive messages in real time. These will end up in the track as the new Sysx Data types of events, which can hold System Exclusive messages up to 255 bytes long. To do so, choose *Options-Global*, click the MIDI Filter tab, and check the System Exclusive item. Change the desired input port if necessary (only one port can be recorded from). The Buffers setting may be left at 128 unless the data are not being recorded.

Sysx Echo

You can configure Pro Audio to echo received System Exclusive messages to output devices.

To Echo Sysx Messages...

1.   Choose *Options-Global*.

2.   Select the MIDI Filter tab.

3.   Check the Echo System Exclusive option.

4.   Click OK.

Pro Audio echoes received Sysx data according to the echo settings on the MIDI Input tab of the Project Options dialog box.

Saving MIDI Files Containing Sysx Banks

If a MIDI file has System Exclusive Auto-Send banks, then Pro Audio saves these in a MIDI file as System Exclusive messages at the very beginning of the song (1:1:0). If the song has other MIDI data starting at 1:1:0—for example, notes—it won't be played correctly because the System Exclusive transmission will delay the start. The beginning of the song will sound garbled.

The solution is to start the song at measure 2, leaving room for the System Exclusive. (A good rule of thumb is to slide everything later by one measure, but you could use an even longer duration if need be.) If you have tempo changes, meter/key changes, or markers in your song, you'll have to use cut and paste to cut the entire song and paste it a measure later. If you have only notes in your song, you can use the *File-Open* command instead, which requires fewer steps.

Make sure you set the Sysx bank to Auto send in the Sysx view before saving the .MID file. After saving it as a .MID file, use the *File-Open* command to load it again and open the Sysx view. You'll notice that the Sysx has been split up into many different banks. You can send all these banks of Sysx submessages by clicking ▇ in the Sysx view. There is a necessarily small delay after each Sysx bank is sent. Any names you give the banks will not be saved as part of the .MID file.

Sysx *.ini* File Settings

The *TTSSEQ.INI* initialization file contains settings that govern the sending and receiving of System Exclusive information. If you are experiencing difficulties using Sysx, you will probably be able to correct the problem by adjusting these settings.

The options described below occur in the [Options] section of the TTSSEQ.INI file. You can edit this file using the Windows Notepad. Every time you add or change one or more lines in *ttsseq.ini*, you must restart Pro Audio in order for the change to take effect.

SysxSendDelayMsecs=n
This setting causes Pro Audio to delay *n* milliseconds if it encounters an F7 in a System Exclusive bank.

n = 60 Default value (in milliseconds)

SysxDelayAfterF7=n

This setting causes Pro Audio to delay Sysx transmission for a certain amount of time if it encounters an F7 in a System Exclusive bank. This gives some instruments the required amount of "breathing" time necessary to process the Sysx transmission. The default delay is 1/18 of a second, but can be changed by also adding the SysxSendDelayMsecs=n line.

The possible values of n are 0 and 1. Their significance is as follows:

n = 0 No delay

n = 1 Delay between each Sysx string

SysxSendPacketSize=n

System Exclusive bytes are transmitted in packets, with a 1/18-second default delay between each packet. Setting this value to a smaller number will help slower synthesizers avoid overflowing their internal buffers. This line sets the number of bytes between each Sysx transmit delay.

n = 1024 Default value (in bytes)

Troubleshooting

Pro Audio Is Not Receiving Sysx Messages

Make sure you have the right MIDI Input port selected by using the **Options-MIDI Devices** command. Also, make sure that your instrument is set up to transmit System Exclusive data.

Sysx Bank Names Don't Show When I Open a File

Sysx bank names are only saved in *.wrk* files (not in *.mid* files or *.syx* files). If you use the Save Bank button in the Sysx View, the data are saved as a standard MIDIEX format file. There are no provisions for MIDIEX to remember the bank names.

Doesn't Include a DRM for My Instrument

If there is no Dump Request Macro (DRM) for your instrument, you should select You start dump on instrument, then initiate the Sysx dump from the instrument. Once the bytes received count stops increasing, click Done to tell Pro Audio to stop receiving. The currently selected bank now holds the received Sysx data.

You can also add a DRM for any unlisted instrument. For more information on how to do this, read the section "More about Dump Request Macros" earlier in this chapter.

Synthesizers Reporting MIDI Data Errors

Some synthesizers will report data errors when you try to send Sysx information to them. This usually happens when Pro Audio sends data at a rate too fast for the synthesizer to keep up. You can use the SysxSendPacketSize=number setting in *ttsseq.ini* to make Pro Audio transmit Sysx data more slowly, as described on the previous page.

Try setting the number to 64. If that does not solve the problem, try successively smaller values. If 64 works, you may try larger values until it stops working; go back to the largest value that worked and you will have the fastest transmission rate that the problematic synthesizer can keep up with.

My Equipment Is Not receiving Sysx from Pro Audio

Make sure the instrument is set up to receive System Exclusive messages. In the Sysx View, make sure the right destination port is selected. Verify that the Sysx message originally transmitted from the same kind of instrument. An instrument will not recognize Sysx messages from a different make or model of instrument.

Finally, try adjusting the parameters in the *ttsseq.ini* file, as described earlier in this chapter.

Timing Requirements When Receiving Sysx

Some MIDI devices have special timing requirements when receiving System Exclusive transmissions. If your equipment has problems receiving System Exclusive data from Pro Audio, you might need to introduce some small delays to allow the equipment to digest the information it is receiving.

The *ttsseq.ini* settings SysxDelayAfterF7=n and SysxSendDelayMsecs=n let you control the timing of System Exclusive transmissions.

Some devices have problems receiving System Exclusive data sent from Pro Audio until you add this single line:

 SysxDelayAfterF7=1

This gives the device extra time to process each System Exclusive message.

Roland Equipment

Some Roland equipment—notably, the GR-1 and GR-50 Guitar Synthesizers—have problems receiving Sysx packets in fast succession. You must use the setting SysxDelayAfterF7 = 1 with these devices.

Ensoniq Instruments

Successfully sending Sysx messages to most Ensoniq instruments requires that you add the following three lines to the [Options] section of *ttsseq.ini*:

SysxDelayAfterF7=1   Enables delay

SysxSendDelayMsecs=200   Sets delay time to 200 milliseconds

SysxSendPacketSize=65535   Increases packet size to 65k

15 Synchronizing Your Gear

Your computer is often used with other equipment: sound cards, MIDI equipment, and digital tape decks or other digital recording tools. All these devices can have their own built-in clocks or timing mechanisms.

When several pieces of equipment are used together, it's important that they operate in synchronization. For this to happen, all the equipment must rely on the same source of clock or timing information. Pro Audio lets you use many different types of synchronization so that you can get your work done quickly and efficiently

In This Chapter

Synchronization Overview

Pro Audio supports several different types of synchronization, which rely on a variety of different clock sources:

Clock source...	Timing is determined by...
Internal	The clock on the computer motherboard
Audio	The clock on the computer's sound card
MIDI Sync	The clock on an external MIDI device
SMPTE/MIDI Time Code (MTC)	A time code signal (in SMPTE or some other format) recorded on some external medium

When you use either the internal or audio clock, Pro Audio can control other MIDI devices using MIDI Sync. In this case, Pro Audio is the "master" device and the other MIDI devices are the "slaves."

When MIDI Sync is the clock source, Pro Audio operates in response to incoming MIDI messages. In this case, Pro Audio is the slave, and an external MIDI device is the master. Note that audio playback is not supported when using MIDI Sync with Pro Audio as the slave.

When SMPTE/MIDI Time Code (SMPTE/MTC) is the source of timing information, Pro Audio operates in response to incoming MTC messages. These messages could be generated by:

• An external MIDI device that is capable of generating MIDI Time Code (like the Roland VS880)

• A MIDI interface that is converting other time code signals (like SMPTE, EBU, or film time code) into MIDI Time Code

When you use some of these synchronization options, some Pro Audio commands work differently. This chapter describes each of the synchronization options, how and why each is useful, and the effect each option has on other features and commands.

The Sync toolbar lets you change back and forth quickly between the different clock settings:

You can also choose the sync mode as follows:

1. Choose **Options-Project**, and click the Clock tab.

2. Choose the desired clock source from the Clock list.

3. Click OK.

The clock source and the type of synchronization that is used are options that are stored as part of your project files. For example, one of your projects might be set up to use the internal clock; a second might use the Audio clock and MIDI Sync with Pro Audio as the master timing source; and another might use SMPTE/MTC Sync as the clock source.

Many technical support requests concern synchronization problems, which are among the hardest to diagnose and duplicate over the phone. If you experience problems, before you call, perform as much experimentation and gather as much information as possible about what does and doesn't work. The more prepared you are, the more we can help.

Clock Sources with No External Devices

When Pro Audio is used alone, or with an external device that does not have its own clock or timing signal, you use one of two clock sources: Internal or Audio.

When the clock source is set to Internal, Pro Audio uses the clock built into the computer or the computer's MIDI interface as its timing source. If your projects contain only MIDI (no audio), this is the most efficient method of playback.

If your projects contain MIDI and audio, or only audio, you should set the clock source to Audio. This lets the sound card clock determine the correct speed for audio playback and automatically synchronizes MIDI playback to match the audio. For more information, see "Configuring Your Audio Hardware" on page 13-3. You cannot use the tempo ratio controls when using the audio clock, because the audio playback speed is determined by the audio clock.

When either of these clock sources is used, you can also configure Pro Audio to drive other MIDI devices using MIDI Synchronization. For more information, see "MIDI Synchronization" on page 15-4.

To Use the Internal Clock Source...

1.   Click ![icon] on the Sync toolbar.

OR

1.   Choose *Options-Project*, and click the Clock tab.

2.   Check the Internal box.

3.   Click OK.

To Use the Audio Clock Source...

1.   Click ![icon] on the Sync toolbar.

OR

1.   Choose *Options-Project*, and click the Clock tab.

2.   Check the Audio box.

3.   Click OK.

MIDI Synchronization

MIDI Synchronization, or **MIDI Sync**, is usually used to synchronize Pro Audio with drum machines, stand-alone MIDI hardware sequencers, and sequencers built into MIDI keyboards.

When MIDI devices are synched, the master device sends messages to all other devices to start and stop playback and to keep all the devices in sync. To change the tempo of a song, you adjust the tempo on the master device. The playback tempo on all slave devices is then set automatically.

The following MIDI messages are sent by the master device to support MIDI Sync:

Message...	How it is used...
Start	This message tells slave devices to start playing from the beginning of the currently loaded sequence.
Stop	This message tells slave devices to stop playback.

Continue	This message tells slave devices to continue playing from the current location in the currently loaded sequence.
Song Position Pointer (SPP)	This message tells slave devices to change the current location to the designated point in the song. Pro Audio normally issues an SPP message immediately prior to any Start or Continue message.
Clock	The master sends clock messages to each slave device at the rate of 24 per quarter note. The slave devices use these messages to establish the tempo and stay in sync.

When you start playback on the master MIDI device, for example, it sends a Start message to all slave devices, announcing that playback has started. If the slave devices are set up correctly, they receive the message and start playing back with the master device. When Pro Audio is set up as the master device, you can enable or disable these messages.

Pro Audio as the Slave

When Pro Audio is slaved to an external MIDI device, the following changes occur:

- When you click the Play or Record button, a message (Waiting for MIDI Sync) is displayed in the status bar. When you start your external device, Pro Audio will follow.

- If you change the tempo using an external device, the SMPTE time code display in Pro Audio will be incorrect.

- Pro Audio will not transmit MIDI Start, Continue, Stop, and Clock messages.

- Digital audio playback is not supported.

To Use MIDI Sync with Pro Audio as the Slave...

1. Configure the external MIDI device you want to use as the master device to transmit MIDI Sync.

2. Configure external slave devices to receive MIDI Sync.

3. Choose **Options-MIDI Devices** to display the MIDI Ports dialog box.

4. Make sure that your MIDI interface is highlighted in the Input Ports list, and click OK.

5. Click ![icon] on the Sync toolbar to use the MIDI Sync clock source.

From now on, Pro Audio starts playback and recording only after the appropriate message is received from the master device.

Tip:
Make sure the status bar is displayed when using MIDI Sync. Otherwise, you will not be able to see the MIDI Sync status messages. To display the status bar, choose ***Options-Global*** and click the General tab. Then check the Show Status Bar box.

Pro Audio as the Master
There are several options you can use when Pro Audio is the MIDI Sync master device:

Option...	What it's for...
Use Start, Never Continue	If you are using an external drum machine to repeat a drum pattern or loop, you might always want playback on the drum machine to start at the beginning of the loop. When this option is chosen, Pro Audio sends a Start message to all slave devices when playback is started, even if you are in the middle of a song. (Normally, Pro Audio would send a Continue message if playback starts from the middle of a song.)
Transmit MIDI Song Position Pointer (SPP)	When this options is checked, Pro Audio sends an SPP message before starting or continuing playback. If you are using a drum machine as described previously, you might want to disable this option.

Option...	What it's for...
Locate Delay for SPP Recipient	Some older MIDI devices take a small amount of time to respond to SPP messages. This option causes Pro Audio to delay briefly after sending an SPP message, to give the slave device time to respond. The delay is in 1/18ths of a second. Enter 1 for a 1/18th second delay, 2 for 2/18ths of a second, or 18 for a full second delay.

To Use MIDI Sync with Pro Audio as the Master...

1. Configure your external MIDI device to receive MIDI Sync.

2. Click ▣ or ▣ on the Sync toolbar to use the MIDI or Audio clock source.

3. Choose *Options-Project*, and click the MIDI Out tab.

4. Check the Transmit MIDI Start/Continue/Stop/Clock box.

5. For most applications, check the Transmit MIDI Song Position Pointer box.

6. If you are using a drum machine to play patterns or loops, check the Use Start, Never Continue option and disable the Transmit MIDI Song Position Pointer option.

7. Click OK.

From now on, the transport controls in Pro Audio control playback on the external MIDI devices.

Using MIDI Sync with Drum Machines

The most flexible way to use a MIDI drum machine is to record the notes it generates into Pro Audio, then use that machine as a MIDI playback device. This lets you edit, cut, paste, and copy your drum parts like any other clip. You can use MIDI Sync to record the notes from the drum machine into Pro Audio as follows:

1. Use the drum machine's pattern-composing facilities to compose your drum part.

2. Configure the drum machine to be a slave device that receives MIDI Sync messages.

3. Configure Pro Audio to send MIDI Stop/Start/Continue/SPP messages.

4. Record the drum part from Pro Audio. The drum machine starts automatically when recording begins and stops automatically when you press Stop.

5. Switch the drum machine out of MIDI Sync mode so that it acts simply as a sound-producing module.

Troubleshooting MIDI Sync

If you experience problems with MIDI Sync when Pro Audio is the master device, verify that your external devices are configured correctly to respond to MIDI Sync. Most devices have a Clock option that should be set to External or MIDI.

If Pro Audio does not respond to MIDI Sync as a slave device, verify that your external devices are configured correctly to transmit MIDI Sync. Remember that only one external device can be used as the master clock source.

If your computer locks when using MIDI Sync, a MIDI loop with an external device is probably the cause. To solve this problem, either turn off MIDI Thru (sometimes called MIDI Echo) on the external unit or choose *Options-Project*, click the MIDI Input tab, check None under Echo Mode, and click OK.

SMPTE/MIDI Time Code Synchronization

SMPTE/MIDI Time Code Sync (SMPTE/MTC) is another method of synchronization that lets Pro Audio act as a slave to an external device. SMPTE/MTC messages are received from an external MIDI device or from a MIDI interface that generates MTC from other time code signal (such as SMPTE, EBU, or film).

SMPTE/MTC is a position and timing reference that indicates the current location in the project and how quickly the project should be playing. Time code labels the position in a project in hours, minutes, seconds, and frames. The speed of playback is indicated by a **frame rate**.

Time code is recorded onto tape using a device called a time code generator. The process of recording a time code signal onto a track is called **striping**. Normally, the start of a tape stripe has a particular time, expressed in hours, minutes, seconds, and frames. For example, the

tape stripe might start at 00:00:00:00, 01:00:00:00, or any other time. The material recorded on the tape usually starts anywhere from 10 seconds to several minutes after the start of the time code. Sometimes, the tape stripe starts at a time like 00:59:50:00, and the material starts 10 seconds later, at 01:00:00:00.

When you create a new Pro Audio project, by default the project is configured so that the beginning of bar 1 is synchronized with a time code of 00:00:00:00. If the starting point of the material on your tape is not 0, you need to enter an offset to tell Pro Audio the time code that corresponds to the start of the project.

Pro Audio supports five time code frame rates, which are normally used for the following types of applications:

Frame rate...	Used for...
24 frames per second	Film
25 frames per second	European video
29.97 frames per second (drop)	NTSC color video
30 frames per second (non-drop)	NTSC black-and-white video and most music-only applications
30 frames per second (drop)	Rarely used

For more information on frame rate time formats, see the documentation for your time code hardware.

Refer to the documentation for your MIDI interface or external MIDI device for additional information about SMPTE/MTC.

Configuring Pro Audio to Sync to SMPTE/MTC...

1. Click on the Sync toolbar to enable SMPTE/MTC Sync.

2. Choose **Options-Project**, and click the Clock tab.

3. Choose the frame rate and time offset that are appropriate for your source material.

4. Click OK to close the dialog box.

5. Choose **Options-MIDI Devices** to display the MIDI Ports dialog box.

6. Make sure that your MIDI interface is highlighted in the Input Ports list. If your interface also has a Sync driver, highlight that as well, then click OK.

7. Choose **Realtime-Loop and Auto Shuttle** to display the Loop/ Auto Shuttle dialog box.

8. Check the Loop Continuously box, and click OK.

This last step lets you control playback entirely from your external device, without having to manipulate the transport controls in Pro Audio.

When Pro Audio is slaved to SMPTE/MTC, here's how things work:

•   When you click the Play or Record button in Pro Audio, a message (Waiting for SMPTE/MTC…) is displayed in the status bar. See "Status Bar/CPU Meter/Disk Meter" on page 13-14 for information on displaying the Status bar.

•   Start playback on the external device. It takes about two seconds for Pro Audio to lock from the time it receives time code input.

•   If the time code is earlier than the start of the project (based on the time code offset), another message (Chasing…) is displayed in the status bar. When the time code reaches the start of the project, Pro Audio starts to play in sync.

•   If the time code is at or after the start of the project, Pro Audio starts playback as soon as it locks to the time code.

•   When the external device stops (or when the time code ends), Pro Audio will stop.

Playing Digital Audio under SMPTE/MTC Sync

Pro Audio gives you two choices for controlling audio playback when using time SMPTE/MTC Sync:

Option...	How it works...
Trigger and freewheel	Audio event playback is started (or **triggered**) at the exact time code, but then the audio plays at its own internal rate (or **freewheels**). When audio freewheels, it can gradually drift from the time code due to variations in the time code signal.

Full chase lock	The speed of audio event playback is continually adjusted to stay in sync with the time code. If the external clock drifts or changes rate, Pro Audio adjusts the audio playback speed to stay in sync. This adjustment may introduce slight pitch changes, but those changes will be negligible if the external clock is reasonably steady.

Some digital sound cards (such as the Frontier Design Wavecenter or the Antex Studio Card) have external clock inputs. If you are using one of these cards, and an external clock source like a digital tape deck is the master timing source for the project, choose the Trigger and Freewheel option. The clock input on the audio card guarantees that there is no drift between the time code and audio playback.

To Set the Audio Playback Option...

1.   Choose **Options-Audio**, and click the Advanced tab.

2.   Check the desired option from the Synchronization list.

3.   Click OK.

Audio playback under time code sync is handled according to the setting you chose.

SMPTE/MTC Sync and Full Chase Lock

When using SMPTE/MTC Sync with full chase lock, the first time you play any audio the pitch may fluctuate wildly for up to 30 seconds. Also, you may occasionally note the pitch of the audio sounding consistently high or low pitch.

A simple analogy makes this behavior easy to understand: Synchronizing audio to SMPTE/MTC is a lot like trying to get even and stay neck-and-neck with another car on the freeway. If the car is ahead of you, you need to drive faster to catch up to it. If it's behind you, you have to slow until the car catches up to you. Once the two cars are neck-and-neck, you can simply keep going at the same speed, unless the other car changes its speed. If the other car speeds or slows, you must speed or slow too.

The first time you play audio under SMPTE/MTC Sync, the audio clock has to get even with the external clock. This could mean racing ahead, which raises the pitch of the audio, or stepping on the brakes, which lowers the pitch of the audio. These fluctuations continue until Pro

Synchronization

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Audio matches its playback speed to the external clock, which usually takes no more than 30 seconds. The stable playback speed, by the way, may be slightly faster or slower than the normal audio playback speed, resulting in a slight change in the pitch of the audio. Here's the best way to address this problem:

- Start each new Pro Audio session by playing some audio under SMPTE/MTC Sync.

- Let the audio play for 30 seconds or until all audio pitch fluctuations stop.

Once this procedure is complete, Pro Audio knows the difference in rates between the external time code and the audio clock on your sound card. For the rest of the session, Pro Audio will start playback closely in sync, without any drastic pitch changes.

If the external timing source were 100 percent stable, the audio would stay in sync with the external clock. Unfortunately, no timing source is perfect. Therefore, every once in a while after playback has started, Pro Audio may need to vary the playback speed by a tiny amount to stay even with the time code. If the time code signal is unstable (as might be the case from an analog source), these variations can cause noticeable changes in audio pitch, which can in turn cause audible audio distortion.

Troubleshooting SMPTE/MTC Sync

The most common problems with SMPTE/MTC Sync, and ways to correct or avoid them, are shown in the following table:

Problem...	What to do...
The tape is striped incorrectly	Check the tape stripe using your time code generator and, if necessary, restripe the tape.
The MIDI interface isn't producing MIDI Time Code	Use utility programs that come with your MIDI interface to make sure that the time code stripe is being received (sometimes you must enable a Time Code Sync option). Check the MIDI interface settings to make sure that MIDI Time Code is being generated.
The frame rate is set incorrectly	The frame rate on the stripe must match the frame rate you set in Pro Audio.
The offset is set incorrectly	The offset you enter in Pro Audio must match the start time of recorded material on the tape.

Pro Audio is not configured correctly	Verify and/or repeat the steps in "Configuring Pro Audio to Sync to SMPTE/MTC…" on page 15-9.
Audio playback drifts out of sync with the tape	Enable the Full Chase Lock option, which keeps audio from freewheeling.
Pro Audio continues playing for up to one full second after the time code stops	Some time code readers tolerate dropouts of up to one second, without affecting playback. When you stop the tape deck, it takes a full second for the reader to realize that this isn't merely a dropout and to signal the end of the time code to Pro Audio. This does not indicate any problem with time code sync.

MIDI Machine Control

MIDI Machine Control (MMC) is a protocol that controls an MMC-equipped remote device via MIDI. Pro Audio lets you use MMC to start and stop playback and recording on remote MIDI devices such as tape decks, video recorders, and even other software packages. If you have several MMC-controllable devices in your studio, assign each a unique Unit ID so that MMC commands can be addressed to a particular device.

MMC is very powerful when used with MIDI Time Code sync. For example, suppose you have an MMC-equipped digital tape deck that generates time code and want to use the tape deck as the timing master for a project. You can set up your equipment and software so that the transport controls in Pro Audio send MMC messages to the tape deck, which in turn starts and stops playback in Pro Audio via SMPTE/MTC Sync. In this configuration, Pro Audio's transport buttons (Play, Record, and Stop) are simply remote control substitutes for the buttons on your tape deck. In this type of configuration, you must choose one MMC-controllable device as the time code master.

When MMC is enabled, press Play to start playback on all connected MMC devices, and press Stop to stop all connected devices. If you press Record while playback is underway, all connected MMC devices (e.g., tape decks) begin recording on any armed tracks. If you stop recording (without stopping playback), Pro Audio instruct the tape decks to punch out. You must arm and disarm tracks on the tape deck; you cannot do this from Pro Audio.

If you have established punch-in/out points using the **Realtime-Record Options** command, Pro Audio will attempt to preprogram the punch-in and punch-out times. However, your equipment must recognize the

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MMC event command for this feature to work. (Consult the owner's manual or contact the equipment manufacturer for more information.) If your equipment behaves erratically with automated punch-in, don't attempt to use it when those pieces of equipment are connected.

Pro Audio instructs MMC devices to locate the current song position only when playback or recording is started. This prevents excessive wear on the motors and tape heads of the devices.

To Configure MIDI Machine Control...

1. Choose *Options-Project*, and click the Clock tab.

2. Check the Transmit MMC box.

3. Enter the ID of the master timing device in the Time Code Master's Unit ID box.

4. Click OK.

MMC is now enabled.

To Disable MIDI Machine Control...

1. Choose *Options-Project*, and click the Clock tab.

2. Make sure the Transmit MMC box is not checked, and click OK.

MMC is disabled.

16 Programming with Cal

Cakewalk Application Language (CAL) is an event-processing language that you use to extend Pro Audio with custom editing commands.

You can write your own CAL program and use or edit CAL programs that other people have written. You also can create CAL programs by recording a series of commands, keystrokes, and mouse actions. Pro Audio translates and saves these actions as CAL programs, which you can use or edit. CAL files are stored on disk in files with an extension of *.cal*.
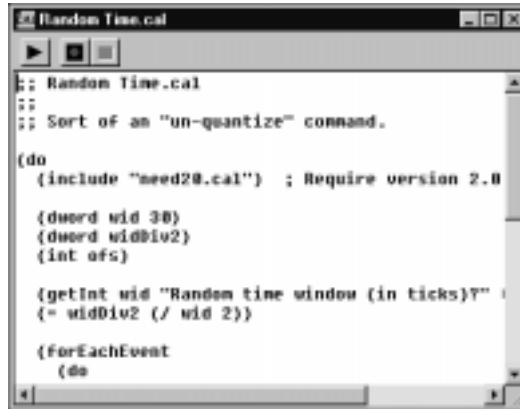
The Cakewalk World Wide Web site (www.cakewalk.com) contains additional CAL programs that you can download and use. If you have written some interesting CAL programs and want to make them available to other users, please let us know.

Programming

In This Chapter

Creating and Running CAL Programs

The CAL view is a small notepad-like editor for creating, editing, saving, recording, and running CAL programs.

The CAL view works like a basic text editor, allowing you to enter and edit your programs freely. The editor supports *Cut*, *Copy*, and *Paste*, and you can also paste information into a CAL view from a word processor or other text editing program.

While you can run a CAL program from within the CAL view, you can also run an existing CAL program without displaying it in the CAL view. To interrupt a CAL program while it is running, press the Esc (Escape) key. Press OK to confirm that you want to interrupt the CAL program. As a rule, you shouldn't interrupt a CAL program in this way unless you suspect it is stuck in an infinite loop.

To Open a CAL Program...

1. Choose *File-Open* or click 🖼 in the toolbar.

2. Choose CAL from the Files of Type list.

3. Choose the file you want to open and click Open.

The CAL view displays the program. Use the CAL view to edit or modify the program.

To Create a New CAL Program...

1.   Choose **File-New** or click [icon] in the toolbar.

2.   Choose CAL Script from the list and click OK.

Pro Audio creates a new CAL program and displays it in the CAL view. Use the CAL view to edit or modify the program.

To Save a CAL Program...

1.   From the CAL View, choose **File-Save As** to display the Save As dialog box.

2.   Enter a file name and click Save.

The CAL program is saved in the file.

To Run a CAL Program from the CAL View...

1.   Click [icon] in the CAL view toolbar.

To Run a CAL Program without Opening the CAL View...

1.   If required by the program, select the track(s) you want to edit or highlight a time range.

2.   Choose **Edit-Run CAL** or Ctrl-F1 to display the Open dialog box.

3.   Choose the CAL program you want to run and click Open.

Sample CAL Files

The following is a description of the sample CAL programs that come with Pro Audio. You can use these programs as is or modify them to suit your own needs.

SPLIT NOTE TO TRACKS.CAL

This program splits individual notes to separate tracks. It is useful if you have one drum track but want to split each drum to a separate track (for more flexible editing).

SPLIT CHANNEL TO TRACKS.CAL

This program splits a track by channel into 16 new tracks. This can be useful for Type 0 MIDI files, which may have data recorded on many channels but only one track.

To use the program:

1. Select only one track.

2. Set the From and Thru markers for any part of the track (you don't have to split the whole track).

3. Run the *split channel to tracks.cal* program.

4. Pro Audio displays a dialog box.

5. Select the first track for the 16 split-channel tracks (preferably, the first of 16 blank tracks).

6. Click OK.

RANDOM TIME.CAL

This program randomizes event starting times. It asks you for a number of ticks. The program then changes each event time by an amount that is randomly between plus or minus one-half the number of ticks that you supply.

For example, if you type the number 4, each event time will have -2, -1, 0, 1, or 2 added to it.

THIN CONTROLLER DATA.CAL

This thins continuous Controller data. It prompts you for two numbers.

• The number of the Controller that you want to thin. For example, MIDI assigns the Volume controller to number 7.

• A thinning factor. For example, if you specify the number 3, the program deletes every third Controller event of the kind you've specified.

This program never deletes Controllers with the values 0, 64, or 127, because the goal is to thin the data without destroying the fundamental shape of it.

THIN CHANNEL AFTERTOUCH.CAL

This works almost exactly like the previous program, but it thins channel aftertouch (ChanAft) events. It asks you for the thinning factor.

THIN PITCH WHEEL.CAL

This works almost exactly like the previous two programs, but it thins pitch-wheel events. It asks you for the thinning factor.

This program never deletes wheel events with these special values: -8192, 0, and 8191.

MAJOR CHORD.CAL, MINOR CHORD.CAL

These two CAL programs and the three other chord-building CAL programs that come with Pro Audio build chords using existing events in the track(s) as chord roots.

For instance, if you select a single note as the region and run MAJOR_CHORD.CAL, two notes are added above the original note. The resulting chord is a major triad.

Normally, you'll use these programs on a region containing a single note. You can, however, apply these to tracks containing many notes. Each original note will become the root of a chord.

Writing CAL Programs

This section outlines the basics of writing CAL programs. Things will be easier if you've done at least a little programming, whether in BASIC, C, Pascal, LISP, or another language. (CAL blends elements of C and LISP, in particular.)

Pro Audio provides only a limited amount of CAL programming technical support. If you need help with your CAL programming, please e-mail your request and include a copy of the CAL file in question. For additional information on developing CAL programs:

• The on-line help for CAL contains a complete function reference

• A tutorial called CAL Tutor is available from Clockwork Music

Here is a sample program that illustrates how the CAL language works. This sample program asks the user to enter a value and then adds that value to the velocity parameter of note events.

```
(do)
        (int amt 0)
        (getInt amt "Amount to add?" -127 127)
        (forEachEvent
                (if (== Event.Kind NOTE)
                        (+= Note.Vel amt)
                )
        )
)
```

CAL has a very simple syntax that is similar to LISP. Every statement in CAL is a call to a function, and the function returns a value:

```
(<function> <argument(s)>)
```

Those of you experienced with C or Pascal programming will find this natural when you think of function calls such as:

```
(message "Hello, world.")
```

Here, the function message is passed a string argument. As you might guess, this CAL program displays text on Pro Audio's message line.

This syntax is not quite as natural when you realize that arithmetic operations are treated as functions. For example, the addition operator is really a function. To add two numbers, you say:

```
(+ 1 1)
```

the result of which is 2. This will be comfortable to LISP hackers, but others may find it a little unnatural at first.

Recording CAL Programs

Most Pro Audio commands have CAL equivalents. As a result, you can use the macro record capability of the CAL view to create basic CAL programs.

To Record a CAL Program...

1.   Choose **File-New**, select CAL Script from the list, and click OK. A new CAL program is displayed in the CAL view.

2. Click the ■ button in the CAL toolbar to start recording.

3. Choose **File-Open** or click ▣ on the main toolbar to display the Open dialog box.

4. Choose any file and click Open.

5. Return to the CAL view and click ■ to stop recording.

Pro Audio creates a simple CAL program that opens the file. To test the program, close the file you just opened, return to the CAL view, and press ▶ to replay the program. You can save this program as a CAL file like any other, and even assign a key binding to it using the **Key Bindings** command.

The CAL on-line help includes a complete listing of Pro Audio commands that have CAL equivalents.

Programming

many instruments). See the documentation for your instrument for more information.

Another possibility is that you are playing back a GM (General MIDI)-authored MIDI file on a non-GM compatible device.

How Do I Use Pro Audio to Access All the Sounds on My MIDI Instrument?

Pro Audio is normally set up to access the 128 sounds that are part of the General MIDI standard. Pro Audio also includes custom instrument definitions that match the sounds on many popular instruments. To use a custom instrument definition:

1. Choose **Options-Instruments** to display the Assign Instruments dialog box.

2. Click the Define button to display the Define Instruments and Names dialog box.

3. Click Import, and then choose the file for the manufacturer of your instrument.

4. Choose your instrument from the list and click OK.

5. Click Close to return to the Assign Instruments dialog box.

6. Select from the Port/Channel list all the ports and channels that are being sent to that instrument.

7. Click on the instrument in the Uses Instrument list.

8. Click OK when you are done.

If your manufacturer or instrument doesn't appear, check our web site to see if an updated instrument definition is available. You can also create your own instrument definition. For more information on instrument definitions, see Chapter 10, *Using Instrument Definitions*.

My Keyboard Doubles Every Note I Play

When your keyboard doubles the notes, each note seems heavier or thicker than usual, as if two notes of the same pitch are emitted when you press the key. Also, you may find that you can play only half as many notes at one time before some of the held notes drop out.

This can occur when MIDI echo is enabled. The keyboard plays the note for the key you've pressed. At the same time, the note is sent through the

MIDI interface and echoed back to the keyboard, where it is played a second time.

The best way to resolve the problem is to disable Local Control on the keyboard, following the instructions that came with the keyboard. This stops the keyboard from playing independently. The keys you play still produce sound on the keyboard because they are echoed back by the MIDI interface. In many cases, Pro Audio disables local control automatically when the program is started, but this is not always possible.

An alternate solution is to disable echoing, as follows:

1. Choose **Options-Project** and click the MIDI Input tab.

2. Under Echo Mode, check None.

3. Click OK when you are done.

This alternate solution may cause other problems if you are working with several MIDI devices at once.

It's also possible that your keyboard is transmitting information on two channels at once. To see if this is so, create a new project and record two notes from the keyboard. Then look at what you've recorded in the Event list view. If you see four notes displayed instead of two, then your keyboard is transmitting on two channels. See the documentation for your keyboard to learn how to correct the problem.

I Don't See the Clips Pane in the Track View

The splitter bar may be so far to the right that the Track pane fills the entire Track view. Here's how to solve the problem:

1. Place your cursor over the splitter bar. It is located on the far right side of the Track view, just to the left of the vertical scroll bar. When you place the cursor over the splitter it changes to a double-headed arrow.

2. Click and drag the splitter bar to the left. You should be all set.

Why Can't Pro Audio Find My Audio Files?

Pro Audio looks for all audio data in a certain folder, called the wavedata folder. If you have renamed or moved either Pro Audio or the wavedata folder, Pro Audio may not be able to find your audio files.   If you know where the audio files are stored, choose **Options-Audio**, click Advanced and enter the full path name of the folder in the Data Directory box. If

you don't know where the audio data are stored, choose **Start-Find-Files or Folders** and search for files named *.wav*.

For more information about the wavedata folder, see "Digital Audio Data Management" on page 13-5.

Why Do I Get Errors from the Wave Profiler?

Audio devices such as voice modems or speakerphone devices can cause an error message from the Wave Profiler. Sometimes these errors are harmless; on other occasions you need to disable the voice modem or speaker-phone device before running the Wave Profiler. To do so:

1. Choose **Options-Audio** and click the Drivers tab.

2. Make sure that the voice modem or speaker-phone device is not selected in both the Input and Output device lists.

3. Click OK.

4. Choose **Options-Audio**, click the General tab, and run the Wave Profiler again.

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B

Appendix B: Tips & Tricks

Pro Audio includes literally hundreds of features that make it easy to configure your work environment and get your project work done more efficiently. This appendix lists some of the features not covered elsewhere in the manual and highlights some shortcuts and tricks you can use to be more productive and efficient. For more tips, check out the "Tip of the Day" by selecting *Help-Tip of the Day*.

In This Appendix

Video Support

Pro Audio can load and play AVI, QuickTime, and MPEG video files. Use the ***Insert-Video Clip*** command to insert a video file into the current project (only one video per project is allowed). Pro Audio displays the video in its own view, along with the current time, and plays it in sync with the project.

You can export the currently loaded video and audio data to a new AVI file with ***Tools-Export Video to AVI***.

Double-Clicking Clips

By default, double-clicking a MIDI clip in the Clips pane opens a Piano Roll view for that track, and double-clicking an Audio clip opens an Audio view for that track. You can set the type of view opened when a clip is double-clicked. For example, you may want to open MIDI tracks in a Staff view rather than in a Piano Roll view.

To Set the View Opened by Double-Clicking...

1.   Right-click in the Clips pane and choose ***View Options***.

2.   Select the types of view opened by double-clicking MIDI and audio clips.
3.   Click OK.

Playing Files in Batch Mode

Pro Audio includes two ways you can play several files in sequence automatically, like a jukebox. You can use these features in live performance applications or just for fun.

• Pro Audio's Play List view lets you create and work with a series of project, MIDI, and bundle files. As each file plays, Pro Audio loads it and displays it in the Track view and other views like any other project file.

• The Virtual Jukebox is a stand-alone program that lets you play back a series of project, MIDI, bundle, and wave files. You can use the Virtual Jukebox without using Pro Audio.

These features are described below.

The Play List View

The Play List view lets you create, edit, and save a **playlist** (or **set**) of up to 128 Pro Audio projects. Once you've created the list, you can play back the entire sequence automatically. You can even program the list to pause between songs for a fixed amount of time or to wait for a keystroke before proceeding.

The Play List view looks like this:
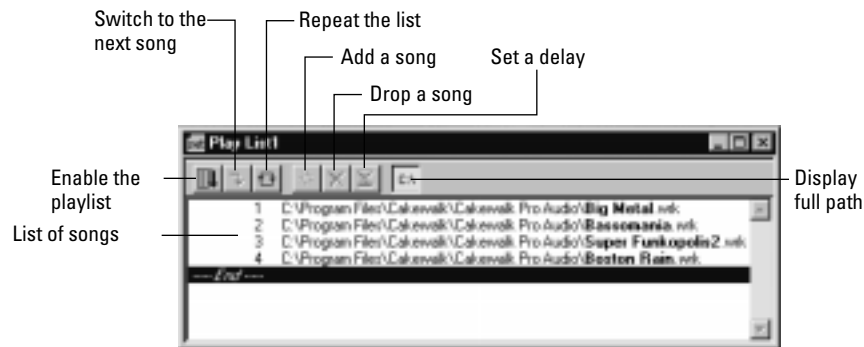
Playlists can be saved for future use. Playlist files have the extension *.set*.

To Create and Edit a Playlist...

1. To create and edit a playlist in the Play List view, follow the instructions in the table:

To do this...	Do this...
Open an existing playlist	Choose **File-Open**, choose Play List from the Files of Type list, choose the file you want and click Open
Create a new playlist	Choose **File-New**, choose Play List Set from the list, and click OK
Add songs to the playlist	Click ⊞ or press Insert, choose a file from the Add Song to Play List dialog box, and click Open
Set the delay after a song	Click on the song in the playlist, click ⧗, enter the delay you want, and click OK

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Change the order of songs	Drag the file to a new location in the playlist
Copy a song to another location in the playlist	Ctrl-drag the file to a new location in the playlist
Remove a song from the playlist	Select the song and click ☒ or press the Delete key
Save the playlist	Choose *File-Save*; or choose *File-Save As*, enter a file name, and click Save

To Play Files from the Play List View...

1. To play back files from the Play List view, follow the instructions in the table.

To do this...	Do this...
Activate the playlist	Click ⏸ in the Play List view toolbar so that the button is pressed. If this button is not pressed, only a single file will play when you start playback.
Choose the starting song	Double-click the file you want to start with. The project is opened and displayed as usual.
Start playback	Click ▶ , choose *Realtime-Play*, or press the space bar.
Stop playback	Click ▶ , choose *Realtime-Stop*, or press the space bar.
Skip to the next file	Click ⏭ in the Play List view toolbar.
Loop continuously over the playlist	Click the ↺ button in the Play List view toolbar.
Show or hide file name extensions and folder names (path)	Click the 🖹 button to enable or disable the display of folder.

Virtual Jukebox

The Virtual Jukebox is a stand-alone program that lets you play up to
999 songs or audio files in sequence. Virtual Jukebox lets you create
playlists (*.ply* files) containing files in the following formats: project
(*.wrk*), bundle (*.bun*), playlist (*.set*), MIDI (*.mid*), and wave (*.wav*). You

can create and edit a playlist using menu commands or using drag-and-drop editing. By default, the Virtual Jukebox plays all the files in the playlist in sequence. You can modify the playback mode for all files at once or for each individual file. If your playlist includes files that contain any MIDI data, you must choose a MIDI output device before you can play the file.

The Virtual Jukebox looks like this:
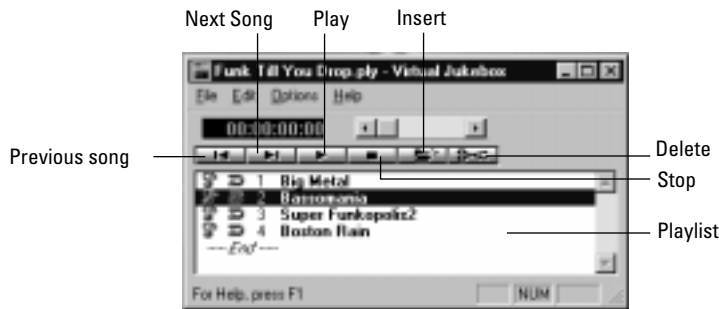
You can drag files from the Windows Explorer into the Virtual Jukebox. The files that you drag into the Virtual Jukebox window are inserted into the playlist before the current selection.

You can also drag files from the Virtual Jukebox into Pro Audio as follows:

• To open a project, drag the *.wrk*, *.mid*, or *.bun* file from the Virtual Jukebox into Pro Audio

• To insert an audio event into a project, drag a *.wav* file from the Virtual Jukebox to a specific position in the Audio view

To Start the Virtual Jukebox...

1. In Pro Audio, choose **Tools-Virtual Jukebox**, or click the Windows Start button and choose **Programs-Cakewalk-Pro Audio 9-Virtual Jukebox.**

To Choose a MIDI Output Device...

1. Choose **Options-Configure MIDI Devices** to open the MIDI Ports dialog box

2. Choose a device from the Output Ports list, and click OK.

To Create or Edit a Playlist...

1. To create or edit a playlist, follow the directions in the table:

To do this...	Do this...
Create a new playlist	Choose **File-New Playlist**. If you made any changes to the currently open playlist, you will be prompted to save the changes.
Open an existing playlist	Choose **File-Open Playlist**, choose the file you want, and click Open.
Add files to the playlist	Choose **File-Add Files to Playlist**, **Edit-Insert**, or click the Insert button to open the Add Files to Playlist dialog box, and then select one or more files from the list. The files you select are inserted into the playlist before the current file in the list.
Move a file	Drag the file to a new location in the list.
Copy a file to another location in the playlist	Ctrl-drag the file to the location where you want the copy.
Edit the playlist	Use the standard **Edit** menu commands (**Cut**, **Copy**, **Paste**, and **Delete**) to edit the playlist.
Remove a File from the playlist	Select the file in the list and click the Delete button.
Save the playlist	Choose **File-Save**, or choose **File-Save As** and enter a new file name.
Find a specific file in the playlist	Choose **Edit-Find**, type the first few letters of the file name, and click OK. The playlist moves to the first matching file. Choose **Edit-Repeat Last Find** (or press F3) to find the next matching file.

To Control Playback...

1. Here's how to control playback with the playlist:

To do this...	Do this...
Play the playlist	Double-click a file to start playback on that file, or click on a file in the list and click the Play button.
Stop playback	Click the Stop button.
Move forward or backward in the current file	Use the scroll bar next to the Sequence time display.
Skip to the next or previous file while playback is in progress	Use the Forward and Back buttons.
Skip to any other file while playback is in progress	Click on the file you want to play while playback is in progress. The current file will stop playing, and the file you selected will start playing.

To Change the Playback Mode...

1. To modify the playback mode for all files at once, use the following commands:

Command...	How it works...
Options-Set Playback Mode (All Files)-Auto Advance	Causes the Virtual Jukebox to move onto the next file in the playlist as it finishes playing each file
Options-Set Playback Mode (All Files)-Wait for Keypress	Tells the Virtual Jukebox to wait for a keypress before playing the next file in the playlist
Options-Set Playback Mode (All Files)-Time Delay	Lets you set a time delay between successive files in the playlist
Options-Randomize Play	Causes the Virtual Jukebox to select the next file to play at random

Or

1. To modify the playback mode for a single file, right-click the file and choose a playback mode from the pop-up menu.

To Set Other Virtual Jukebox Options...

1. There are several options you control with the following menu commands:

To do this...	Do this...
Keep the Virtual Jukebox on top of all other program windows	Choose **Options-Always on Top**
Display the full folder and file name of files in the playlist	Choose **Options-Show Full Path**
Display the File Information dialog box for each file as it plays	Choose **Options-Show Cakewalk File Information**

Key Bindings

Key bindings let you associate Pro Audio commands with keys on your MIDI or computer keyboard. This makes it easy for you to access specific features more quickly and efficiently.

From your computer keyboard, you can create a custom key binding for any of 62 key combinations:

*   The Ctrl key in combination with any letter of the alphabet

*   Any function key (F1 through F12)

*   The Ctrl key combined with any function key

*   The Shift key combined with any function key

Some of these key combinations are already used by Pro Audio by default. For example, the F11 key is used to drop a marker on the fly. If you reassign one of these key combinations, your assignment overrides the default assignment for that key combination.

Rather than tie up all the notes on your MIDI keyboard with key bindings, Pro Audio lets you define a Shift key on your keyboard that indicates when you want to use a key binding. For example, you could designate the lowest note on your keyboard as the Shift key, and then any number of notes to specific commands (for example, C4 to **Edit-Quantize**, C5 to **Edit-Groove Quantize**, and so on). If you press the C4 key by itself, the note plays normally. If you press the C4 key in combination with the lowest key on your keyboard (the Shift key), then

it's just as if you had chosen the ***Edit-Quantize*** command from the menu.

You can choose one of two options to define the Shift key:

- MIDI key (typically, the very lowest or highest key on your MIDI keyboard)

- Controller event (typically, one of the pedals)

If you use a MIDI key as the Shift key, then you lose the ability to play that note by itself. When you play the note, Pro Audio assumes you are about to choose one of the key bindings you have created and ignores the note. If this is ever a problem, you can disable MIDI key bindings without canceling the key assignments and then re-enable the MIDI key bindings later on.

You can use a key binding to execute a command only when that command is available from the menu. For example, the ***File-Save*** command is disabled when no projects are open. If you have assigned the Ctrl-F2 key combination to the ***File-Save*** command, it won't do anything when no projects are open.

You use the ***Options-Key Bindings*** command to set up and manage your key bindings. Here's how.

To Create a Key Binding Using the Computer Keyboard...

1. Choose **Options-Key Bindings** to display the Key Bindings dialog box.

2. Check Computer in the Type of Keys list.

3. Highlight the key combination you want to bind from the Key list.

4. Highlight the command you want to assign from the Function list.

5. Click Bind to bind the key combination to the command.

6. Click OK when you are done.

Pro Audio puts an asterisk (*) next to the key to show that it is bound to a function and draws a black line connecting the key and function name. From now on, pressing the chosen key combination executes the command you have chosen.

To Create a Key Binding Using a MIDI Keyboard...

1. Choose **Options-Key Bindings** to display the Key Bindings dialog box.

2. Check MIDI in the Type of Keys list.

3. Check the Enable box to make sure MIDI key bindings are enabled.

4. If you haven't already done so, assign a Shift key by doing one of the following:

    • Check Key in the MIDI Shift Option list, and enter the name of the key you want to use

    • Check Controller in the MIDI Shift Option list, and choose the controller you want from the list

5. Highlight the key you want to bind from the Key list.

6. Highlight the command you want to assign from the Function list.

7. Click Bind to bind the key to the command.

8. Click OK when you are done.

Pro Audio puts an asterisk (*) next to the key to show that it is bound to a function and draws a black line connecting the key and function name. From now on, pressing the chosen key combination executes the command you have chosen.

To Enable or Disable MIDI Key Bindings...

1. Choose **Options-Key Bindings** to display the Key Bindings dialog box.

2. To enable MIDI Key bindings, check the Enabled box. To disable MIDI key bindings, make sure the box is not checked.

3. Click OK when you are done.

To Clear a Single Key Binding...

1. Choose **Options-Key Bindings** to display the Key Bindings dialog box.

2. Choose the key whose binding you want to clear.

3. Click Unbind.

4.   Click OK when you are done.

To Clear All Key Bindings...

1.   Choose *Options-Key Bindings* to display the Key Bindings dialog box.

2.   Click the Zap All button

3.   Click OK to confirm that you want to clear all key bindings.

4.   Click OK when you are done.

Windows Taskbar Indicators

When Pro Audio is running, you'll normally see two indicators in your Windows Taskbar, right next to the clock:

Volume control

MIDI activity monitor
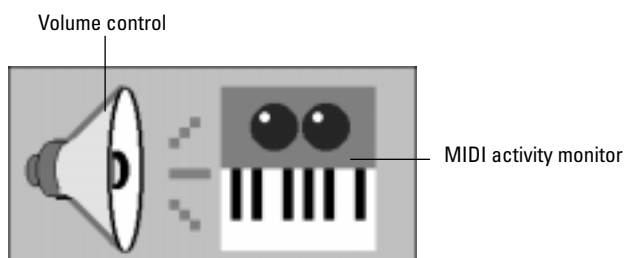
The MIDI activity monitor contains two lights that indicate MIDI input and output. When you play your MIDI keyboard, the first light flashes when each note is pressed, and it flashes again when each note is released. When you play back a project that contains MIDI, the second indicator lights up.

The volume control is used to control the playback and record volumes on your sound card. Double-click on this indicator to open a dialog box that lets you control the levels for audio, MIDI, CD playback, and record.

The volume control is available only if your sound card is using a native Windows driver. If your sound card does not use a native Windows driver, no volume control will be displayed in the taskbar. In this case, your sound card probably came with a separate program to control input and output levels. See your sound card documentation for more information.

Undo, Redo, and the Undo History

Pro Audio provides very powerful *Undo* and *Redo* commands that let you move forward or backward through any portion of an editing session. Every project has its own independent undo history. This means you can return to any open project and use the *Undo* and *Redo* commands, even if you've spent the last hour working on a different project.

Remembering everything that is necessary to undo the changes you have made can use a lot of memory. If a change you are about to make requires too much memory and cannot be undone, you will be advised that the operation is too big to undo later and asked if you want to go ahead anyway. If you do choose to perform the operation, you will not be able to undo it. Therefore, you may want to save your project first.

The *Edit-History* command displays a complete history of the commands and actions you can undo for the current project. The Undo History dialog box looks like this:

Most recent change

Earliest change

Click to clear the undo history

Adjust the number of steps you can undo

The *History* command is grayed out until you make a change to the current project that can be undone.

The History list is updated every time you make a change to a project. For example, if you insert a new note into a project using the Piano Roll view, that action is added to the History list. This entry remains on the list—even if you undo the change—so that you can redo the change later on. If you use the Erase tool to delete the note, this change is added to the History list.

You can click the Clear button in the Undo History dialog box to erase the undo history for the current project and free up some memory. If Pro Audio is low on memory, it may offer to erase the History list.

To revert to an earlier version of a project, highlight the entry in the History list that represents the point to which you'd like to return, and click OK. Pro Audio performs the necessary undo or redo actions to take you to that point. Once you edit the project (for example, by inserting a note), the History list is truncated at that point. Then, as you do further work, the History list grows again. Any events occurring before the event you highlighted remain on the list.

By default, Pro Audio keeps a history of up to 128 editing actions for each open project. Once that limit is reached, each new action pushes out the oldest item from the History list. You can raise or lower that number in the Undo History dialog box.

Screen Colors and Wallpaper

Pro Audio lets you customize the colors that are used for virtually all parts of the program using the ***Options-Colors*** command. This command also lets you change the background bitmap that is displayed in the Pro Audio window.

For any Pro Audio screen element, you can assign a color in two ways:

- Choose one of the colors that is part of your Windows color scheme.

- Assign a custom color.

The table below identifies each of the screen elements in Pro Audio:

Screen element...	Explanation...
Window background	Background color for the entire program window
Window text	Text color
Rules	Vertical lines used to mark values or time
Major rules	Major lines used to mark larger intervals of values or time
Values	Color of selected events and tempo changes in the Tempo view
Drawing	Colors used to show your drawing in the Piano Roll and Tempo views

Erasing	Color used to show your erasing in the Piano Roll and Tempo views
Event List Note	Color of note events in the Event List view
Event List KeyAft	Color of key aftertouch events in the Event List view
Event List Control	Color of controller events in the Event List view
Event List Patch	Color of patch events in the Event List view
Event List ChanAft	Color of channel aftertouch events in the Event List view
Event List Wheel	Color of pitch wheel events in the Event List view
Event List Sysx	Color of System Exclusive events in the Event List view
Event List Special	Color of other, special events in the Event List view
Note that is on	Color of currently playing notes
Events	Color of selected events in the Piano Roll view and selected data in the Audio view
Clips playing on MIDI ports	Default color of clips on tracks assigned to MIDI ports in Track view
Clips playing on Audio ports	Default color of clips on tracks assigned to Audio ports in Track view
Markers	Color of markers in time rulers
Loop points	Color of loop point markers
Punch points	Color of punch recording markers
Audio view samples	Color of audio event data in the Audio view
Audio view events	Background color of audio events in the Audio view
Anchor point	Color of audio event anchor points in the Audio view

Audio view pan envelope	Color of audio event pan envelopes in the Audio view
Audio view volume envelope	Color of audio event volume envelopes in the Audio view
Piano Roll Tracks 10, 20, 30...	Color of all tracks in the Piano Roll that end in the number "0" (10, 20, 30, etc.)
Piano Roll Tracks 1, 11, 21...	Color of all tracks in the Piano Roll that end in the number "1" (1, 11, 21, etc.)
Piano Roll Tracks 2, 12, 22...	Color of all tracks in the Piano Roll that end in the number "2" (2, 12, 22, etc.)
Piano Roll Tracks 3, 13, 23...	Color of all tracks in the Piano Roll that end in the number "3" (3, 13, 23, etc.)
Piano Roll Tracks 4, 14, 24...	Color of all tracks in the Piano Roll that end in the number "4" (4, 14, 24, etc.)
Piano Roll Tracks 5, 15 ,25...	Color of all tracks in the Piano Roll that end in the number "5" (5, 15, 25, etc.)
Piano Roll Tracks 6, 16, 26...	Color of all tracks in the Piano Roll that end in the number "6" (6, 16, 26, etc.)
Piano Roll Tracks 7, 17, 27...	Color of all tracks in the Piano Roll that end in the number "7" (7, 17, 27, etc.)
Piano Roll Tracks 8, 18, 28...	Color of all tracks in the Piano Roll that end in the number "8" (8, 18, 28, etc.)
Piano Roll Tracks 9, 19, 29...	Color of all tracks in the Piano Roll that end in the number "9" (9, 19, 29, etc.)

Note that if you set any other screen element to the same color as Window background, you'll make that screen element invisible!

To Assign Custom Colors...

1. Choose **Options-Colors** to display the Colors dialog box.

2. Choose the screen element whose color you want to change from the Screen Element list.

3. Assign a color to the screen element in one of two ways:

    •   To use a color from the Windows color scheme, choose one of the options in the Follow System Color list

    •   To use a custom color, check Use Specific Color, click the Choose Color button, and select the color you want

4. To save these changes from session to session, check the Save Changes for Next Session box.

5. Click OK when you are done.

Pro Audio uses the colors you have chosen.

To Restore the Default Colors...

1. Choose *Options-Colors* to display the Colors dialog box.

2. Click the Defaults button.

3. Click OK.

Pro Audio uses the default colors for all screen elements.

To Change the Wallpaper...

1. Choose *Options-Colors* to display the Colors dialog box.

2. Choose the desired wallpaper according to the table:

To do this...	Do this...
Use the default wallpaper	Check Default in the Wallpaper list
Not use any wallpaper	Check None in the Wallpaper list
Use a custom bitmap	Check Custom, choose a bitmap file, and click Open

3. Click OK when you are done.

Music Notation for Nonconcert Key Instruments

For historical reasons, certain musical instruments are traditionally notated in a transposed key rather than the actual key. For example, a normal (Bb) trumpet part is written in the key one whole step higher

than the actual concert key, and an Eb alto sax part is written a major sixth higher. Musicians have traditionally learned to read and refer to the notes they play using the proper transposition interval for their instrument.

Pro Audio supports these nonconcert instrumental keys through use of the Key+ column in the Track view. Simply enter or record the notes into the instrument's track transposed as the musician would expect them, and then set the proper transposition interval in the Key+ column to make it play in the correct key. For example, a Bb trumpet track should have all its notes a whole note higher than concert pitch, and should have Key+ set to -2 to transpose it two chromatic steps back down. Remember, not all trumpets are Bb instruments!

The Staff view automatically transposes the key signature for each track according to the track's Key+ value. Multiple tracks appear and can be printed as an orchestral score, with the proper different key signatures for each track.

Note that this Key+ information is saved in Pro Audio *.wrk* files, but not in standard MIDI files. If you save a file as a MIDI file, the Key+ transposition will be applied to each note event, so that the file will sound the same, but the Key+ information will be lost. If you're reading in a MIDI file, you can easily set up the nonconcert instrument tracks and then save the file as a normal project file. First set the Key+ offset to reflect the nonconcert instrument's key signature. Then, use Transpose to compensate for the Key+ offset.

C

Appendix C: Advanced Setup

This appendix contains additional details on installing Pro Audio and configuring your equipment for use with Pro Audio.

Step 1. Install Windows 95, 98 or NT

Before installing Pro Audio, make sure that Windows 95, 98 or NT is installed properly.

Try some of the sample programs that come with Windows, such as Media Player and Sound Recorder. If you experience problems, try to resolve them before installing Pro Audio, using the technical support services provided by Microsoft or your system vendor. It is generally easier for you to solve one problem at a time, and it is much easier for us to help you when you have a reliable Windows installation. Make sure that you have the most recent video, printer, and sound card drivers to ensure maximum performance of Pro Audio.

Step 2. Install Cakewalk Pro Audio

1. Start your computer and start Windows. Close any open programs, but leave Windows running.

2. Place the Cakewalk Pro Audio CD-ROM in your CD-ROM drive.

3. Cakewalk AutoRun starts automatically, showing you a dialog box with several buttons. Click the Install Cakewalk Pro Audio button, and a dialog box welcomes you to Cakewalk Pro Audio Setup.

Note:

If you exit Setup without completing the installation, choose **Start-Run**, type D:\AutoRun.exe (where D:\ is your CD-ROM drive), and click OK. This will reopen the AutoRun window, and you can click Install Cakewalk to start installation again.

4. When Setup starts, a dialog box welcomes you to the Cakewalk Pro Audio Setup. Click Next to continue.

5. Setup asks you to enter your name, company (if any), and serial number. Cakewalk uses your name as the default author and copyright holder of songs. These credits appear on printed scores.

Note:

You can use the *File-Info* command to change a song's author and copyright holder.

6. Choose the installation type and destination directory. By default, Pro Audio is installed to C:\Program Files\Cakewalk\Pro Audio 9. If you want to change the destination directory, click Browse and specify a new directory.

7. Select a Start menu for the program. By default, Setup creates a new menu on the **Start-Programs** menu and names it Cakewalk. You can give the new menu a different name or choose an existing menu from the list.

8. Setup now asks you to confirm the installation options you have selected. You can click Back to go back and change something, or click Next to proceed with the installation.

9. Setup installs the Pro Audio files to the installation directory, and it creates an item for the Cakewalk folder in the Windows **Programs** menu. The folder contains icons for Pro Audio itself, for the Virtual Piano utility, the Virtual Jukebox utility, and for the *readme.rtf* file.

10. Setup also asks if you would like to register MIDI files (files with extensions *.mid* and *.mff*) as Cakewalk file types. Choosing Yes means that Pro Audio will automatically open these files when you double-click them.

Pro Audio can be uninstalled from the Add/Remove Programs section of the Windows Control Panel. Any *.mid* files on your system may still be registered as Cakewalk files after you do this; if you still need to open the *.mid* files, you can register them with other applications. See your Windows documentation for more on registering files.

Audio Files and Disk Caching
By default, Pro Audio bypasses the Windows disk cache when reading and writing digital audio files. You can selectively re-enable disk caching. For more information, see Chapter 13, *Improving Audio Performance*.

Step 3. Read the README File
Cakewalk Pro Audio Setup installs a *readme.rtf* item in the Start menu. Choose this to view the file; it contains important notes about changes or additions not covered in the manual.

Step 4. Install a MIDI Driver
If you've already installed Windows multimedia MIDI or sound card drivers, you can skip this section. Just make sure that there are no conflicts between the driver and the sound card.

Pro Audio uses the multimedia extensions in Windows to "talk" to MIDI interfaces and sound cards. The multimedia extensions provide a way for applications to talk to different kinds of MIDI interfaces and sound cards through drivers. For Pro Audio to work with your device, you must use the Control Panel to install a driver.

Make sure that the driver you install is the correct one for your MIDI interface. The Pro Audio CD contains a driver for MPU-401 compatible MIDI interface cards. If you have such a MIDI interface card installed in your system, you should install this driver using the following steps. However, if your MIDI interface is not MPU-401 compatible, or if your MIDI interface is provided by your sound card, then you *must not* use this MPU-401 compatible driver for your MIDI interface. It will not work properly. Instead, use the MIDI driver provided with your MIDI interface card or sound card. Consult your card's accompanying documentation to determine which driver to use and how to install and configure that driver.

If you plan to record and play back digital audio on a Windows-compatible sound card, make sure you have installed the wave driver for that sound card. Also make sure that you install a 16-bit or greater sound card: up to 24-bit.

If you have followed the above guidelines and you're having problems with your sound card, contact the card's manufacturer.

Installing Drivers in Windows 95

This section contains instructions for installing, uninstalling, and changing the settings of multimedia drivers under Windows 95. Please contact the manufacturer of your multimedia device for specific information about Windows 95 drivers, configuration, and compatibility.

To Install a Driver Not Included with Windows 95...

1. Click the Start button, and choose ***Settings-Control Panel***.

2. In the Control Panel, double-click the Add New Hardware icon.

3. In the Add New Hardware Wizard, click Next.

4. When the Add New Hardware Wizard asks you, "Do you want Windows to search for your new hardware?" select No.

5. In the list of hardware types select sound, video, and game controllers, and click Next.

6. Click Have Disk.

7. Insert the manufacturer's diskette, specify the correct drive and path, then click OK.

8. Select the driver from the list, and click OK.

9. Click Finish.

10. In the Driver Set Up dialog box, select the hardware settings that match your multimedia hardware, and click OK.

11. Remove the manufacturer's diskette and click Yes to restart your computer.

To Install a Driver Included with Windows 95...

Windows 95 includes drivers for most common multimedia devices. To install a driver included with Windows 95, do the following:

1. Click the Start button, and choose ***Settings-Control Panel***.

2. In the Control Panel, double-click the Add New Hardware icon.

3. In the Add New Hardware Wizard, click Next.

4. When the Add New Hardware Wizard asks you, "Do you want Windows to search for your new hardware?" select No.

5. In the list of hardware types select sound, video, and game controllers, and click Next.

6. Select the manufacturer and model of your multimedia device, and click Next.

7. Select the Resource IRQ, port, and DMA settings that match your multimedia hardware, then click Next.

8. Click Finish.

9. Click Yes to restart your computer.

To Examine and Change Driver Resources...

At some point you may wish to examine and edit the resource settings of a driver (for example, if you have resource conflicts). To examine the resource settings, do the following:

1. Click the Start button, and choose ***Settings-Control Panel***.

2. In the Control Panel, double-click the System icon.

3. Select the Device Manager tab.

4. In the list of hardware items, double-click the sound, video, and game controllers. The list will expand to show the complete list of installed multimedia drivers.

5. Highlight the driver you want to verify, and click Properties.

6. Select the Resources tab to examine the multimedia driver settings.

If you need to change DMA, IRQ, or port settings, deselect the Use automatic settings checkbox and reconfigure the driver with the correct DMA, IRQ, and port addresses.

To Remove a Driver...

1. Click the Start button, and choose *Settings-Control Panel*.

2. In the Control Panel, double-click the System icon.

3. Select the Device Manager tab.

4. In the list of hardware items, double-click the sound, video, and game controllers. The list will expand to show the complete list of installed multimedia drivers.

5. Highlight the driver you want to remove, and click Remove.

The changes will take effect the next time you restart your computer.

Installing Drivers in Windows NT 4.0

This section gives you general steps for installing and setting up multimedia drivers under Windows NT 4.0. Please contact the manufacturer of your multimedia device to find out about Windows NT 4.0 drivers, configuration, and compatibility for your specific device.

Many sound cards and MIDI interfaces do not yet have drivers for Windows NT 4.0. Before you purchase or install any device, find out whether it is compatible with NT 4.0. Read the Microsoft Windows NT

"Hardware Compatibility List" to find out which devices NT 4.0 supports.

If you don't log on with NT Administrator privileges, you can't install or remove drivers.

1. If you have a sound card or MIDI interface that goes inside the computer, make sure that the card is physically installed. If it isn't, shut down the computer and install the card now. If you have an external MIDI interface, make sure that it's connected to the computer.

2. Choose **Start-Programs-Administrative Tools**. This opens the NT Diagnostics program.

3. Click the Resources tab. Use the information in this window to find the available resources for your sound card or MIDI interface. When you finish, close the Diagnostics dialog box.

4. Choose **Start-Settings-Control Panel**.

5. In the Control Panel, double-click the Multimedia icon.

6. In the Multimedia dialog box, click the Devices tab.

7. Click the Add button.

8. Scroll through the list of drivers to find one that matches your card or interface. When you have done this, you'll be prompted to enter IRQ and port address settings for the card or interface.

9. When you finish, click OK and restart NT.

Step 5. Connect Your MIDI Equipment

If you are using a MIDI interface (such as an MPU-401 or Sound Blaster MIDI option) with an external MIDI keyboard, you need to connect the equipment using MIDI cables.

It is possible to connect your equipment in some rather complex ways that may cause problems. If you call for technical support with a problem concerning equipment that doesn't seem to be responding, we'll probably suggest that you reconnect things in one of the ways listed below before we explore the problem further. Also be sure to check *Appendix A: Troubleshooting*, before calling us.

There are two methods that fit many circumstances. The one you choose depends on whether your keyboard has:

•   All three types of MIDI jacks: In, Out, and Thru

- Only two types of MIDI jacks: In and Out

If you have only one keyboard, read the "If Your Keyboard Doesn't Have a MIDI Thru Jack" section (regardless of whether you have MIDI Thru or not).

If Your Keyboard Has a MIDI Thru Jack

If your keyboard has three MIDI jacks—In, Out, and Thru—then use the following diagram.

THRU   IN   OUT

Master Keyboard

IN   OUT

MIDI Interface

IN   THRU

MIDI Module A

IN   THRU

MIDI Module B

etc.
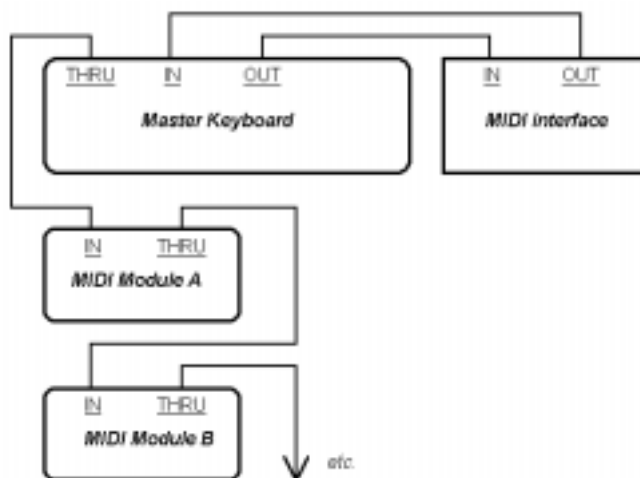
If you are using a 15-pin joystick adapter cable that splits into two MIDI cables:

- Connect the 15-pin jack to your computer's joystick port.

- Connect the In cable to your instrument's MIDI Out jack.

- Connect the Out cable to your instrument's MIDI In jack.

Here's a checklist:

Connect this...	To this...
Master keyboard Out	MIDI interface In
MIDI interface Out	Master keyboard In
Master keyboard Thru	Another MIDI module's In
That MIDI module's Thru	Yet another MIDI module's In

Continue the sequence, repeating the last connection for each of your sound modules.

Each MIDI device should be set to a unique MIDI channel or range of channels to avoid note-doubling. Refer to the manuals for your MIDI devices for information on how to set their MIDI channels.

Your MIDI interface may have a Thru jack as well as In and Out jacks. If your master keyboard lacks MIDI Thru, you can add more MIDI modules to your setup by connecting the MIDI interface's Thru to the first module's In. You can then chain subsequent modules onto the first module, as described earlier.

If your master keyboard now seems to double notes (they sound thicker), or if you can play only one half as many notes at once, first make sure that no MIDI channel is being used by more than one of your MIDI devices. If no MIDI channel is assigned to duplicate devices and you hear doubling or only half as many notes as you should, see "My Keyboard Doubles Every Note I Play" on page A-5.

If Your Keyboard Doesn't Have a MIDI Thru Jack

If your keyboard has only two MIDI jacks—In and Out—or if you have only one keyboard, use the following diagrams instead:
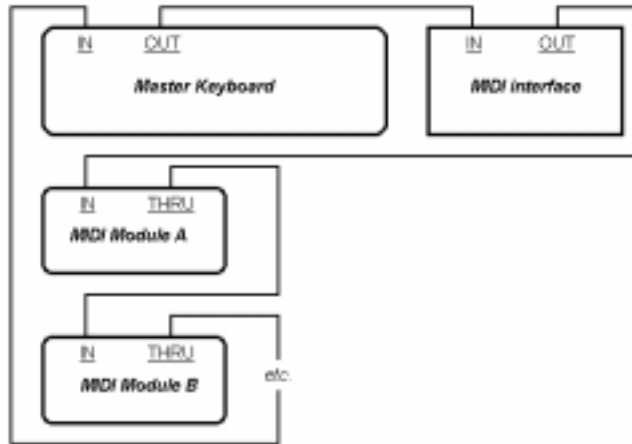
Each MIDI device should be set to a unique MIDI channel or range of channels to avoid note-doubling. Refer to the manuals for your MIDI devices for information on how to set their MIDI channels.

If your master keyboard now seems to double notes (they sound thicker), or if you can play only one half as many at once, first make sure that no MIDI channel is being used by more than one of your MIDI devices. If no MIDI channel is assigned to duplicate devices and you hear doubling or only half as many notes as you should, see "My Keyboard Doubles Every Note I Play" on page A-5.

Step 6. Configure Your Audio Hardware

Before running Pro Audio, you should ensure that Pro Audio knows the capabilities of your audio hardware. How you do this depends upon the kind of digital audio hardware you have.

To use the audio features of Pro Audio, you must have a 16-bit or greater sound card: up to 24-bit. Older, 8-bit sound cards cannot take advantage of Pro Audio's features.

The first time you start Pro Audio, it will automatically run the Wave Profiler utility. Wave Profiler determines the proper settings for your sound card and writes them to a file that Pro Audio consults to use the card. The Wave Profiler is discussed later in the appendix. To find out if your sound card is compatible with Pro Audio, check the sound card's documentation.

Step 7. Set Up to Record Digital Audio

In general, the inputs of sound cards take 1/8" stereo minijacks. Sound cards usually have two inputs—one for line level inputs and the other for microphones (at mic level). The line level input is stereo; the mic input could be either stereo or mono. If your final output does not terminate in a 1/8" jack (and it probably doesn't), you will need an adapter to plug it into your sound card.

Most sound cards use the Windows 95 Volume Control to adjust the master input and output volumes and to control which recording inputs are active. If you don't hear audio tracks, or if you can't easily control the audio volume in Pro Audio, go to *Start-Accessories-Volume Control* and check the settings there. See your sound card's documentation for more.

Electric Guitar Direct-In

You can connect an electric guitar directly to your sound card using a 1/4" mono to 1/8" stereo adapter. The following diagram shows this setup:

1/4" mono → ADAPTER → 1/8" stereo → input (line may work, too)

1/4" mono to 1/8" stereo
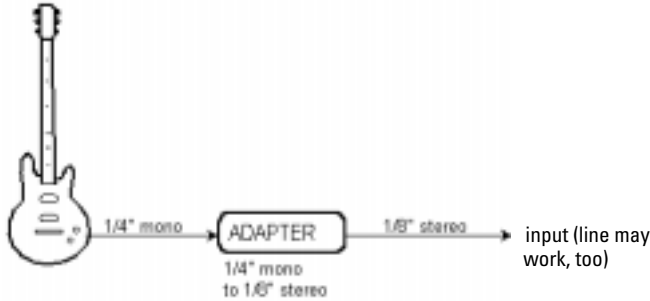
The 1/8" jack should be plugged into the sound card's mic input, although plugging into the line input may also work.

Electric Guitar Through Effects Rack

You can also plug an electric guitar into an effects rack, then send the output of the rack to the sound card's input, as shown in the following diagram:
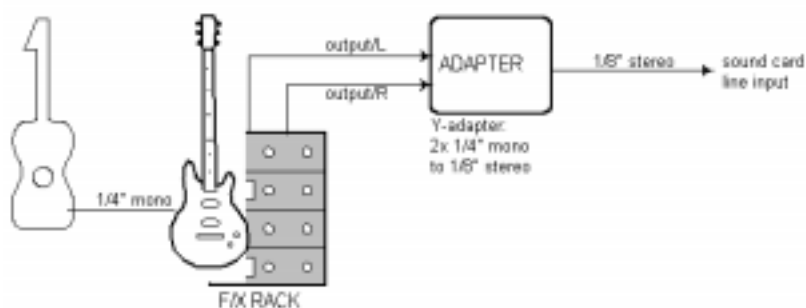
This diagram assumes that the output of the rack is at line level. If it is at pro level instead (+4 dB), and your card does not accept a +4 db input, you will need to attenuate (lower) the F/X rack's signal. To do this, use a mixer between the rack's output and the Y-adapter. If the rack has only a mono output, a 1/4" mono to 1/8" stereo adapter should be used instead of a Y-adapter.

If you want to connect a guitar amplifier's direct output to the sound card, you should base your setup on this example.

Microphone Direct-In

Microphones can be plugged into the sound card's mic input. Some inexpensive microphones are made especially for use with sound cards and come equipped with 1/8" jacks. However, better quality microphones take better quality cables, which do not terminate in 1/8" jacks. The diagram below illustrates how to connect a microphone that terminates in a 1/4" jack:

Home Stereo, CD Player, Radio Tuner, Preamp Output

The output of a stereo component can be connected to the sound card's line in, using a dual RCA to 1/8" stereo mini Y-adapter. Many portable cassette players come with this kind of adapter, or even with a single

cable with all the necessary jacks. In the following diagram, a stereo component is connected to the Y-adapter using standard RCA cables:
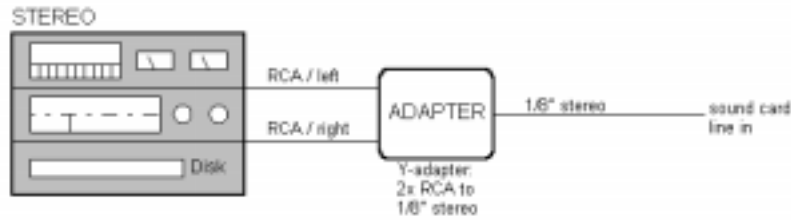
Internal CD Player

If you are using your computer's internal CD player, and it does not have its audio outs connected internally to the sound card, run a cable from the CD player's Headphone jack to the card's Line In jack. If there is no Headphone jack, you'll need to use an external CD player.

Mixer

You can connect a mixer to the sound card with a setup of the following kind:
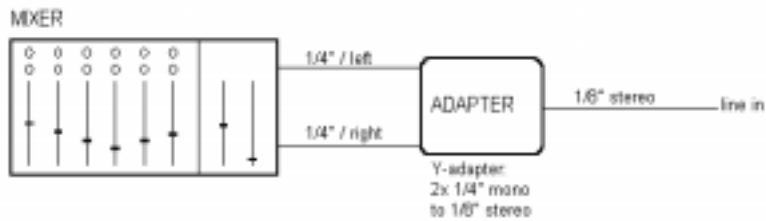
Note:

If your mixer has buses, use them! This helps avoid feedback.

Step 8. Start Pro Audio

When you installed Pro Audio, the default setup procedure added a
Cakewalk folder to your *Programs* menu.

To Start Pro Audio...

1. Click the Start button located in the lower-left corner of the
   screen.

2. Point to Programs to see a list of available programs and folders.

3. Point to the Cakewalk folder to open it.

4. Click on Pro Audio 9.

Here are some other ways to start Pro Audio in Windows:

- Right-click on the desktop and choose *New-Cakewalk Song*. When
  the song icon appears, type a name for the song. Then double-click
  the icon to start Pro Audio.

- Click the Start button, point to Documents, and choose a previously
  opened Pro Audio song from the menu.

- Select the Pro Audio program item or a Pro Audio document file
  using the My Computer icon on the desktop, the Windows Explorer,
  or the *Find* menu. All Pro Audio file types (*.wrk, .bun, .tpl, .mid,
  .mff*) are registered with Windows. See your Windows
  documentation or on-line help for more information.

Migrating Preferences

The first time you run Pro Audio, it asks if you want it to search for an
older version of Pro Audio and transfer (or migrate) the preferences you
established in that version to Pro Audio. Pro Audio searches all hard
disks in your system for older versions, and if you have more than one
older version of Pro Audio installed, Pro Audio presents a list of them.
You may choose one from this list. The preferences and settings stored in
the older version's *cakewalk.ini* and *ttsseq.ini* files are then transferred
to the identically named configuration files for Pro Audio. Pro Audio
migrates certain preferences to the Windows Registry rather than to the
cakewalk.ini file.

Running Wave Profiler

The first time you start Pro Audio, it automatically runs the Wave
Profiler utility. Wave Profiler determines the proper MIDI and Audio

timings for your sound card and writes them to a file that Pro Audio refers to when using the card. Wave Profiler does not change the sound card's DMA, IRQ, or port address settings.

Wave Profiler attempts to detect the make and model of your sound card, which determine the card's audio characteristics. When Wave Profiler determines the kind of card you have, it asks whether you want to use the default settings for that card or override them. If Wave Profiler has identified your sound card correctly, you may accept the default settings. However, the utility is not infallible. If it does not identify your sound card correctly, you must enter the correct settings yourself. To determine those settings, you may need to consult your sound card's manual and consider using the tech support options discussed in Chapter 1, *Introduction*.

Note:
You can run the Wave Profiler again at a later time (for example, if you install a new sound card or driver) by choosing the ***Options-Audio*** General tab command and clicking Wave Profiler.

Setting Up the MIDI In and MIDI Out Devices
When you start Pro Audio for the first time, it checks your computer to find all the MIDI input and output devices you have installed (such as sound cards and MIDI interfaces). However, sometimes you need to tell Pro Audio exactly which devices you want it to use. If you're not getting sound from your sound card or MIDI keyboard, or if you just want to change the MIDI ports and devices that you are using, follow the steps in this section.

Choose ***Options-MIDI Devices*** to open a dialog box in which you select the MIDI In and MIDI Out devices that Pro Audio will use. Each item in

the list is a MIDI In or MIDI Out port from drivers installed using the Windows Control Panel.

1. Go into Pro Audio, and choose **Options-MIDI Devices**. You will see the MIDI Ports dialog box, which lets you choose instruments on MIDI input and output ports:
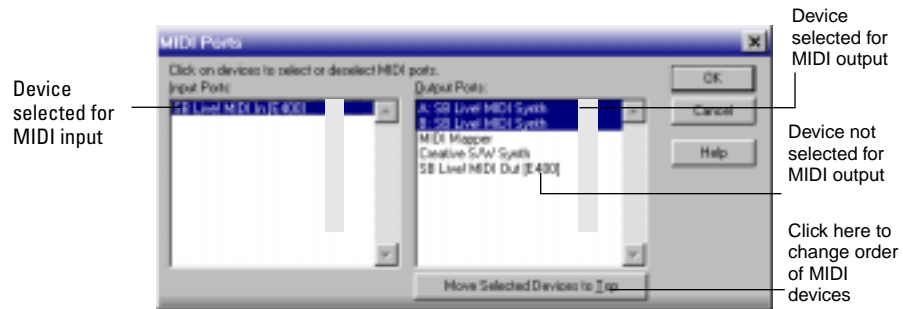
2. Look at the left window. Notice that it shows devices on MIDI Input Ports; make sure that all devices in this window are highlighted. If a device isn't highlighted, click on it once to select it for MIDI Input.

3. Look at the window on the right. Notice that it shows devices on MIDI Output Ports. Pro Audio numbers its MIDI Output Ports by the order of the devices in this window. The device on top is on Port 1, the one below it is on Port 2, and so on.

4. Highlight each device in the Output Ports window and click Move Selected Devices to Top to change its order. Then highlight all the devices that appear in the window to select them for output.

Tip!

Be sure to choose MIDI output devices from **Options-MIDI Devices**. If you don't do this, you won't hear any of your MIDI instruments when you play songs in Pro Audio.

Using MIDI Devices After Making Driver Changes

If you later add or remove drivers using the Drivers icon of the Windows Control Panel, Pro Audio reacts in the following way:

• If you remove a Control Panel driver, Pro Audio will not use the device it belongs to the next time you run the program. Any other devices you had selected using the **Options-MIDI Devices** command will remain selected.

• If you add a driver through the Control Panel, Pro Audio does *not* automatically use it. You must use the **Options-MIDI Devices** command to add the new driver to Pro Audio's list.

Note:

After you add or remove a driver with the Drivers icon in the Windows Control Panel, you must restart Windows for the change

Defining Your MIDI Instrument or Sound Card

Once you have selected your MIDI Input and Output devices, Pro Audio, by default, plays back MIDI sequences using a General MIDI instrument definition. If you are using a synthesizer or sound card that does not adhere to the General MIDI standard, you may want to define that instrument. For information about instrument definitions, see Chapter 10, *Using Instrument Definitions*.

D

Appendix D: MIDI Files

The Standard MIDI file format is a file interchange format defined by the MIDI Manufacturers Association (MMA). The purpose of the format is to allow for the exchange of MIDI data between different programs. Any program that can read and write MIDI files has a common language with which to talk to other MIDI software. The compact size of MIDI music files makes them particularly useful for delivering music online.

Pro Audio can open standard MIDI files, and can save your projects in standard MIDI file formats. Note that only the MIDI portion of your projects is saved in a standard MIDI file. If your projects contain digital audio, the audio portion of the project will be lost when you save it to a standard MIDI file.

Pro Audio supports two different MIDI file formats, MIDI Format 0 and MIDI Format 1. Format 0 MIDI files contain a single track, with all events stored in that track. Format 1 MIDI files can store up to 256 tracks, just like Pro Audio project files. When you load a MIDI Format 0 file, Pro Audio splits it into 16 separate tracks, based on the MIDI channels assigned to each event. When you save a project to a MIDI Format 0 file, Pro Audio collapses MIDI information from all of its tracks into one single track.

Pro Audio also lets you save and load files in the RIFF MIDI file format. This is a standard Resource Interchange File Format specification that encapsulates a Standard MIDI File of either format 0 or format 1. These files typically have an extension of *.rmi*.

A disadvantage of MIDI files is that the way the file sounds on playback varies based upon the sound reproduction hardware you are using. The same song sounds very different on two different synthesizers or two different sound cards. Another problem is that the Standard MIDI File

specification leaves some details open to interpretation by software and hardware manufacturers.

To Save a Song as a Standard MIDI File or RIFF MIDI File...

1. Choose *File-Save As* to display the Save As dialog box.

2. Choose the desired format from the Save as Type list.

3. Enter a file name and click Save.

Timebases

MIDI files can be expressed in any of a number of timebases (ppq resolutions). It is likely that most MIDI files you will encounter use a common timebase, such as 96 or 120. Although Pro Audio supports many timebases, it is possible that a MIDI file may use a timebase that Pro Audio does not support. In that case, the times will be converted into whatever timebase is currently the default.

Supported MIDI File Meta-Events

MIDI files can contain meta-events. The types of meta-events that Pro Audio supports are listed in the following table:

MIDI File Meta-event...	How it is represented in Pro Audio...
Meter and key signature	Meter/key signature map entry
Tempo	Tempo change
General text	Track name
General text in the conductor track of a Format 1 file	Markers view markers
Track name	Track name

Features Not Supported by MIDI Files

While the MIDI file format is very flexible and extensive, it cannot store the following parameters that are part of a standard project file: key offset, velocity offset, time offset, and forced channel.

When you save a project to a MIDI file, most of these parameters are applied to the individual events. For instance, if you have assigned track 1 to channel 10 in the Track view, Pro Audio will write the MIDI file so

that every event on track 1 has a channel number of 10. When you subsequently load the MIDI file all of those Track view parameters will have vanished. But the music will sound the same, because Pro Audio has made these changes to the events themselves.

Other MIDI File Handling Notes

Here are a few specific points about how Pro Audio works with MIDI files:

- Pro Audio places Lyric events found in Format 0 MIDI files into Track 4, in accordance with conventions used by karaoke players.

- Pro Audio inserts any Text or Lyric events found at time 0 in a track into the Comments field in the File Info dialog box, unless the Text or Lyric event is preceded by a Note event.

- Pro Audio automatically enables the Zero Controllers when Play Stops option (available through the *Options-Project* command, on the MIDI Out tab) whenever a MIDI file is loaded.

- If a general MIDI file contains a copyright notice, the File Info window will be displayed automatically when the file is opened.

Special Handling of GM, GS, and XG MIDI Files

General MIDI compatibility of a song file is indicated by the presence of a special System Exclusive message at the beginning of the song. When Pro Audio finds a GM, GS or XG reset message, it assumes that you would like to work within the GM Score Production guidelines. This causes Pro Audio to use special timing for program change information when writing MIDI Files, and allows it to search more aggressively for track parameters when reading MIDI files. The result is that it is easier than ever to create and use General MIDI song files with Pro Audio.

Pro Audio does not enforce or even verify compliance with the GM guidelines for your music data. But Pro Audio does comply with them when generating events that represent track parameters. If necessary, Pro Audio will insert blank setup measures at the start of your song. This makes space for certain events to be inserted at the correct times at the start of each track: bank changes, patch changes, volume, and pan. This means that you can use Pro Audio's track parameters for these settings when composing songs: When you save your work as a MIDI File, Pro Audio will place these events in the track at the specific clock ticks recommended by the guidelines.

You can tell Pro Audio to follow the GM guidelines by loading the "Turn GM System On" Sysx bank in the Sysx View (*gmsystem.syx* in your Cakewalk directory), and then either inserting a sysx event at time 1:1:0 or using the Auto setting for that bank.

When loading a GM file, each track's bank, patch, volume and pan parameters are lifted from the data stream and placed in Pro Audio's Track view for you to see and edit onscreen. The GM mode ensures that all patches, banks and controllers are placed at specified times throughout a setup measure when you save a MIDI file. This ensures that all setup information can be digested by your synthesizer before it starts playback. If you don't have a setup measure in your song, Pro Audio will insert one for you.

If there is no GM, GS, or XG reset System Exclusive message present at the start of your song, Pro Audio will not operate in this GM mode.

If You Have Problems Playing MIDI Files

A MIDI file can cause playback problems if all of the following are true:

- The MIDI file is a GM-compatible Standard MIDI Format 1

- All patches, banks and/or controllers are stored in one track

- All related note events are stored in a different track

When Pro Audio loads such a file, it may try to optimize the program changes, causing incorrect selection of synthesizer voices during playback (the GM, GS, and XG specifications all recommend the use of Standard MIDI Format 0 for distribution of music data, which would make this problem irrelevant). If you encounter this problem, simply re-select your instruments and re-save the file.

If You Plan to Publish Your Songs

If you plan to publish your own songs, we encourage you to follow the General MIDI authoring guidelines. These guidelines are quite detailed about the exact layout of many types of song data, and a complete discussion of them can be found on the World Wide Web at www.midi.org. However, Pro Audio can help you to conform with the GM guidelines if you follow these practices:

- Always save your master copy of any work in progress in Pro Audio project (*.wrk*) file format. When you are ready to publish your work, use the **File-Save As** command to create a Standard MIDI Format 0 file.

- All of the major publishing guidelines recommend that you use Standard MIDI File Format 0 instead of Format 1. Some sequencers cannot read the more complex Format 1 files, particularly sequencers embedded in some types of hardware such as karaoke players.

- Load the "Turn GM System On" system exclusive bank (*gmsystem.syx* in your Cakewalk directory) in the Sysx view, and set

the bank to Auto Send. This message will not only re-initialize a General MIDI compatible sound module to a known state, but will also tell Pro Audio to generate GM setup measures for your program changes when you save the song in Standard MIDI Format. See "Variables in the [Options] Section" on page E-4 for information on disabling setup measure.

- For best results, you should always place program changes and other MIDI messages in the same tracks as the notes they affect. This keeps the data for each track together as a single unit, and avoids problems that might occur when Pro Audio cannot easily correlate the program changes with the note events.

E

Appendix E:
Initialization Files

Many Windows applications, as well as Windows itself, use files to store information about your preferences and configuration. Often applications store values to these files when you make selections in the program using menus or dialog boxes. However, you can also change these files directly. In some cases, there is no way to change the settings in the application, and changing the file directly is the only way.

Initialization Files

This appendix documents three initialization files, which are stored in the Pro Audio program folder (by default, C:\Program Files\Cakewalk\Cakewalk Pro Audio 9):

*   *cakewalk.ini*

*   *ttsseq.ini*

*   *aud.ini*

To view and edit the *cakewalk.ini* file, choose **Options-Initialization File**. Use the Windows Notepad to open and alter any of the three files. There are several other .INI files in the Pro Audio folder, but you should not attempt to edit or modify these files in any way. Changes to these other files could cause Pro Audio to stop operating properly.

Before making any changes to any of the *.ini* files, you should make a backup copy in case you make a mistake. After you have made your changes, save the file and close *Notepad*. Pro Audio reads the settings in these files only when it first starts up. Therefore, if you change any settings while Pro Audio is running, you should exit and restart Pro Audio in order for the changes to take effect.

Initialization File Format

Initialization files all follow a common format. They are divided into sections whose names appear in the file in brackets, like this:

    [Section Name]
Within each section, variables are of the form:

    <variable name>=<value>

For example, the DrawPlayingAudio variable belongs in the [Wincake] section in *cakewalk.ini*, and determines whether the audio waveform is redrawn or not when the display is scrolling during playback. If the value is 0 (FALSE), then the waveforms are not redrawn. If the value is 1 (TRUE), then waveforms are redrawn. To redraw waveforms when scrolling during playback, the entry in the file looks like this:

    [Wincake]
    DrawPlayingAudio=1

The variable names contain no spaces. They are not case sensitive.

CAKEWALK.INI
Many of the items in *cakewalk.ini* are set using Pro Audio menus and dialog boxes. However, some items can be changed only by using the **Options-Initialization File** command or by directly editing this file using the Windows Notepad.

cakewalk.ini is divided into different sections. Unless otherwise noted below, all entries should appear in the section that starts with the line:

    [Wincake]

For example, if you want to add the line PanicStrength=1 to *cakewalk.ini*, you should put it on the line under [Wincake], like this:

    [Wincake]
    PanicStrength=1

The following section lists the different variables you can change in *cakewalk.ini*.

Variable...	Type...	Default value...	What it does...
DrawPlayingAudio=< 0 or 1>	Boolean	0 (disable)	This line controls whether the audio waveform is redrawn or not when the display is scrolling during playback. By setting the value to 1, you can force the Track and Audio views to always redisplay audio data, even during playback. This is recommended only for very fast machines.
ForegroundForSMPTE=<0 or 1>	Boolean	1 (enable)	This line specifies whether or not Pro Audio should jump to the foreground (focus) once it locks to SMPTE.
HyphenDir=<drive:path name>	Path	<installation directory>\ttshyph.dll	This determines the location of the Hyphenator extension DLL used by Pro Audio, and is written during installation. This should never need to be changed.
MaxPanelUndoSteps= <num>	Integer	128	Each StudioWare view remembers a certain maximum number of (Design mode) operations before discarding old ones. This line lets you control the maximum depth of each Panel undo history. Be aware that the larger the number you specify, the more memory must be dedicated to storing the information required to undo commands.
PanelsShowWidgetBitmaps = <0 or 1>	Boolean	1 (enable)	This line controls whether Pro Audio hides (n=0) or shows (n=1) all widget bitmaps while in Use mode (except those in Image widgets).
PanicStrength=<0 or 1>	Boolean	0 (controller 123 only)	The Panic/Reset button stops playback and turns off any stuck notes. There are two ways a MIDI note can be turned off: By a note-off message (n=1) or by MIDI controller number 123 (all notes off). By default, Panic uses controller 123 only (n=0).

Initialization Files

StaffViewChanSeparateVoices= <0 or 1>	Boolean	1 (enable)	This line specifies whether or not Pro Audio should treat channels assigned to each note as separate voices. This is useful if you want to force note stems up or down for different voices.
StaffViewPreScanMeasures = <num>	Integer	16 (measures)	This line specifies how far back (in measures) Pro Audio should search for long elements in order to display them in the Staff view. If a long element does not start within the specified time, then it will not be displayed in the Staff view (although it will print).
ToolTempFileDir= <drive:path name>	Path	<Windows TEMP directory>	This line specifies where to store temporary .WAV files when launching a third party wave editor from the Tools menu.

TTSSEQ.INI

The *ttsesseq.ini* file can only be changed using the Windows *Notepad*.

Variables in the [Options] Section

Variable...	Type...	Default value...	What it does...
ChaseDelay=<num>	Integer	20 (2 seconds)	This line specifies the sync chase delay in 1/10 seconds. During SMPTE/MTC sync, when the position is determined, playback begins at a later time to allow for setup. This line specifies the delay amount. If this value is too long, you always have to wait after starting playback before Pro Audio locks. If this value is too short—especially on slower computers—then it will try to play before it's ready, which will cause a spurt of notes to catch up when it actually starts, the effort of which could also cause sync to give up if the CPU is really overtaxed.
FlywheelAmount=<num>	Integer	5 (∫ second)	This line specifies the SMPTE flywheel time in 1/10 seconds. This is the maximum dropout time length Pro Audio will allow before aborting sync.

GeneralMidiSMFs=<0 or 1>	Boolean	1 (enable)	This line controls whether or not Pro Audio creates a General MIDI setup measure when loading Standard MIDI Files.
LyricTrack=<num>	Integer	3 (track 4)	This line specifies which track is to contain lyrics from Type 0 Standard MIDI files. A zero means track 1, a 1 means track 2, and so on.
MMCDelayMsecs=<num>	Integer	100	This setting specifies the minimum amount of time that must elapse between any two MMC commands. Some MMC gear, including the Fostex MTC-1 and the Tascam SY-88, can get confused unless there is at least a 10-millisecond delay after every MMC command. This can cause intermittent problems on fast machines. Pro Audio corrects this problem with the MMCDelayMsecs=<n> line. The default value is 100 milliseconds, although some experimentation may be required to find the proper value for your system.
MMCPort=<num>	Integer	-1 (all)	By default, Pro Audio will transit MMC commands on all MIDI ports. In some situations it is necessary to limit the number of ports MMC is transmitting on. This line specifies which port MMC is to be transmitted on. The value is 0 based, so a value of 0 means port 1, and a value of 1 means port 2, etc.
MMCPreRoll=<num>	Integer	20 (2 seconds)	This line specifies the MMC pre-locate amount in 1/10 seconds. By default, Pro Audiowaits for two seconds after it starts receiving time code before beginning to playback or record. You can add this line to change the two-second delay.
			If this setting does not exist, the value of the ChaseDelay setting is used. If the ChaseDelay setting does not exist either, then the default for MMCPreRoll is 20.
MMCUseEvent=<0 or 1>	Boolean	1 (enable)	If all MMC features work except for Auto Punch record mode, your equipment probably doesn't support the MMC Event command (consult with the manufacturer if you aren't sure). You can overcome this limitation by adding this line.

SendLocalOff=<0 or 1>	Boolean	1 (enable)	This line determines whether or not Pro Audio should send a Local Control OFF message during startup.
SendLocalOn=<0 or 1>	Boolean	0 (disable)	This line determines whether or not Pro Audio should send a Local Control ON message at exit.
SyncAllowRateTweak=< 0 or 1>	Boolean	1 (enable)	When synching to SMPTE, Pro Audio normally attempts to track the rate of the incoming sync signal, in order to survive dropouts better when the SMPTE source speed is slightly off. Setting this to 0 defeats this. If you have a slower computer and dense work to play, defeating this can result in a small efficiency improvement and also prevent rate-tracking timing inaccuracies when the computer is so busy that it's late processing incoming sync messages.
SysxDelayAfterF7=<0 or 1>	Boolean	1 (enable)	This setting causes Pro Audio to delay Sysx transmission for a certain amount of time if it encounters an F7 in a Sysx bank. This gives some instruments a required amount of delay time that is necessary to process the Sysx transmission. The default delay is 1/18 of a second, but can be changed by also adding the SysxSendDelayMsecs=<n> line (see below). The possible values are 0 and 1. Their significance is as follows: 0: no delay 1: delay between each Sysx string (F0 … F7)
SysxSendDelayMsecs=<num>	Integer	60	This setting causes Pro Audio to delay a specified number of milliseconds if it encounters an F7 in a Sysx bank.
SysxSendPacketSize=<num>	Integer	1024	This line specifies the number of bytes between Sysx transmit delays. Sysx bytes are transmitted in packets, with a 1/18 second delay between each packet. Setting this value smaller will help slower MIDI devices (synthesizers, etc.) avoid overflowing their internal buffers.

| UseCableMetaEvents=<0 or 1> | Boolean | 1 (enable) | This line specifies whether or not Pro Audio should use nonstandard "Cable" meta-events for storing Sysx bank port number into Standard MIDI files (by default, n=1). |

Variables in the [MIDI Input Devices] Section

Variable...	Type...	Default value...	What it does...
MaxInPort=<num>	Integer	15 (16 ports)	This variable determines the maximum number of MIDI input ports. The value is 0 based, so a value of 15 means that the limit is 16 ports.

Variables in the [MIDI Output Devices] Section

Variable...	Type...	Default value...	What it does...
MaxOutPort<num>	Integer	15 (16 ports)	This variable determines the maximum number of MIDI output ports. The value is 0 based, so a value of 15 means that the limit is 16 ports.

AUD.INI

The *aud.ini* file can only be changed using the Windows *Notepad*.

Variables in the [Aud] Section

Variable...	Type...	Default Value...	What it does...
PicCacheMB=<size in MB>	Integer	20	This variable specifies the maximum size of the picture cache. The picture cache is located in the directory specified by the PictureDir=<path> variable (defaults to <Cakewalk Folder>\Picture Cache).
PictureDir=<drive:path name>	Path	<Cakewalk directory>\Picture Cache	This line specifies where to store the picture cache.

F

Appendix F: Presets

The following is a list of presets provided with Pro Audio plug-in audio effects. The FX effects are stereo effects; the CFX effects are mono effects.

FX Stereo Reverb and CFX Reverb

Preset...	Description...
Ambient	Very wet reverb—great for synth pads.
Arena	When applied to several instruments, this creates an arena or stadium type of sound.
Club	Simulates a small club room. Good for sax, rhythm guitar, or percussion.
Concert	Simulates the sound of a large concert hall. Works well on strings.
Cosmos	Billions and billions of tiny echoes. Works best on slow passages.
Infinity	This reverb's long decay time creates a wash of sound.
Room	A short reverb. Adds a room sound to drums or vocals.
Symphonic	Good for orchestral instruments.
Vocal Club Wet	A fairly wet reverb that works well with lead vocals.
Tiled Room	Reverb with that tiled shower sound, very bright and slightly ringy.
Shimmer Verb	A shimmery reverb. Works best with bright sounds.
Jazz Club	A great reverb on acoustic bass and other acoustic sounds for that intimate jazz club sound.
Small Plate	A short plate-like reverb.
Large Plate	A longer plate-like reverb.
Long Bright Ambience	A very bright, somewhat longer reverb for keyboards, synthesizers, and new-age music.
Vocal Warm Hall	A warmer reverb, slightly longer, hall-like.
Vocal Med. Room	A shorter reverb with no early reflections.
Live Stage	A wet bright reverb. Good on acoustic guitars.

FX Stereo Chorus and CFX Chorus

Preset...	Description...
Deep Chorus Guitar	A deep chorus, Fender Jazz-like. Great on bass too.
Vocal Chorus	A solo vocal chorus effect.
Thick Group Vocals	Great for taking a few background voices and creating more of a choir-sized sound.
Thicken	Use this effect to thicken a sound rather than give it an obviously chorused sound.
Slightly Chorused	A definite chorus sound but more subtle than the other effects.
Chorus Slight Flange	Chorused with a subtle flanging. Great on guitars.

FX Stereo Flanger and CFX Flanger

Preset...	Description...
Classic Flange	A classic flange effect.
Deep Flange	A deeper version of Classic Flange.
Crying Flange	A flange with a wailing, crying artifact.
Ducking Flange	A strongly pitched flange with deep modulation.
Sticky Flange	A compressed flange with a comb-filtered sound.
Tremolo Flange	A quickly modulating flange.
Fripp Flange	A wild, distorted flange effect.
Slow Flanger	A slow, smooth flange.
YoYo Flanger	Sounds like a yoyo to me...

FX Stereo Delay

Preset...	Description...
Slap-back 1	A 100 millisecond slap-back delay.
Slap-back 2	A 400 millisecond slap-back delay.
Slap-back 3	A 500 millisecond slap-back delay.
Fast Tremolo Delay	A fast delay with a tremolo effect. Great on guitars.

CFX Delay/Echo

Preset...	Description...
Fast Delay	Good for vocals, especially when mixed with Reverb.
98bpm Delay	Delay time is set at 98 bpm.
120bpm Delay	Delay time is set at 120 bpm.
Fast Tremolo Delay	A fast delay with a tremolo effect. Great on guitars.
Slow Multi-Tap Delay	A slow delay with 5 or 6 taps.
Fast 4-Tap Delay	A fast 4-tap delay.
Trails	A multi-tap pitch modulating delay. Good for those one-time effects in a mix.

FX Pitch Shifter

Preset...	Description...
3rd up	Pitch shift a 3rd up.
3rd down	Pitch shift a 3rd down.
4th up	Pitch shift a 4th up.
4th down	Pitch shift a 4th down.

5th up	Pitch shift a 5th up.
5th down	Pitch shift a 5th down.

FX Time/Pitch Stretch

Preset...	Description...
Vocal 3rd Up	A formant-preserving pitch shift a 3rd up.
Vocal 3rd Down	A formant-preserving pitch shift a 3rd down.
Vocal 4th Up	A formant-preserving pitch shift a 4th up.
Vocal 4th Down	A formant-preserving pitch shift a 4th down.
Vocal 5th Up	A formant-preserving pitch shift a 5th up.
Vocal 5th Down	A formant-preserving pitch shift a 5th down.
Chipmunks	That classic chipmunk sound.
20% Faster Tempo	A template to demonstrate increasing the tempo of an audio file.
20% Slower Tempo	A template to demonstrate decreasing the tempo of an audio file.

FX Stereo Parametric EQ

Preset...	Description...
6dB High pass filter	Slight reduction of low-frequency elements.
6dB Low pass filter	Slight reduction of high-frequency elements.
AC Hum removal	Narrow band pass filter, reducing frequencies around 60Hz by 12dB.
Flat response	No filtering.

CFX 2-Band EQ

Preset...	Description...
60 Cycle Hum	A notch to remove 60 cycle hum.
1 Pole Lowpass	A template 6dB per octave roll-off lowpass. The cutoff frequency is set at 10,000 Hz but can be moved as needed.
2 Pole Lowpass	A template 12dB per octave roll-off lowpass. The cutoff frequency is set at 10,000 Hz but can be moved as needed.
1 Pole HiPass	A template 6dB per octave roll-off hipass. The cutoff frequency is set at 1,000 Hz but can be moved as needed.
2 Pole HiPass	A template 12dB per octave roll-off hipass. The cutoff frequency is set at 1,000 Hz but can be moved as needed.
Partials Boost (Middle C)	An example preset to demonstrate how to boost specific partial(s) in an audio file. This example boosts the fundamental and 1st partial of a Middle C note (fundamental at 261.63 Hz) Very useful for sound-designers needing to tailor multi-samples across a keyboard.
Mid-Range Cut	A wide band frequency range with a 6dB cut. Also useful are narrow bands to reduce or cut an unwanted frequency, such as a ring in a snare drum.

G Appendix G: Summary of New Features

Pro Audio 9 has many important new features to make your work easier and more productive. This appendix highlights the major differences between version 9 and version 8.

AudioX Window

Pro Audio 9 has a new window that lists any of your sound cards that conform to the new AudioX standard (such as the Yamaha DSP Factory). AudioX is a standard that allows sound card producers to write software that makes all of their card's features fully available, and will easily work with any recording software that supports the AudioX standard. To open Pro Audio's AudioX window, choose ***View-AudioX***. See the on-line help or your soundcard's documentation for more information about AudioX. AudioX appears in the View menu only if you have at least one AudioX driver installed.

Reduced Audio Latency

Cakewalk continues to enhance Pro Audio's audio performance. Pro Audio 9's latency figures compare favorably with those of all major audio applications.

Piano Roll Supports Multiple Track Editing

Pro Audio 9's Piano Roll view can now display multiple tracks for editing, and has a new Track List pane to control which tracks are being edited and displayed. For more information, see "Working with Multiple Tracks in the Piano Roll View" on page 6-7

Stereo Tracks

Pro Audio 9 now allows you to store and process stereo audio data in a single track. You can even put stereo audio data into tracks that contain mono data.

Guitar Fretboard Display, Tablature, and Tuner

Pro Audio 9 has a host of new features for guitar players, including real-time fretboard display of MIDI guitar tracks, guitar tablature, and a guitar tuner. You can enter and edit notes and chords from the Fretboard or TAB displays. You can export tablature to ASCII TAB distribution on the Internet. For more information on tablature, see "Tablature" on page 8-29.

Session Drummer

Pro Audio 9 has a new MIDI plug-in called Session Drummer that enables you to instantly add some realistic drum grooves to your projects, or just to play along with. For more information, see *Appendix H: Session Drummer*.

Export to MP3 and RealAudio

Pro Audio 9's mixdown features offer greatly enhanced capabilities:

- Export to MP3

- Export to RealAudio G2 (with optional inclusion of RA 5.0-compatible stream)

- Export to Windows Media Technologies 4.0

- Mixdown entire tracks or just the current selection (between From and Thru times)

- Options to include/exclude FX, volume and pan envelopes, and controller automation in mixed-down audio

For more information about exporting audio, see "Mixing Down and Distributing Audio" on page 9-29.

FX Bin in Track View

Pro Audio 9 has a new Effects Bin in the Track view. You can now add audio or MIDI effects to individual tracks without leaving the Track view.

CPU Meter and Disk Meter

Pro Audio 9's Status bar now includes a CPU meter, a disk meter, and a dropout indicator to instantly display audio performance and resources.

NTONYX Style Enhancer MIDI Plug-in (Micro 1.28 Lite Version)

The NTONYX Style Enhancer uses performance modeling to give MIDI tracks a more human feeling. The Style Enhancer models a wide variety

of musical styles that you can apply to any selected MIDI data. For more information, see the online help.

Global Toolbar to Mute, Solo, or Arm Tracks

Pro Audio 9 has a new toolbar that enables you to mute or un-mute, solo or un-solo, and arm or unarm all tracks at once. It's called the Solo toolbar and you display it by choosing ***View-Toolbars*** and clicking Solo.

More Reliable Clip Indicators

Pro Audio 9 provides sample-accurate input clipping indicators. Pro Audio 9's clipping indicators illuminate at a point slightly below 0dB, specifically at 0.1dB below the threshold of 0dB.

Apply Audio Effects Button

The new Apply Audio Effects button lest you destructively apply an audio track's effects to the track, thereby freeing up CPU resources for more tracks and/or effects. For more information, see "To Apply Multiple Audio Effects Offline..." on page 9-19.

Pick Track Button Enhancement

The Pick Track button now has a drop-down arrow on its right side that displays the Next Track/Previous Track menu.

Record Mode Saves with Each Project

In Pro Audio 9, when you save a project you also save the particular record mode (sound-on-sound, overwrite, etc.) that you chose for that project.

Open Patch Browser Directly from Track and Console Views

In Pro Audio 9, you can open the Patch Browser from the Track view by Right-clicking in the Bank or Patch columns, or from the Console view by Right-clicking a patch name or bank button in a MIDI track module.

Enhanced Patch Browser

See the bank each patch belongs to, as well as the patch number. You can sort patches by bank, patch name or patch number in either ascending or descending order.

Real-time Tempo Adjustment

In Pro Audio 9, you can use the spin buttons on the tempo dialog box to change tempo and hear the results immediately.

Minimum Clip Width

This viewing option in the Clips pane ensures that even the smallest clip is visible enough to edit. For more information, see "Displaying Clips" on page 5-6.

Must Arm Tracks to Record

Pro Audio 9 requires you to specifically arm at least one track to start recording. This ensures that you don't accidentally record data to the wrong track. However, there is an option to allow MIDI recording without an armed track available in the ***Options-Global*** General tab.

Reorganized Menus

The Tools menu has been split into two separate menus--Tools and Options. The MIDI Devices command, Audio Options, and all options-type menu choices are now in the Options menu.

Tools-Run CAL Command Moved to Edit Menu

The Run CAL command has moved from the Edit menu.

Play List Easier to Use

In Pro Audio 9, you can start or stop playback of a Play List by pressing the Spacebar. Pro Audio 9 gives you several other keyboard shortcuts as well as saved screen layouts.

Right-click Opens Snap to Grid Dialog Box

Now either Shift-clicking or Right-clicking opens the Snap to Grid dialog box.

Smooth Audio Scrubbing

The Scrub tool allows you to emulate the "rocking" of an analog reel-to-reel tape.

AmpSim Lite Plug-in

A lite version of the AmpSim plug-in gives you several classic amplifier sounds.

H

Appendix H:
Session Drummer
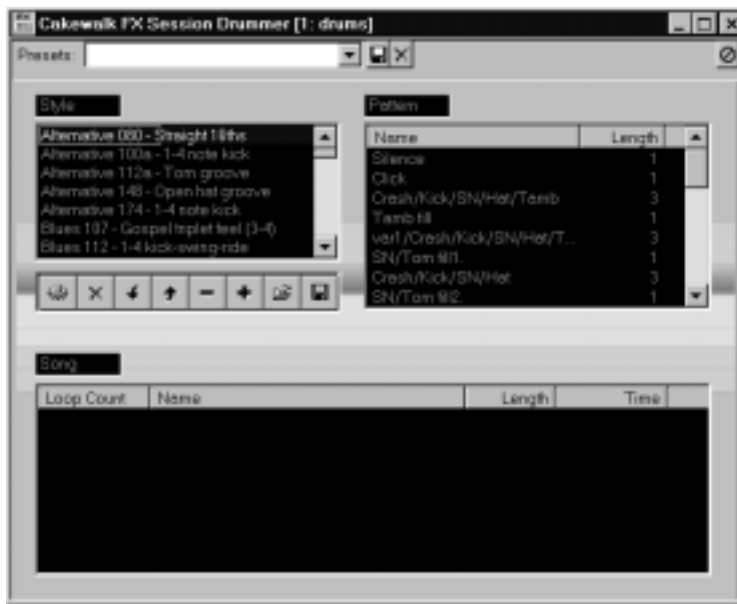
The Session Drummer is a MIDI Plug-in that allows the user to select, arrange and then play a MIDI drum pattern within a song in Cakewalk. It is as simple to use as standard drum machine, but, unlike the hardware device, it works within the program so no syncing is required. It uses standard MIDI files, so users can easily create and add new patterns and styles. And, best of all, users do not have to compose their own drum parts before doing their projects.

The Session Drummer can quickly generate drum parts for practicing, composing, or just playing. The MIDI drums can play back on the internal sound card, or out the MIDI port to any compatible MIDI device.

Style

Various drum patterns representing different styles of music. The choices in the Pattern section vary according to which style you choose in the Style section.

Pattern

A variety of patterns appear in the Pattern section based on the Style.

Song

The drum parts you have selected in the Pattern section and added using the ![icon] button. When you have finished a song you can save your song as a preset or create a MIDI drum track in your project.

Note:

If you do not save the song, it will be lost the next time you open the project.

Clear a Song

Click the ![icon] button to clear all the patterns from the Song section.

Move Down

Select a pattern in the Song section and click ![icon] to move that section down one position.

Move Up

Select a pattern in the Song section and click ![icon] to move that section up one position.

Remove Pattern from a Song

Select a pattern in the Song section and click ![icon] to remove it from the song.

Add Pattern to a Song

Select a pattern in the Pattern section and click ![icon] to add it to the song section. Use the ![icon] and ![icon] buttons to put the new pattern in its proper place in you song.

Load Song from a File

Click ▣ to select from a list of previously saved drum tracks. In the Open dialog, select the drum track you want to open and click OK.

Save Song to a File

Click ▣ to save the set of patterns in the Song field. In the Save dialog, enter a name for the drum track and click OK.

Presets

Once you have made changes in the Settings dialog, you can save them as a preset for use with future projects. See Saving Your Settings as a Preset for more information.

The Settings Dialog

Click ▣ to open the settings dialog. From here you can select the source folder for the drum style/patterns. This feature allows you to organize your patterns into different folders and still have access to them from within the plug-in. You aren't limited to a single folder.

In addition, the settings dialog also includes a drum map. This allows you to map the General MIDI (GM) patterns to non-GM instruments.

You can only use Standard (type 0) MIDI files with Session Drummer.

To Change a Mapping...

1. Click ▣ to open the Settings dialog.

2. Select a mapping from the list.

3. Press the '+' key to move the map value up (from B4 to C5, for example), or press the '-' key to move the map value down (from C5 to B4, for example).

You can save your changes as a preset for use with future projects.

To Set the Port, Channel and Directory...

1. Open the Settings dialog.

2. Select the Port or Channel from their drop-down lists, or use the Browse button next to the Content Folder field to set the content folder.

3. In Session Drummer, enter a name for the new mapping in the drop-down list.

4. Click the 🔲.

Note: If you do not select an output port, the default port is set at 1

To Save as a Preset...

1. Click 🔲 to open the Settings dialog.

2. Make the changes you want in the Settings dialog and click OK.

3. In Session Drummer, click in the Preset field and enter a name for the current settings.

4. Click 🔲 to save the Preset for future use.

Default Settings

The following is a list of the default settings in the Settings dialog:

Port
The default port is 1.

Channel
There is no default channel set.

Instruments Drum Map

Note #	Note Name	Name	Note #	Note Name	Name
35	B2	Acoustic Bass Drum	59	B4	Ride Cymbal 2
36	C3	Bass Drum 1	60	C5	Hi Bongo
37	C#3	Side Stick	61	C#5	Low Bongo
38	D3	Acoustic Snare	62	D5	Mute Hi Conga
39	Eb3	Hand Clap	63	Eb5	Open Hi Conga
40	E3	Electric Snare	64	E5	Low Conga
41	F3	Low Floor Tom	65	F5	High Timbale
42	F#3	Close Hi-Hat	66	F#5	Low Timbale
43	G3	High Floor Tom	67	G5	High Agogo
44	Ab3	Pedal Hi-Hat	68	Ab5	Low Agogo
45	A3	Low Tom	69	A5	Cabasa
46	Bb3	Open Hi-Hat	70	Bb5	Maracas
47	B3	Low-Mid Tom	71	B5	Short Whistle
48	C4	Hi-Mid Tom	72	C6	Long Whistle
49	C#4	Crash Cymbal 1	73	C#6	Short Guiro
50	D4	High Tom	75	D6	Long Guiro
51	Eb4	Ride Cymbal 1	75	Eb6	Claves
52	E4	Chinese Cymbal	76	E6	Hi Wood Block
53	F4	Ride Bell	77	F6	Low Wood Block
54	F#4	Tambourine	78	F#6	Mute Cuica
55	G4	Splash Cymbal	79	G6	Open Cuica
56	Ab4	Cowbell	80	Ab6	Mute Triangle
57	A4	Crash Cymbal 2	81	A6	Open Triangle
58	Bb4	Vibraslap			

Deleting a Preset

To delete a preset, select the preset from the drop down menu and click the button (to the right of the disk button).

To Write a Song to a Track...

1.   Arrange patterns the way you want.

2.   Open the Track view.

3.   Patch Session Drummer into a track and create a song.

4.   Select the track.

5.   Open the Console view and click 🔲.

     A dialog appears asking if you want to remove the plug-in from the track insert. Removing the plug-in prevents duplicate notes from playing.

6.   Make sure the Delete the effects from the track inserts checkbox is checked and click OK.

     The contents have been added to the track. Session Drummer data always begins one measure into the track regardless of the Now Time

Using Session Drummer in Real-time

To Apply Session Drummer as a Real-time Effect...

1.   Start a new project.

2.   Open the Console view.

3.   Right-click in the Aux bus and choose Add MIDI Track.

     A new module appears in the Console view.

4.   Right-click in the Effects Patch area (the black window directly below the track name field in Console view) and select Cakewalk FX/Session Drummer.

5.   Double-click on the Session Drummer plug-in.

6.   In Session Drummer, choose a Style and select drum patterns to create a song.

7.   Click the Play button on the Transport toolbar.

The drum track repeats, like a drum machine, as long as the play button is engaged. Open the Session Drummer template from the New Project dialog to save a few steps (1-4 above).

Arranging Patterns Into a Song

Playing patterns from the pattern pane is as easy to use as a drum machine. However, at some point you may get bored hearing the same pattern over and over again. This is where the Song pane comes in. You can add patterns to the song pane, control how many times and in what order they play. When you are finished, you can save the arrangement as a preset, or you can print the contents into the track.

To Create a Song...

1. Open Session Drummer.

2. Select a style from the Style pane.

3. Double click on a pattern in the pattern pane to move it to the song pane. You can also use the ⊞ button in the toolbar.

4. Click the Loop count field and type a + or – key to set the number of repetitions.

5. Add other patterns using step 3

6. Re-order a pattern by selecting it and clicking the ⬆ or ⬇ buttons.

    The contents have been added to the track. Session Drummer data always begins one measure into the track regardless of the Now Time

When you click play in the transport toolbar, the arrangement of patterns that you just added to the song pane will play back in order. A dotted box shows you which pattern is playing so you can follow along.

To remove a pattern from the song pane, select it and click the ⊟ button or hit the Delete key. To remove all patterns from the Song pane, click the ✖ button in the toolbar.

Creating Drum Styles for the Session Drummer

The Session Drummer supports standard Type 0 MIDI files so that you can easily create or add new styles and patterns to it. Patterns are stored in a single track (10) and are separated by Markers. When you see the patterns listed in the Session Drummer, what you are really looking at is

a list of the markers in file. These patterns are stored in a single file, called a style file. The file name that is used when saving a style file is what will appear in the style pane of the Session Drummer. A quick way to familiarize yourself with this is to open one of the drum style files using Pro Audio's Open command.

To Create a Style for Session Drummer...

1. Create or locate a single track drum pattern that is voiced for General MIDI.

2. Arrange patterns in a track, making sure to align them to the first beat of each measure.

3. Create and name one or more markers aligning them with the beginning of each measure.

4. Save the file as Type 0 MIDI file in the content directory of your choice.

This file name will appear in the Style pane of Session Drummer.

To Create a Style from an existing pattern...

1. Open a New Project.

2. Choose an appropriate tempo.

3. Locate the desired pattern, then copy and paste it at 1:1:000 in the Track view.

4. Position the now time at 1:1:000.

5. Click on the Insert Marker button from the toolbar or press the F11 function key.

6. In the Marker dialog, type a name the represents the pattern and click OK.

7. Save the file in the Drum Style directory (or your own directory) using the name as you would like it to appear in the Style pane.

When you open the Session Drummer, you should see your new style pattern. Click on it and you will now see the pattern you just created. Now click on the pattern to select it and then click play from the Transport toolbar.

Since the Session Drummer plays the pattern over and over, it is extremely important that the pattern loops correctly. You can check this before you save your Style pattern by selecting the clip in the track view and looping it using the loop toolbar.

Guidelines

- Patterns should be voiced for General MIDI and be contained on a single track

- Patterns can be of any length

- Patterns must include a marker, located at the beginning of the pattern.

- Make sure that the pattern is aligned to a measure. Setting the snap to button to 1 measure is helpful to ensure this.

- Make sure that the beginning and ending of the pattern does not cross measure boundaries. Remember that the Session Drummer will loop and you want it to loop on measure boundaries.

- Make sure that the volume of the pattern is constant, with no volume increase or decreases.

Drumtrax Style files in the Session Drummer

Experiment with sounds

A Hip Hop or a Rap tune may require different drum sounds than a country song or a rock ballad. Above all, experiment – a groove played on an acoustic drum set takes on a whole new flavor when played on World kit.

Be creative

- Don't limit your groove selection to a specific category. Most of the grooves can be used in many different styles of music. For example, many of the Hard Rock patterns can interchanged with the Alternative patterns.

- Experiment! Speed up or slow down tempos; chain or loop sections using the Session Drummer's Song arrangement feature.

- Change Instrument Sounds.

- Once you have printed a Session Drummer part to the track, try removing instruments from the Piano Roll view to strip down the groove

- Overdub your own parts over the patterns

Defining the Arrangement

Many styles of modern music feature several different musical sections (verse, chorus, bridge etc.). The rhythm arrangements can be changed or altered (slightly or drastically) to help distinguish these different sections. Here's a few very basic ideas among the thousands that are commonly used:

- Use a different groove variations for different sections

- Use tom fills and cymbal crashes to introduce sections and for accents.

- Introduce new percussion parts to help "lift" the chorus (congas, snare drum accents, ride cymbals, etc.).

- Try switching from a hi-hat part in the verse to ride cymbal in the chorus.

- Try using a side-stick sound on the verses and switch to a snare on the chorus

Looping Measures

One quick and simple way to begin designing your drum arrangement is to loop a few measures into a song-length groove. You can easily loop patterns in the Session Drummer from the Song pane. Once you have mapped out your song with other instruments, go back to the drum arrangement and replace the looped patterns with other groove variations, fills, intros and endings.

Adding Fills

One of the nice things about using a VAMTECH Drumtrax pattern is that a real drummer played the kit that created the pattern. But what if you decide to add something over it like a tom fill? Try deleting the hi hat or snare drum in those measures to make the section sound more "real."

Regarding Tempos

The tempos of individual sequences were determined when they were originally played by the live drummer, so they sound great at their recorded tempo. Nevertheless, don't be afraid to try them at different tempos. The recorded tempo is included in the Session Drummer Style name. For example, the style Alternative 080 was originally recorded at a tempo of 80 beats per minute.

Quantizing

These grooves have been played in by real drummers; thus, they feature subtle variations in timing and velocity that give them a natural feel. Quantize with care.

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