



Logic Pro 7
Reference Manual

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Recent years have seen a revolution in the use of personal computers for creating music.

Music projects that until recently would have required an array of professional studio equipment can now be completed in a home or project studio, using a personal computer and readily available resources. A personal computer with a fast processor and enough RAM can now serve as a workstation for recording, arranging, mixing, and producing complete music projects, which can be played back on the computer, burned on a CD or DVD, or distributed over the Internet.

What Is Logic?

Logic is an integrated system for composing, producing, and scoring music, built specifically for Mac OS X. Musicians can create professional sounding original music compositions, royalty-free soundtracks for Final Cut Pro video projects, and more. Logic allows you to build musical arrangements using MIDI and software instruments alongside audio recordings of acoustic instruments, vocal performances and prerecorded audio files.

You can freely combine and arrange loops plus MIDI and software instrument parts in Logic's Arrange window, add professional-quality effects, mix your music in stereo or Surround, and export the final mix to one or more standard audio file(s) or an audio CD that can be played on any multimedia-equipped computer, home stereo or imported into Final Cut Pro or other applications.

Logic includes the following features, amongst many others:

- Record MIDI information via connected MIDI input devices, such as keyboards, and play back this information via any connected MIDI device or Logic's integrated software instruments.
- Create, arrange, and edit MIDI projects, and print out musical notation via a printer connected to your computer.
- Digitally record acoustic and electric instruments or vocal performances into your projects, and process these audio recordings with Logic's in-built real-time effects.

- Make use of the integrated software instruments, including; Sculpture, Ultrabeat, ES1, ES2, EVP88, EVB3, EVD6, and EXS24 or third-party Audio Unit instruments.
- Load songs or channel strips from Apple's *GarageBand* application, and edit them, making use of the additional processing and editing possibilities afforded by Logic.
- Mix your MIDI and audio tracks, including effects and software-based instrument settings, via a sophisticated total recall mix automation system. Logic includes high-quality effects plug-ins that you can use in your projects. You can also install third-party effects in the Audio Units plug-in format.
- Bounce all audio data, including effects and mix automation settings, to a stereo (or multiple Surround format) file(s) for mastering or further processing.
- Work in real time: You can work on Logic projects in real time, adding, and editing audio and MIDI parts while the project is playing, and hear the results of your changes immediately.
- Use existing loop libraries: Logic directly supports Apple Loop files, and is compatible with a wide variety of existing audio file types, including those created in ReCycle.
- Locate and preview files easily: The Project Manager and Apple Loop Browser, parts of the Logic interface, provide powerful file browsing and search features, making it easy to locate loops by instrument, genre, mood, or other search criteria.
- Mix Apple Loops recorded at different tempos and keys: Logic automatically matches loops to the project tempo and key, allowing you to freely combine loops from different sources in a single project.

About this Manual

This book is the final arbiter on all things in Logic, and covers all areas of the program in detail.

You will find descriptions of the most essential aspects of Logic's interface, commands, and menus in the *Using Logic* chapter. These descriptions are often paired with instructions or examples for accomplishing specific tasks.

Chapter 2 discusses the use of Logic's Transport functions and covers the navigation of your Logic projects.

The following chapters will provide you with an overview and complete description of all parameters and functions available in each of Logic's editing and file handling windows. You will learn how to make use of the arranging, recording, and editing facilities available—for MIDI and audio data—in these chapters.

Later chapters discuss mixing, automation, and Logic's preferences, Song settings and synchronization options.

The Onscreen Help system—accessible from Logic’s Help menu—is fundamentally the Reference Manuals in electronic form. It has the advantage of being at your fingertips when you need it, and is also searchable.

Even if you’re the type who just doesn’t like reading manuals, we ask that you read the next section. It will provide you with essential information on the basic operation of Logic’s interface.

Please note that all topics described herein were accurate at the date of printing. For up to date information on changes or additions made after printing, please refer to the *Late Breaking News* on the Logic DVD, and/or to the *Update Info*, included with each Logic update.

Conventions of this Manual...

Before commencing, we’d like to cover the following conventions used in this manual.

Menu Functions

For functions that can be reached via hierarchical menus, the different menu levels are described as follows: *Menu > Menu entry > Function*.

Important Entries

Some text will be shown as follows:

Important: Information on function or parameter.

These entries discuss a key concept or technical information that should, or must, be followed or taken into account. Please pay special attention to these entries.

Notes

Some sections provide additional information or tips that will assist your use of Logic. These are displayed as shown below:

Note: Information on function or parameter.

Key Commands

Many Logic functions can be activated or accessed with key commands—computer keyboard shortcuts. The key commands mentioned in this guide are based on the standard Key Command Set, assigned by the Logic Setup Assistant. Where possible, we have also included the standard Key Commands for PowerBook users. These are based on the PowerBook Key Command Set, assigned in the Logic Setup Assistant.

The following chapter will guide you through Logic's basic interface elements, file handling options and common input techniques.

You will also learn about a number of shortcuts and features that will accelerate your workflow, and assist you while learning about Logic.

Using the Mouse

The mouse can be used in the following ways in Logic:

Clicking

Place the mouse pointer on the object (button, input field and so on) and press the mouse button once.

Double-clicking

The same as clicking on an object, but you press the mouse button twice, in quick succession. You can set a suitable interval between clicks in the System Preferences (Keyboard and Mouse pane).

Grabbing or Clicking and Holding

The same as clicking on an object, but you keep the mouse button held down.

Moving or Dragging

Grab the object, and move the mouse (keeping the mouse button held down) to the desired position.

Mouse Wheel Events

You can use the mouse wheel to scroll vertically in Logic. There are also some modifiers supported:

- If you press Command, the mouse wheel can be used to scroll horizontally.
- If you press Option, the mouse wheel can be used to zoom in/out vertically.
- If you press Option-Command, the mouse wheel can be used to zoom in/out horizontally.

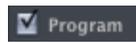
- If you press Option-Control, the mouse wheel can be used to zoom in/out in both directions.

Note: Logic also supports mice with two wheels. The second wheel works like the first wheel, but with interchanged axes.

Input Options

This section discusses the various methods available for interaction with parameters, and data entry tasks.

Mouse Input Checkboxes



Checkboxes are square boxes that are “checked” when you click them, in order to activate an option (or function). Click the checkbox a second time to remove the “check”, and deactivate the option.

Pull-down Menus



Pull-down menus open when you click-hold on certain input fields or buttons. You can select a function from within such menus by highlighting the desired item with the mouse, and releasing the mouse button. If you wish to select an item that is outside the visible section of the menu,

- move the mouse over the top or bottom edge of the menu; the further you move it, the faster you will scroll through the menu.
- hold down Shift as you do this. You can then release the mouse button, and use the scroll bar to the right of the pull-down menu to browse. When the mouse reaches the entry you wish to use, release Shift.

Mouse as Slider

You can set most numerical parameters (even note values or names) by grabbing the parameter value, and moving the mouse up or down. If the parameter consists of several separate numbers (song position, for example), you can adjust each number individually using this method.

Using the Mouse for In/Decrementing

Nearly all parameter values that can be set using the mouse as a slider (and even some of the pull-down menu parameters) may also be increased or decreased in single units by clicking on the top or bottom half of the value, while holding down Control.

Numerical Input



Double-clicking on a numerical parameter value opens an input field. The existing value is highlighted, and ready to be overwritten by a new entry. You can also use the mouse to make a partial selection in an input field, so that only the highlighted part is overwritten. As long as the input field is open, the computer keyboard may only be used for data entry, and may not be used for key commands (with the exception of the main menu functions).

Arithmetical Operations

You can enter numbers at any time by typing in an arithmetical operation: "+2" or "-5"; for example, which changes the current value by/to that amount.

ASCII Code

You can also input numbers as ASCII code: just place a ` or " in front of the selected key, and the ASCII code will be input as a number. As an example:

- "`! results in a value of 33
- `"a results in a value of 97

This function is particularly useful for entering text in SysEx strings.

Cancel Numerical Input

Direct numerical input can be canceled by entering no text at all and pressing Enter or Return.

Text Input

You can input text names in the same way as numbers, but you only need to click a name field once to allow input. You can directly click on an object with the Text tool to rename it.

Numbered Names

Any number of selected Objects or Regions can be assigned same name. If the name ends with a number, this number will automatically be incremented by 1 for each subsequent Object or Region. This allows you to quickly, and uniquely, name all of the Regions on a track or all of the Fader Objects in the Environment, as examples.



Note: To turn off automatic numbering, place a space after the number at the end of the Object or Region name. All selected Objects and Region will then end in the same number.

Tools and the Toolbox

Logic allows recorded data to be handled graphically. This means that you don't need to input instructions in command lines in order to perform operations, but rather, do so by manipulating graphical "objects". This is done with the help of Tools (see "The Tools" on page 18). Each edit window provides different Toolboxes that are suitable for the tasks performed in the editor.

The Arrange window Toolbox looks like this:



When editing objects graphically, you always have two tools available at the mouse pointer position: one is already active, the other is activated by holding down Command.

You can change the currently active tool by clicking on another tool in the Toolbox. The mouse pointer then adopts the shape of the tool you clicked on, allowing you to instantly identify the active tool by looking at the cursor graphic: the Eraser is used for deleting, the Scissors for cutting and the Glue Tool for merging Regions, as examples. To assign a tool to Command, click on the desired tool in the Toolbox, with Command depressed.

If you have a suitable mouse, you can also assign the right mouse button to a third tool, allowing the use of three assignable tools:

- left-click
- Command- (left) click
- right-click

Note: You can also assign the Toolbox to the right mouse button with the *Global > Editing > Right Mouse Button Opens Toolbox* preference. This allows you to open the Toolbox at the mouse cursor position by right-clicking anywhere in the working area of the open window.

Tools are only effective in the working area of the window in which they were selected. You can define individual tools for each opened window.

A tool (the Scissors, for example) basically affects the Objects or Regions that you click on. If multiple Objects or Regions are selected, they will all be affected by the tool (the Scissors would cut all selected Regions at the same song position, for example).

Note: The Toolbox can be hidden in the Arrange and Score Editor windows to save onscreen space, which can be very helpful if you only have a small monitor. The function is accessible via the *View > Toolbox* menu option.

Selecting Tools

You select the tool you wish to use by clicking on it (with the left or right mouse button) in the Toolbox (or clicking while holding down Command for the alternate tool).

Note: You can use the *Set next Tool* and *Set previous Tool* key commands to switch to the neighboring tool in the top window.

Opening the Toolbox at the Mouse Position

Use the *Show Tools* key command (default: Esc) to open a Toolbox at the mouse position. When a Toolbox is opened at the mouse position, you can also use one of the number keys to select a tool. The tools are always numbered from left to right and top to bottom. Press the *Show Tools* key command a second time to switch to the pointer, and close the Toolbox.

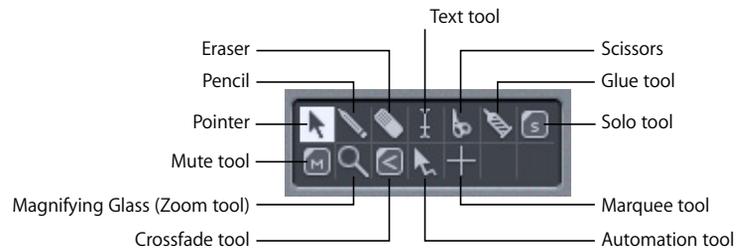
Using Key Commands

Each tool can be selected via a specific key command. Key commands that switch to a specific tool toggle between this tool and the previously selected tool.

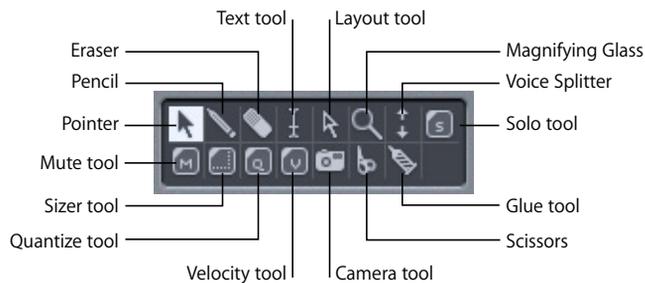
The Tools

Here are two example Toolboxes, which contain most of the tools available in Logic:

Arrange Toolbox



Score Toolbox



All tools, including a number of tools not displayed in the images, are described below. As mentioned earlier, some tools are specific to certain editing windows.

Pointer

The Pointer is the default tool. The mouse also takes on this shape outside the working area when making a menu selection or inputting a data value. Within the working area, the pointer is used for selecting (by clicking on Objects or Regions), moving (by grabbing and dragging), copying (by holding down Option and dragging), and editing lengths (by grabbing the bottom right corner and dragging). Grabbing and dragging anywhere on the window background activates a “rubber band,” that allows the selection of multiple Regions or Objects.

Note: When changing the lengths of multiple Regions, you can make all lengths equal by holding Shift-Option.

Pencil

The Pencil is used to add new Regions. You can also select, drag, and alter the length of Regions while the Pencil tool is active.

Scissors

The Scissors tool is used to split Regions, allowing individual sections to be copied, moved or deleted.

Text Tool

The Text tool is used to name Regions, or add text to a musical score.

Layout Tool

The Layout tool is used to graphically move events in the Score Editor, in order to optimize the display (bars to lines: “Local Formatting,” for example), without altering the timing of the actual MIDI events.

Sizer Tool

The Size tool is used to adjust the size of graphic elements in the score. It looks similar to the bottom right corner of a Mac window, which is also used for resizing tasks.

Magnifying Glass

The Magnifying Glass allows you to zoom in on a “rubber-banded” section, up to the full window size. You can revert to the normal zoom level by clicking on the background with the tool. You can also access this function when other tools are selected by holding down Control.

Solo Tool

Click-holding on a Region with the Solo tool allows you to listen to the selected Regions in isolation during playback. Moving the mouse vertically also outputs any events the cursor touches, even when the sequencer is stopped.

Mute Tool

Clicking on a Region with the Mute tool prevents it from playing. A dot is placed in front of the Region name (and the Region is shaded if the *Preferences > Display > Arrange > Muted Regions are textured* preference is active), to indicate that it is muted. You can unmute the Region by clicking on it again with the Mute tool. If multiple Regions are selected, the setting of the clicked Region applies to all selected Regions.

Finger Tool

The Finger is used to alter note lengths in the Matrix Editor. In the Marker List window, it is used to jump to markers, and simultaneously reposition the locators to the marker position.

Eraser Tool

The Eraser deletes selected Regions and Objects. When you click on an Object or Region with the Eraser, all of the currently selected Objects and Regions are deleted (as if you had used Backspace).

Glue Tool

The Glue tool performs the reverse operation of the Scissors tool. All selected Regions are merged into a single Region, which is assigned the name and track position of the first Region on the time axis.

Crosshair Tool

The Crosshair is used to input a linear series of MIDI events in the Hyper Editor.

MIDI Thru Tool

Clicking on an instrument in the Environment with the MIDI Thru tool assigns the instrument to the selected track in the Arrange window, thereby making it the active MIDI Thru instrument.

Voice Splitter Tool

You can separate polyphonic voices onto different staves in the Score Editor by drawing a dividing line with the Voice Splitter tool (provided you are using a polyphonic score style).

Camera Tool

The Camera tool is used to select, and export, sections of the Score Editor display as graphics files.

Quantize Tool

The Quantize tool is used to correct the timing of MIDI note events in the Matrix and Score Editors.

Velocity Tool

You can use the Velocity tool to change the velocity of notes in the Matrix and Score Editors.

Automation Tool

This Automation tool performs a number of Automation tasks. When Track Automation is activated via the *View > Track Automation* menu option, a pull-down menu below the Toolbox allows you to define the functionality of the tool.

Marquee Tool

The Marquee tool allows you to select portions of a Region in the Arrange window. The selected area can then be subsequently edited with other tools.

Help Tags

A help tag appears just below the mouse cursor position—for as long as the mouse button is held down—when using many of the tools. The help tag provides useful feedback about the type of operation you are performing.

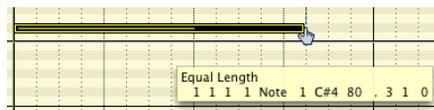
Important: You must enable the *Preferences > Display > Show Help Tags* option in order to view help tags during editing operations.

During operations involving Regions, the help tag will look something like this:



From left to right (and from top to bottom), the values indicate: (name of) operation, mouse (or Region) position, Region name, track number, and length of the Region.

During operations involving events, the help tag looks something like this:



From left to right, the values indicate: (name of) operation, mouse (or event) position, event type, event MIDI channel, first data byte (note pitch, for example), second data byte (note velocity, for example), and event length (note length, for example).

Window Functions

The basic functions of the Logic windows are the same as those in other Macintosh applications. The display options available in Logic's windows are far more extensive, however, than those of other programs.

In Logic, you can open different combinations of windows (even several of the same type) and adjust each one individually. All open windows in a song are constantly updated. This means that the windows update to follow the song position, and any alterations made in one window immediately update the display of all other windows you are working with. It is also easy to save different window arrangements (called "Screensets"), and recall them with the push of a button.

Working with Windows

Opening Windows

All Logic windows can be opened from the Windows menu. The corresponding key command (*Open Arrange*, Command-1, for example) is displayed beside each menu item, allowing you to open the window without using the mouse. You can open as many of the same type of window as you like.

The *Toggle ... Window* key commands allow you to define one key command to:

- bring an open window (of an assigned type) to the front,
- open a window of the assigned type,
- close a window of the assigned type, if it is in front (the active window).

Setting Window Size

You can adjust window size by dragging the lower right-hand corner of the window, as with any window in the Finder.

Window Buttons



The three buttons found at the top left of all windows (except the Transport) perform the following operations:

- Left button (black dot): closes the window.
- Center button (minus sign): minimizes the window, and places an icon on the Dock. The window can be restored by clicking on the icon in the Dock.
- Right button (plus sign); resizes the window to the maximum screen size. A second click on the icon will restore the original window size.

Moving Up One Level in the Display Hierarchy

Clicking the button featuring the square graphic (Up One Display Level button—or UDL button) in the top left corner of the window takes you to the next (higher) display level.



Note: Double-clicking on the background of the edit area of a window also takes you to the next highest display level.

Display Levels in the Editors

Normally, the editors are at the lowest display level, which shows individual events. Clicking the UDL button, at the upper left corner of the editor window, allows you to move up one level in the hierarchy. As an example, if you are currently looking at the events in a MIDI Region inside a folder, the display will switch to a view of the MIDI Region in the parent folder.

In the Matrix and Hyper Editors, this step up the display hierarchy means that you will then see an Arrange window. In this scenario, a change to the lowest display hierarchy level will cause the relevant editor to reappear. At the Arrange level, you will see the local menus of the Matrix or Score Editors, which also contain all of the Arrange window functions. Double-clicking on a MIDI Region opens the Hyper, Matrix, Score Editor, or Event List display of the contents of the MIDI Region. Use of this facility, in conjunction with the UDL button allows you to quickly switch to another MIDI Region, and edit its contents.

Clicking the UDL button in the Event List moves you up one level in the hierarchy, just like the other editors. In the Event List, however, the form of the display remains the same but instead of a listing of individual events, you'll see a list of Regions—along with their position, name, track number, and length. The MIDI Region that you were just editing will be selected in the list of Regions.

Once again, double-clicking on a MIDI Region (or using the *Go Into Folder or Region* key command) takes you back to the lowest display level, showing the contents of the MIDI Region.

Double-clicking on an Audio Region opens the Region in the Sample Editor.

In the Score Editor, clicking on the UDL button, or double-clicking on the background takes you to the higher display level. Unlike the other editors, individual events can also be edited while in higher display levels in the Score Editor. Double-clicking on a staff (at an empty point), takes you back to a lower display level.

Selecting the Working Area

The scroll bars are situated at the right and bottom edges of a window, if you can only see a portion of the total working area in either the vertical or horizontal dimension.

You can move the visible section by clicking the arrows, or grabbing and dragging the scroll slider. There are two points of note:

- The size relationship of the scroll slider to the entire scroll bar corresponds to the size of the visible section of the window, in relation to the overall window size.
- The visible section changes as you move the scroll slider.

The X/Y scroll element is situated at the bottom left corner of the window. By grabbing and dragging it, you can move the horizontal and vertical window section, as if you were dragging both scroll bars simultaneously. When the cursor hovers over the X/Y scroll element, a crosshair icon with four arrowheads is displayed.



You can also engage the X/Y scroll feature by holding down a third button (the mouse wheel button, for example), and moving the mouse. The distance of the mouse pointer position from the initial clicked position determines the scrolling speed.

Note: Touching the background of the Arrange Window while holding Shift-Control also allows you to scroll the window both horizontally and vertically.

Use the *Page Up*, *Page Down*, *Page Left*, and *Page Right* key commands to scroll one page up, down, left, or right, as if you had clicked in the grey region (in the scroll bar) above/below the vertical scroll slider, or to the left/right of the horizontal scroll slider. The *Page Top*, *Page Bottom*, *Page Left most* and *Page Right most* key commands move the visible section of the working area to the top, bottom, left, or right, just as if you had grabbed one of the scrollers, and moved it to one of its extreme positions.

In the Arrange window, Event List, Hyper, and Matrix editors, *View > Scroll To Selection* allows you to move the visible window section to the first set of selected events. This function is available as a key command in the *Arrange and Various MIDI Region Editors* area. The key command works in the currently-active window.

Closing Windows

You can close windows by clicking on the close symbol at the top left. If you hold down Option as you click, all windows of the active song will be closed. Holding Shift while clicking closes all windows of all currently loaded songs.



Zooming

The Zoom sliders are used to zoom in and out of the working area display. Selection of different Zoom slider values reduces or increases the size of Objects and Regions in the displayed screen section, allowing you to see more Objects and Regions in the same space (zoom out) or a detailed display of fewer Objects and Regions (zoom in).

While zooming, the top-left selected Object/Region is kept in the visible area of the screen, whenever possible.

The horizontal Zoom slider is located to the bottom-left of the working area of the screen—in the Arrange window, it's just under the Track List.



The vertical Zoom slider is found at the top right of the active window.



Clicking on the more closely spaced bars will reduce the zoom level. Clicking on the widely spaced bars will increase the zoom level. You can click-hold and drag the Zoom sliders to step through several zoom levels. Any relative size differences between tracks/objects will be retained when zooming. Command-clicking in the left/right (horizontal) or top/bottom (vertical) half of the Zoom slider decreases/increases the zoom factor by one step.

Storing and Recalling Zoom Settings

You can store three different zoom settings for each window via use of the *Save as Zoom 1–3* key commands. Use *Recall Zoom 1–3* to recall your zoomed settings. These commands only apply to the top (active) window.

Zooming in on One Section of the Screen

To enlarge a section of the screen to fill the whole window, use the Magnifying Glass tool to drag a “rubber band” over the desired area. You can do this more than once.

Auto Track Zoom

The Arrange menu *View > Auto Track Zoom* function automatically enlarges the currently selected track. The track size can be manually set by dragging the lower left corner of any track in the Track List (the cursor will change to a “finger” icon).

Reverting to the Previous Zoom Setting

Click on the background with the Magnifying Glass. This will return the zoom level to the original setting, by backtracking through the previous steps. You can access the Magnifying Glass functions from any other tool (apart from the Pencil) by holding down Control. The pointer will display the active tool, until you press the mouse button. As long as the button is pressed, it will display the Magnifying Glass tool.

Zoom Navigation Key Commands

These commands allow selected Objects, or a Region defined by the locators, to be zoomed to fit the screen. In addition, the last thirty zoom levels and window scroll-bar positions can be freely defined and recalled for each window. There are no default key commands for most of these navigation options, so you will need to assign them in the Key Commands window. Open *Preferences > Key Commands* and type “nav” in the *Find* field. This will display the entries described below.

- *Store Navigation Snapshot*—the current zoom and window position scroll bars settings are saved as a “step” in the navigation path.
- *Navigate Back*—recalls the previous step in the navigation path
- *Navigate Forward*—advances to the next step in the navigation path
- *Zoom to fit Selection vertically & horizontally, store Navigation Snapshot*—displays the current selection as large as possible
- *Zoom to fit Selection horizontally, store Navigation Snapshot*—displays the current selection as large as possible horizontally
- *Zoom to fit Locators, store Navigation Snapshot*—displays the current locator area as large as possible

All Zoom commands create a new step in the navigation path. The *Navigate Back* key command allows you to recall the previous zoom settings.

Window Elements

Adjusting the Size of the Window Elements

If you move the mouse over the top left corner of the Arrange area, the mouse pointer turns into a crosshair. By dragging it, you can adjust the size of the Bar Ruler, Arrange area, Track List, and Transport field buttons. You can also adjust the window elements in the Score, Hyper, and Matrix Editors using the same method.



Concealing/Revealing the Transport Functions

Use *View > Transport* to display or remove the Transport panel from the top left corner of the Hyper, Matrix, or Arrange windows. The number of buttons and indicators shown is dependent on the amount of available screen space.

Concealing/Revealing the Parameters

The *View > Parameters* function allows you to display or remove the entire area (which contains the Region parameters, Instrument parameters, and the Toolbox) to the left of the Arrange, Environment, and other edit windows. Hiding these parameters provides more space for the editing window itself.

In many windows, you can hide and/or reveal further screen elements, such as the Toolbox. These display options are always available from the View menu.

Concealing/Revealing the Local Menu Bar and Scroll Bars

Command-Option-click on the window title bar to toggle the display of the local menu bar and scroll bars. This allows you configure small floating windows, which can be stored as part of a Screenset.

Resizing the Parameters Area

You can alter the size of the entire Parameters area in the Arrange, Score, Hyper, and Environment windows by moving your mouse cursor over the *resize bars* (the gray, vertical bar with the two vertical lines) between the Parameters area and the column to the right. As an example, the Arrange window's Track List. The cursor appearance will change, allowing you to click and drag horizontally. As you do so, the Parameters area is resized, until the mouse button is released. The smallest "unit" of the resizing grid is the width of a tool in the toolbox.

This facility makes reading parameter names and labels clearer.

Menu Handling

Given Logic's extensive range of data manipulation functions, it would be impractical to display all of them in the main menu bar. To ensure that only relevant functions are available in each editor, a local menu system is employed.

Logic's menus are accessed in the same way as in other applications: click-hold on the menu title, move the mouse over the desired item, and release the mouse button. In hierarchical menus, a right-pointing arrow is shown beside the item. If you highlight such an item, a sub-menu will be displayed to the right. To select an item from this sub-menu, move the mouse to the right, into the sub-menu, and then move vertically over the desired item. Release the mouse button to activate the selected function.

Note: A short click on any of the local menus will result in the menu remaining open, even after you have released the mouse button. A long click will result in the behavior described above.

Window Types

There are two different types of windows in Logic: normal windows and float windows. The contents of all windows that belong to the current song are always updated, regardless of type.

Normal Windows

You can open as many normal windows as you want, including several of the same type. Even though the contents of all windows are constantly updated, only one of the windows ever has the status of being the "top" or "active" window. This is the window that is in the foreground when several normal windows overlap.

Topped, or active, windows can be recognized by a title bar that is not dimmed out, and black name.



The illustration above shows the active, non-floating Arrange window

The main distinguishing characteristic of this window is that key commands only affect this window, and not any of the others. The *Windows > Next Window* menu function brings the next open window to the top, if it is fully obscured by other windows.

In background windows, you can not only observe changes, but make almost any kind of change, without having to bring the window into the foreground. To do so, simply long click on it. Background windows are identified by a white title bar (they can be positioned next to the top window, or tiled underneath it) and faded name. You can bring a window to the foreground by clicking on it, clicking on the title bar, or by accessing one of the local menu functions.

Float Windows

Float windows are so named because they always “float” in the foreground, even above the topped normal window (if there are a lot of open float windows, they will inevitably cover each other up—just click on one to bring it to the foreground).



The illustration above shows the Arranger window as float window.

Float windows are recognizable by their narrower, gray title bar. Mouse operations can be carried out in the same way as in normal windows.

The most common example of a float window is the Transport window. You can open any other window as a float window by holding down Option while selecting the desired edit window from the Windows menu.

Note: Holding down Option while opening a window with a key command does not open the window as a float.

Relationships between Windows

The two buttons at the top left of a window, determine its relationship to the song position (Catch), or to other windows (Link, Contents Link, or Contents Catch).



Catch

The Catch function ensures that the visible section of a window follows the song position as the song plays.



If the button featuring the walking man is lit, the window's display follows the song position as the song plays. If the button is not lit, the display does not update, even when the song position line moves past the right edge of the visible portion of the window (Catch Clock Position).

Note: If you move the visible section manually, Catch is automatically switched off, ensuring that the newly displayed section doesn't then disappear.

The *Catch when Sequencer starts* (*Preferences > Global > Catch*) option enables Catch mode whenever you press Play or Pause.

Scroll in Play

The View menus of all windows that display time horizontally (Arrange, Score, Matrix, Hyper), offer the *View > Scroll In Play* option. If the Catch function of the particular window is also activated, the song position line will remain in the middle of the window, while the background scrolls smoothly from right to left.

Note: Scroll in Play requires a powerful graphic card and a fast computer to operate smoothly.

Link, Contents Link, and Contents Catch

You can define these display options to control how information is displayed when working with related editor windows.

Link

When the button featuring the chain link icon is activated in a given window, this window always displays the same contents as the topped window. The display is adjusted whenever the selection in the topped window is altered.



Here's an example: imagine the topped window is an editor. In Linked mode, the other editor windows can display the same data in another form (with the exception of the Arrange window, which does not display event data).

Here's another example, using the Environment window; The top window is the Arrange window. In Linked mode, the Environment window will display the instrument that corresponds to the selected track in the Arrange window. As you switch tracks in the Arrange, the Environment will update to reflect the selection.

Contents Link

Double-clicking on the Link button activates Contents Link mode. This means that the window always shows the contents of the Region or Object selected in the top window. The display is therefore always one level below that of the top window.



Here's an example: if the top window is an Arrange window, in Contents Link mode the editor windows can show the events of a selected MIDI Region. Selecting a different MIDI Region in the Arrange window will cause the display of the linked editor to switch to the newly-selected MIDI Region.

You could also use Contents Link mode in an Arrange window, to display the contents of the folders in another Arrange window.

Contents Catch

By simultaneously switching on Catch and Contents Link, you activate Contents Catch mode. Initially, this is equivalent to Contents Link mode, but when the song position reaches the next Region on the same track, the contents of this Region are then displayed.



You could use this mode in an Arrange window, much as you would in Contents Link mode. The editors would then show the events of whichever MIDI Region is currently being played on a track.

Screensets

Normally, you lay out your windows on the screen in a way that suits your working methods. This layout of various windows, including the display size, zoom, position of each window and other settings is called a Screenset, and can be stored. Once defined, you can freely switch between different Screensets, much as you might swap between different computer monitors.

Storing Screensets

Screensets are numbered from 1 to 99 (using only the 1 to 9 computer keys. The 0 key is used for the Stop command). You can see the number of the current Screenset beside the word *Windows* in the main menu. You don't need to save Screensets with an explicit command. It happens automatically, as soon as you switch to another Screenset. Thus, without any effort, your current working view is always stored in the current Screenset.

Switching Screensets

Just input the number of the desired Screenset (1 to 9). For two-digit Screensets hold down Control while entering the first digit.

Protecting Screensets

Use the *Lock/Unlock Current Screenset* key command or *Windows > Screensets > Lock Screenset* menu option to prevent the current Screenset from being altered. A • appears in front of the Screenset number to indicate that it is locked. Reuse the key or menu command (the default is Shift-L) to unlock the Screenset.

The *File > New* command deactivates all Screenset locks.

Copying Screensets

To copy the current Screenset to a destination Screenset, hold down Shift when you switch Screensets. Two digit Screensets are copied by holding Shift-Control 1+1, ..., 9+9.

You can also use menu functions to copy Screensets via the Clipboard: Switch to the Screenset you would like to copy, and select *Windows > Screensets > Copy Screenset*, then type in the Screenset number that you wish to copy to, and select *Windows > Screensets > Paste Screenset*.

You can also copy individual Screensets between different songs using this method. To import all Screensets from another song, please make use of the *File > Song Settings > Import Settings* option.

Reverting to a Stored Screenset

The *Revert to Current Screenset* key command resets your screen to its state prior to importing the current Screenset.

Recalling Screensets 1 to 9

Screensets 1 to 9 can be recalled by freely-defined key and MIDI remote commands, not only the number keys. This allows you to define the number keys for other purposes, such as toggling windows on and off, as described above. The 1 to 9 key commands are called *Recall Screenset 1* (...*9*, respectively) in the Key Commands window.

Sequencer Controlled Screenset Switching

You can automatically switch Screensets through the use of meta event # 49—just add it to a MIDI Region in the Event Editor.

To switch a Screenset automatically:

- 1 Set the song position to the point where you'd like the Screenset to change.
- 2 Hold down Command and click in the Event Editor on the button shown below.



- 3 The inserted meta event has a default value of 50 (Song Select).
- 4 Alter the number in the *NUM* column from 50 to 49. This changes the name to *Screenset*.
- 5 Input the desired Screenset number in the (*VAL*) column.

You can stop the switching by muting the MIDI Region that contains the meta 49 event.

Window Management Functions

The *Windows > Tile Windows* function tiles all open windows, and makes them all the same size.

The *Windows > Stack Windows* function stacks all open windows on top of one another, so that at least a part of the title bar is visible for each window, no matter which is the foreground window at the time.

The *Windows > Tile Windows horizontally* function tiles all open windows, using all available horizontal space for each individual window (if possible).

Edit Operations

The local edit menus in Logic's various windows all take the same form. The top two items are Undo and Redo. Below Redo are the typical Clipboard functions (see "The Clipboard" on page 34), and at the bottom of each are the main selection commands.

Undo

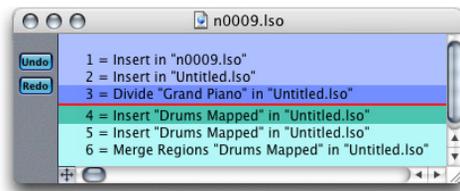
Undo allows you to reverse the previous edit. The default key command for Undo is Command-Z.

Multiple Undo and Redo

An unlimited number of editing steps can be undone. This also applies to the Redo function. You can determine the number of undo steps in the *Preferences* menu.

History of Undo and Redo Steps

You can open the Undo and Redo History window via any *Edit* menu. It shows you a list of all actions that can be undone. The last step, that is the first to be undone, is indicated by the dark blue background. After performing an Undo you will find a Redo list below the Undo items. The first item to be redone is indicated by a dark green background.



Clicking on any entry will undo or redo all steps between the clicked and highlighted entries. All steps are animated during this process. You can stop the undo or redo process by clicking anywhere on the background.

It's also possible to undo/redo an isolated step without influencing all steps between the clicked and highlighted entries. This is achieved by Control-clicking on the desired step.

The Undo History is saved with the song, making it available when reopening it. Use *Edit > Delete Undo History* to erase the complete history. Please be careful: no undos or redos are possible for the deleted steps after deleting the History.

The Clipboard

The Clipboard is an invisible area of memory, into which you can cut or copy selected objects, allowing them to be pasted to a different location.

The Clipboard is universal, which means that it can be used to exchange objects between songs.

Cut

All selected objects are removed from their current position, and placed on the Clipboard. The previous contents of the Clipboard are overwritten in the process (key command is Command-X).

Copy

A copy of all selected objects is placed on the Clipboard. The selected objects are left in place. Here too, the previous contents of the Clipboard are overwritten (key command is Command-C).

Paste

All objects from the Clipboard are copied into the top window. The Clipboard is not erased in the process (key command is Command-V).

The contents of the Clipboard are added at the current song position (if they are events or Regions). The song position is incremented by the length of the pasted Region/event(s).

In the Arrange window, the contents of the Clipboard are pasted to the selected track. If events are pasted into the Arrange window, either a new MIDI Region or Region is created, or the events are added to a selected MIDI Region. Any existing Regions remain unchanged.

In the Environment window, the Objects are pasted into the layer currently being displayed, at their original positions.

Paste at Original Position

This function works in a similar way to Paste, but the Regions/events in the Clipboard are always pasted to the position they were originally cut from, regardless of the current song position (which is where the Regions/events would be placed with the ordinary Paste function).

Paste Replace

This function only works in the Arrange and editor windows. It resembles Paste, except that with Paste Replace, all existing Regions/events are replaced by the Regions/events being pasted.

When using this function, all Regions or events that lie within the time period occupied by the Regions/events on the Clipboard are erased.

Clear

Any selected objects are erased. Clear has no effect on the Clipboard, and is functionally identical to pressing the Backspace key.

Selection Techniques

Whenever you want to perform a function on one or more objects, you first need to select the objects. This applies equally to Regions, individual events or Environment Objects. Selected objects are either displayed in an inverted color scheme, or will flash (in the Score Editor).

An object selected in one window will also be selected in all other windows that display that object. Changing the top window doesn't affect the selection (as long as you don't click on the background, which deselects everything. Be sure to click on the window's title bar).

Goto Selection Start/End

The *Goto Selection Start/End* key command moves the song position line to the location of the first/most recently selected event in the top window.

Scroll to Selection

The *Scroll to Selection* key command automatically updates the top window, so that the first of the currently-selected events is visible.

Selecting Individual Objects

Individual objects may be selected by clicking on them, and deselected by clicking on the background or by selecting another object.

You can also use the *Select next/previous Region/event* key commands (default: *right/left arrows, M/I* in the Event List). *Select first/last* selects the first/last object of the currently displayed level.

Selecting Alphabetically

The Tab key selects the next alphabetical object. In the Arrange or Environment windows, pressing any letter key selects the first object with a name that begins with the chosen letter (as in the Mac's Finder), provided that no key command is assigned to this key.

Selecting Several Objects

To select several non-contiguous objects, hold down Shift as you click them. As subsequent objects or events are selected, the previous selections are retained. This also works with horizontal or rubber band selection.

Use the Toggle Next/Previous Region/Event key commands to select the following/previous Region/event as well (default: Shift-Right Arrow/Shift-Left Arrow).

Horizontal Selection

To select all Regions on a track, click on the track name in the Track List. In the same way, you can select all events (of a specified event definition) in the Hyper Editor, by clicking on the event definition name, or all notes of a certain pitch in the Matrix Editor by clicking the relevant key on the Matrix Editor's keyboard.

In Cycle mode, the selection techniques covered above only affect events that fall within the Cycle area.

“Rubber-Banding”

To select consecutive objects, click on the background and drag a “rubber band” over them. All objects touched, or enclosed, by the rubber band will be selected.

Toggling the Selection Status

When you make any selection (including by rubber band or horizontal selection) while holding down Shift, the active selection status of the objects (events) will be reversed.

You can reverse the selection status of all objects (events) by using *Edit > Toggle Selection*. As an example of where this would be useful: if you want to select all Regions in a song, with the exception of a few, first select the Regions that you don't wish to use, and then *Toggle Selection*.

Selecting Following Regions/Events

To select all Regions/events after the currently selected one (or, if no Region/event is currently selected, to select all Regions/events after the song position line), use the *Edit > Select all Following* function.

Selecting Regions/Events Within the Locators (Vertical selection)

Edit > Select Inside Locators selects all Regions/events lying wholly or partly inside the locator positions.

Deselecting Regions/Events Outside the Locators

Edit > Deselect Outside Locators deselects all Regions/events outside the locators: Regions/events within the locator boundaries remain unchanged.

In the Score editor, this command works on whole MIDI Regions, as well as events.

This command is particularly handy after use of the *Select Equal Regions/Events* or *Select Similar Regions/events* commands, to restrict the effects of ensuing commands to the area that falls between the locators.

Deselecting Regions Outside the Current Track

The *Deselect All Regions Except Recording Track* key command deselects any Regions not on the currently selected track.

This command is especially useful after other special selection commands, ensuring that the effects of ensuing commands are limited to the recording track.

Selecting Empty Regions

Edit > Select Empty Regions selects all empty Regions.

Selecting Overlapped Regions/Events

Edit > Select Overlapped Regions/Events selects all overlapping Regions/Events.

Selecting Muted Regions/Events

Edit > Select Empty Regions selects all muted Regions/Events.

Selecting Equal Colored Regions/Events

Edit > Select Empty Regions selects all Regions/Events of the same color. Useful for replacement of song sections and other group editing tasks.

Selecting Similar or Identical Objects

If you have selected an object, you can use the *Edit > Select Similar Objects/Regions/Events* function to select all similar objects, and the *Edit > Select Equal Objects/Regions/Events* function to select all equal objects.

The table shows the differentiation between similar and equal objects.

Object	Similar	Identical
Controller Event	Controller# equal, any data byte (control value)	Controller# and data byte (control value) equal
Note Event	Note equal, any octave	Note and octave equal
Environment Object	Same object type (e.g. fader)	Same fader type (e.g. text)

If you want to delete all similar objects, select one of these objects and select *Delete similar Objects*.

Conversely, if you want to keep all similar objects and delete all other objects, select *Delete but keep similar Objects*.

Selecting Events with the same MIDI channel

If you've selected an event, you may select all other events on the same MIDI channel by using the *Edit > Select Equal Channels* command.

Imagine you're editing a MIDI Region that contains volume and pan controller information for 16 MIDI channels. To select all events on channels 1 and 3, you can simply Shift-select one event on channel 1 and another event on channel 3, then use the *Select Equal Channels* function. All other events on these two channels will then be selected.

Note: You can use the *Event channel +1* or "*Event Channel -1*" key commands to alter the channel number of the selected event by one.

Selecting Regions and Events with Equal Subpositions

You can select all Regions and events with a certain relative position, such as all snare drums on the off-beat. Select a Region or Event at the desired relative position, and choose the *Edit > Select Equal Subpositions* menu option. All Regions/Events with the same relative position will then be selected. You can use this function for up to ten relative positions simultaneously.

Delete and Select Next Region/Event

This key command erases the Regions and events currently selected in the Arrange and editor windows, and selects the next Region/event.

General Functions of the Editors

Logic's MIDI editors allow the editing of events (MIDI messages). Logic's MIDI editors include the Score, Matrix, and Hyper Editor, Event List and Transform windows.

Opening Editors

Double-clicking on a MIDI Region opens the Score Editor. There is a pull-down menu on the *Preferences > Global > Editing* page, which lets you select the editor that will be opened when you double-click on a MIDI Region. The options are: the Score, Event, Matrix, and Hyper Editor.

Control Output via MIDI

Switching on the MIDI Out button causes MIDI events to be sent when they are added, selected, or edited. This allows you to audibly monitor every editing stage, whether you are scrolling through the Event List (automatic selection) or transposing a note.



General Note Events Functions

In the Functions menu in the editors, there is a sub-menu called Note Events. This contains functions that allow you to manipulate selected notes in a manner influenced by the notes surrounding or overlapping them; musically speaking, you can think of this function as adding division lines within chords. These functions can be very useful if you want to set up a polyphonic display within the Score Editor.

Removing overlaps

When you select *Functions > Note Events > Note Overlap Correction*, any overlapping notes are shortened, so as to remove the overlaps. The affected notes must be selected first. There are three different "overlap" variations, which are also available as key commands:

- Note Overlap Correction (selected/any): this function removes overlaps for all selected notes, regardless of whether the following overlapped notes are selected or not.
- Note Overlap Correction (selected/selected): this function removes overlaps for all selected notes, but only if the following overlapped notes are selected.
- Note Overlap Correction for Repeated Notes: this function removes overlaps for all selected notes, but only if the following overlapped notes have the same note number (pitch).

If the overlapping notes appear to be part of a chord, you will be presented with the following options:

- Keep: simultaneously-sounding notes will be shortened to the same endpoint.
- Delete: simultaneously-sounding notes will be removed, leaving a monophonic line behind.
- Shorten: simultaneously-sounding notes will be shortened separately so that again, only a monophonic line remains.

Legato

Functions > Note Events > Note Force Legato, lengthens all selected notes, so that each note sustains until the startpoint of the next one, in a legato manner.

There are two possible ways of doing this:

- Note Force Legato (selected/any): this function forces legato for all selected notes, regardless of whether the following note is selected or not.
- Note Force Legato (selected/selected): this function forces legato for all selected notes, but only if the following note is selected.

The end of the MIDI Region is treated as a non-selected note. *Note Force Legato (selected/any)* lengthens the last note up to the end of the MIDI Region. *Note Force (selected/selected)* does not alter the length of the last note.

If Logic finds a chord, a dialog box will appear saying:

Some overlapped notes appear like chords! Delete chord notes? Or shorten overlapped notes?

Delete erases any incorrect notes in a poorly played monophonic line. *Keep* evens the start points and durations of all notes in chords, which were played intentionally.

Splitting Chords

The *Functions > Note Events > Select Top Line* command selects the highest notes in the selected chords of a MIDI Region. All previous selections are ignored.

The *Functions > Note Events > Select Bottom Line* command selects the lowest notes in the selected chords of a MIDI Region. All previous selections are ignored.

Select Top Line and *Select Bottom Line* are purely selection commands, which can be used in conjunction with any of the editing commands, such as Cut, to move a voice into another MIDI Region.

Splitting voices across MIDI channels

The *Functions > Note Events > Lines to Channels* command assigns MIDI channel numbers (in ascending order) to individual note pitches in the selected MIDI Region. The highest note in each chord will be assigned as MIDI channel 1, the next note down in each chord channel 2, and so on. Only selected events are affected, so you should use the *Select All* command first, or a related command, such as *Select within Locators*.

Note: The result will only be audible if you play the MIDI Region back through an *All Channel* instrument.

Using different MIDI channels in this way enables you to assign the individual notes in polyphonic score styles, or split each note off into its own MIDI Region, using the Arrange window *Region > Split/Demix > Demix by Event Channel* option.

Converting Sustain Pedal Events to Note Lengths

The *Functions > Note Events > Sustain Pedal to Note Length* command analyzes the sustain pedal events (controller #64) on selected notes, and lengthens the actual notes, so that they sustain until the controller #64 *Off* message is reached. The pedal events are completely erased by use of this function.

Note: When using this function in Page View of the Score window: all selected MIDI Regions are edited. Even if the result sounds the same, the score may look different because the notes will have different durations. Removing the controller #64 messages will delete the corresponding pedal marks from the Score.

Working with Events

By selecting *MIDI > Copy MIDI Events* (see “Copying Events Selectively” on page 168), you can move or copy all events between the locator positions to a different position (default: current song position). This function also offers several other options.

Moving Events

You can move one or more events in the editors with the following key commands.

Note: These commands may also be used to nudge entire Regions by the corresponding grid amount in the Arrange window:

- Nudge Event Position by SMPTE frame +1
- Nudge Event Position by SMPTE frame –1
- Nudge Event Position by SMPTE frame +0.5
- Nudge Event Position by SMPTE frame –0.5
- Nudge Event Position by SMPTE frame +5
- Nudge Event Position by SMPTE frame –5
- Nudge Event Position by SMPTE Bits +1
- Nudge Event Position by SMPTE Bits –1
- Nudge Event Position by Tick +1
- Nudge Event Position by Tick –1
- Nudge Event Position by Format +1
- Nudge Event Position by Format –1
- Nudge Event Position by Beat +1
- Nudge Event Position by Beat –1
- Nudge Event Position by Bar +1
- Nudge Event Position by Bar –1
- Nudge Event Position by +Nudge Value

- Nudge Event Position by –Nudge Value

The selected events (or Regions in the Arrange window) are shifted one step right (+1) or left (–1), by whatever unit is referred to in the particular command name.

Setting Event Starts and Ends to fit Song Position

You can move the start or end of a selected event to the Song Position Line, by use of the following key commands:

- Set Object Start to SPL Position
- Set Object End to SPL Position

The use of *Set Object Start to SPL Position* is only possible when the Song Position Line (SPL) is placed before the start of the event. Similarly *Set Object End to SPL Position* only makes sense if the SPL is placed after the end of the event. If not, the length of the event will be shortened to one format (denominator) value.

Note: These key commands can also be used to set the start and endpoints of Regions.

Deleting Events

The basic techniques are the same as those for deleting Regions:

- Backspace deletes all selected events.
- The Eraser also deletes all selected events, and any events that you click with it (whether previously selected or not).

Deleting Similar Events

Use *Edit > Select Similar Regions/Events* (events with the same controller number, for example), and then delete the selected events by pressing *Backspace*.

Deleting Doubled Events

Events duplicated at the same bar position may be deleted by selecting *MIDI > Erase MIDI Events > Duplicates*. Doubled events may have different second data bytes (velocity, aftertouch or controller values); Logic only looks at the event type and position, when determining whether or not two or more events are “duplicated”.

Deleting Events by Reference to the Locator Positions

Selecting *MIDI > Erase MIDI Events > ...* also allows you to delete all events between (... > *Inside Locators*) or outside (... > *Outside Locators*) the locator positions.

Deleting Events Outside the MIDI Region

When copying events or reducing the length of MIDI Regions, events can sometimes end up outside the limits of a MIDI Region. These technically still belong to this MIDI Region, although they won't be played/heard. You can delete these events by selecting *MIDI > Erase MIDI Events > Outside Region Borders*.

Deleting Unselected Events Within the Selection

If you have selected certain events within a range, and you want to delete all unselected events, select *MIDI > Erase MIDI Events > Unselected Within Selection*.

Locking Events to SMPTE Times

This is described in the section on fixing objects to frames (see “Bar Ruler—Time Ruler” on page 614).

Event and Note Quantization

The Event List and Matrix Editor have a separate quantization function, which can be applied to all selected events. Unlike quantization for MIDI Regions, event quantization applies to all events, not just notes. It irreversibly alters their positions (only notes can be returned to their original recorded positions).

Quantizing Events

Select the events that you want to quantize. Then open the pull-down Quantization menu by grabbing the Q button shown in the image (the Q button in the Matrix Editor looks slightly different).



This is identical to the pull-down menu found in the Region Parameter box, and contains its own quantization grid (see “Quantization” on page 147). As soon as you select an item from the menu, all selected events are quantized.

Note: You can only reverse note quantization. All other events are permanently shifted.

To apply the same quantization value to another series of selected events (even in other editor windows), select *Functions > Quantize Again*, or click (quickly) on the Q button a second time.

Note Quantization

Normally, all notes in a MIDI Region are quantized in accordance with the Quantization parameter value chosen in the Region Parameter box and the Extended Region Parameter box (explained in greater detail in the Quantization section).

To quantize single notes in either the Matrix or Score editors, you can use the Quantize tool, as well as event quantize.



If you click on a single note (or a selected group of notes) with the Quantize tool, and hold down the mouse button, the Quantize menu will open, allowing the selection of the desired quantization value.

If you click quickly on notes, the most recently used Quantize value will be used, just as with the Quantize Again command.

If you click-hold on the background with the Quantize tool, you can rubber band select, and quantize, several objects at once.

Note: When working in the Score window, the Display Quantize setting will have an impact on how this functions.

Reversing Note Quantization

Note events can be returned to their original record positions, or moved manually, by selecting the *off* setting in the Quantization menu. Alternately, you can click on the Q button while holding down Option.

You can also undo the quantization of all currently selected notes by clicking on them with the Quantization tool, while holding down Option.

You can also achieve the same result by selecting *Functions > De-Quantize*.

Key Commands

You can activate nearly all Logic functions with key commands or MIDI messages. The Key Commands window is used for the assignment of key commands to computer keyboard keys or to MIDI messages.

Note: A number of Logic functions are only available as key commands.

Whenever this manual mentions a key command, this refers to a function or option that can be accessed by either a computer keyboard keystroke (or keystroke combination) or a MIDI message. This allows you to completely customize Logic to suit your own working style.

Saving Key Commands

Your personal key assignments are stored in a separate Preferences file. You should:

- Make a backup of this file at another hard disk location.
- Make a backup on removable media (a CD-ROM, for example), in case you need to use Logic on another computer.

Whenever you install Logic updates, your personal key commands will remain unaltered.

Note: Even the fixed global key commands of older versions are user-definable. Please keep in mind that some of these commands such as *Undo, Save, Quit, New, Open, Cut, Copy,* and *Paste* follow Mac OS X conventions, and probably shouldn't be altered.

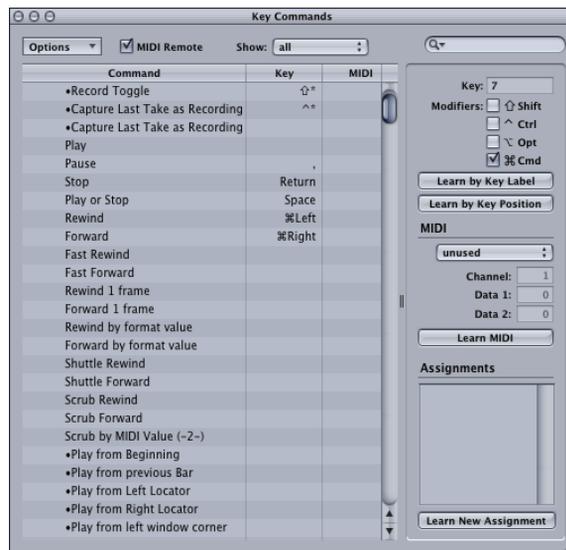
Special Keys

Some keys have special functions:

- The Shift, Control, Option, and Command modifier keys can only be used in conjunction with other keys.
- The Backspace key has the fixed “delete selected objects” function. It can only be assigned to another function in conjunction with the modifier keys.
- The key combinations assigned to the options in the main menu bar cannot be reassigned. The relevant key commands are displayed after the main menu items.
- The plus and minus keys increase or decrease any selected parameter value in single units. They can be assigned different functions which override this behavior.

Key Commands Window

The Key Commands window can be opened by selecting *Preferences > Key Commands*.



All available key commands are listed on the left side. They are grouped according to various categories. The global key commands work regardless of which Logic window is currently active; the other commands require the corresponding window(s) to be topped. This allows you to assign the same key command to different functions in different windows.

A “•” in front of the description of the function indicates that the function is only available as a key command or MIDI command. To the right of the key command listing, you can see the currently assigned key, and below this, the assigned MIDI message (if applicable).

Key Commands List

In the list shown to the left of the Key Commands window, the following applies:

- Groups can be extended or collapsed by clicking on the disclosure triangle to the left.
- Columns can be changed in width by dragging the separating lines between the headers (Command, Key, MIDI, and so on)
- When the list has keyboard focus, physically pressing a key command (or key command combination) selects the appropriate function in the list.
- If the triggered key command is located in a collapsed group, the group will automatically be expanded.

Options Menu



The *Options* menu offers:

- Import and Copy key command functions
- Expand/Collapse and Scroll to Selection functions for the Key Commands List window
- Several Initialize options



Importing Key Commands

This function is particularly useful if you need to work temporarily on someone else's system; you might want to use your personal key assignments on it, without altering the other system's settings.

The *Options > Import Key Commands* function allows you to import the key assignments from any Logic Preferences file. When selected, a file selector box allows you to browse any internal drive or removable media for the desired Logic Preferences file.

The existing Preferences file (on the target system) is automatically saved as a *.bak file. This file contains the old key commands.

Note: You don't need to restart Logic to begin using the new key command set.

Printing a Key Command List

The *Options > Copy Key Commands to Clipboard* function copies the key commands into the Clipboard as text. From here, it's a simple matter of pasting the results into any word processor, formatting as desired, and printing them out.

The *Copy to Clipboard* function also takes into account the *Show* and *Find* function settings (see below). You could, therefore, export a certain group of key commands (those containing a particular character string, for example). What you see in the window display is exactly what's exported.

Initializing Key or MIDI event assignments

The *Options > Initialize all Key Commands* menu item initializes all key assignments.

The *Options > Initialize all MIDI Commands* menu item initializes all MIDI assignments. Once initialized, default assignments will be used.

Note: You will lose your existing key command assignments if you make use of the Initialize functions, so ensure that you have created a copy of your Logic Preferences file before doing so.

Switching MIDI Remote on/off



You can use the *MIDI Remote* checkbox to globally switch on/off responses to all defined MIDI messages. The MIDI command for this (Toggle MIDI remote) is always active, even when MIDI Remote is disabled, and is therefore always available.

If you have assigned MIDI Remote commands to all of the keys on your master keyboard, it's advisable to use a second foot pedal or a programmable button on your keyboard for Toggle MIDI Remote. If no such facility is available, use a key you are unlikely to press by accident (the lowest or highest key, for example) during recording—but you will no longer be able to use this key to record notes.

The *MIDI Remote* checkbox also applies to MIDI events that are created with Transformer or Fader Objects in the Environment, and are routed to the Physical Input Object.

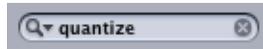
Valid MIDI commands are recognized, and filtered, by the Physical Input Object, because it makes no sense to record them.

Show Menu

You can use the *Show* menu to filter all the used, or unused key commands from the window display. All other Key Commands window functions remain available for use.

Find Function

The Find field is used to find key commands by name or partial name:



- The search is performed as you enter text. There is no need to press the Return key.
- The *Cancel* button to the right (that appears as soon as any text is entered) clears any entered text, and displays all key commands.
- The *Find* menu to the left (the magnifying glass) retains a history of recently used search terms. The *Clear* menu item erases the Find history.

Note: The Find history is limited to searches that were completed with a press of the Return key.

Key Command Properties

The box shown below displays the selected key command's properties:



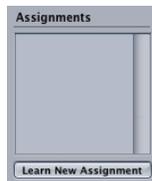
- *Key*: the key's name (or a negative number if it's a scan code). This parameter cannot be edited.
- *Modifiers*: the modifier keys which need to be held down in order to execute the key command function. These can be edited.
- *Learn by Key Label*: enables you to teach Logic to use a particular key or key combination to perform a function.
- *Learn by Key Position*: stores the code from the incoming key. This is different to the *Learn by Key Label* functionality in that a scan code allows you to use the number keys and plus/minus keys (above the keyboard and on the numeric keypad) for different functions. This also means that the key position remains the same if you switch between different operating system language settings or different keyboards.

MIDI



- The uppermost box, the *Status* menu, displays the type of MIDI message that is used for the key command.
- *Channel*: Indicates the MIDI channel number of the incoming message. This parameter is disabled if the *Status* menu is set to *unused*.
- *Data 1*: This field indicates the first MIDI data byte. As an example: This field will show and allow the entry of a MIDI note value if the *Status* menu is set to *Note*.
- *Data 2*: This field indicates the second MIDI data byte. It is disabled if the *Status* menu is set to anything other than *Control Change* or *Poly Pressure*.
- *Learn MIDI button*: Enables you to teach Logic a particular MIDI command to perform a key command function. You must enable this button before Logic will accept any MIDI data for use as a key command trigger.

Assignments



This field displays the control surface assignment associated with the selected key command. It is only relevant when a control surface is used with Logic.

Each line displays:

- The name of the control surface, or the MIDI string if the assignment is from an unsupported control surface.
- The name of the control. If the name is shown in gray, this indicates that the assignment is currently inactive (because it is part of an inactive mode).
- Zone and Mode that the Assignment belongs to, if applicable.

Note: The display is updated when a Zone changes its Mode (when holding down a modifier button, for example).

Double-clicking on a row will show the assignment in the Controller Assignments Editor (see “The Controller Assignments Window” on page 671).

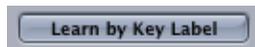
The *Learn New Assignment* button allows you to “teach” Logic a new assignment for the selected key command. Click on the button, and use the desired control.

Note: If you wish to set up assignments for an entire control surface, be it supported or unsupported, make use of the *Preferences > Control Surfaces > Learn Assignment for xxx* function. This is discussed in detail in the Control Surfaces chapter of this manual (see “Customizing Control Surfaces” on page 668).

Assigning and Deleting Key Commands

This section discusses a number of Learn functions that allow you to assign particular computer keys or MIDI commands to Logic functions. Closing the Key Commands window automatically disables any active Learn button.

To assign a function to a key:



- 1 Activate the *Learn by Key Label* button.
- 2 Select the desired function with the mouse.
- 3 Press the desired key, along with the desired modifier keys (Shift, Control, Option, Command), if necessary.
- 4 If you want to make another assignment, repeat steps 2 and 3.
- 5 Deactivate *Learn by Key Label* Key

Learn by Key Position works in the same way, but differs in that it’s not just a reference to an ASCII code that is stored, but the actual code of the key that is pressed.

In practice, this means that you can, for example, assign different commands to the number keys on the numeric keypad and the number keys above the keyboard—and the same goes for the different plus and minus keys on the numeric keypad and main keyboard.

The only disadvantage is that the key code (a number), rather than the ASCII symbol, is displayed in the Key Commands window. The ASCII symbol is more useful for reference purposes.

To clarify the difference between these two functions, here’s a short comparison:

If you use the *Learn by Key Label* function, and define only one key command for the key, it will be used, no matter which of the two keys (either plus key, for example) is pressed.

If you use the *Learn by Key Position* function, and define two key commands (one for the alphanumeric keyboard, one for the numeric keypad), then the appropriate key command will be used (one for each plus key, for example).

To delete key assignments:

- 1 Activate the *Learn by Key Label* or *Learn by Key Position* button.
- 2 Use the mouse to select the function/key assignment that you want to delete.
- 3 Press Backspace.
- 4 To erase more assignments, repeat the second and third steps.
- 5 Deactivate the *Learn by Key Label* button.

To assign a function to a MIDI message:



- 1 Activate the *Learn MIDI* button.
- 2 Select the desired function with the mouse.
- 3 Send the desired MIDI message from your controller.
- 4 If you want to make another assignment, repeat steps 2 and 3.
- 5 Deactivate the *Learn MIDI* button.

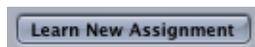
Note: If you want to assign a Note On message, remember to switch off *Learn MIDI* before you release the key in question (and thereby transmit a Note Off message). The assignment used is always the last message received.

To delete a MIDI assignment:

- 1 Activate the *Learn MIDI* button.
- 2 Use the mouse to select the function/assignment that you want to delete.
- 3 Press Backspace.
- 4 To erase more assignments, repeat the second and third steps.
- 5 Deactivate the *Learn MIDI* button.

To learn a controller assignment:

- 1 Activate the *Learn Assignment* button.



- 2 Select the desired function with the mouse.
- 3 Send the desired MIDI message from your controller.

Note: The *Learn Assignment* button will be deactivated automatically when the entire message has been received. This avoids reception of the message sent by the device when you release the button. To ensure reliable reception, hold the button for a short period before releasing it.

- 4 If you want to make another assignment, repeat steps 2 and 3.

Note: If you wish to set up assignments for an entire Control Surface, be it supported or unsupported, make use of the *Control Surfaces > Learn Assignment for xxx* option. This is discussed in detail in the Control Surfaces section of the manual (see “Customizing Control Surfaces” on page 668).

Step Input

The Step Input functions allow you to insert MIDI notes when Logic is not in a realtime Record mode. This allows you to input notes that may be too fast for you to play, or may be useful if replicating sheet music, but you don't sight read. You can use any of the following for step entry:

- a screen keyboard (Step Input Keyboard window)
- the computer keyboard
- MIDI

Notes are inserted in all modes at the current song position. All three methods can, and should, be combined to make full use of the features that each option offers. Here is an example: you can set the note length in the Step Input Keyboard Window, insert notes via a MIDI keyboard and locate the Song Position Line using key commands.

Note: It is also possible to enter note data in realtime with the computer keyboard (see “Caps Lock Keyboard” on page 57).

Step Input Keyboard Window

The Step Input Keyboard window can be opened via the main menu *Windows > Step Input Keyboard*. It allows you to insert notes in any MIDI editor.



Key Commands

There is a set of key commands for the insertion of notes via the computer keyboard. To activate Step Input mode, the *In* button (see picture below) must be switched on in the selected MIDI editor.



This mode (and the *In* button) is available in the Event, Matrix, and Score Editor. You will find the relevant key commands in the *Keyboard Input* section of the Key Commands window.

MIDI Input

When the *In* button is engaged, you can insert notes via an external MIDI keyboard. You can use the Step Input Keyboard window and/or the Input key commands to adjust any settings that are not available from the MIDI keyboard itself. These include: the length of the note and location commands. As with Key Commands Input, the MIDI Input is available in the following windows: Event, Matrix, and Score Editor.

Input via Screen Keyboard

You can open the Step Input Keyboard window via *Windows > Step Input Keyboard*.

If you decide to work in the Score Editor, you need to adjust the display settings for the selected MIDI Region accordingly: Interpretation (see “Interpretation” on page 526) should be off, the Display Quantize (Qua) setting (see “Qua (Display Quantization)” on page 524) should be set to the smallest note value that you intend to insert.

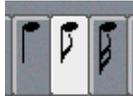
Before starting note entry, set the Song Position Line to the spot where you want to insert the first note. This can be done in a number of ways, such as adjusting the song position in the Transport window, for example.

Single Notes

We suggest that you use the mouse while familiarizing yourself with step entry. Click on the key of the desired pitch in the Step Input Keyboard, and make use of the buttons for note length, velocity, and other parameters. This will insert a note of the selected pitch (at the current song position, in the selected MIDI Region), with the length and velocity that you chose earlier in the Step Input Keyboard window.

The *pitch* of an inserted note is determined by the key that you click in the Step Input Keyboard window.

Length and *velocity* are determined by the corresponding buttons in that window. If the buttons look like those shown in the illustrations below, a sixteenth note with a velocity setting of 96 would be inserted—this value (96) corresponds to the forte (*f*) indicator. The eight available velocity values are represented by the traditional volume indicators *ppp*, *pp*, *p*, *mp*, *mf*, *f*, *ff*, and *fff*, which correspond to velocity values 16, 32, 48, 64, 80, 96, 112, and 127, respectively.



The MIDI channel of an inserted note is determined by the *Channel* setting in the Step Input Keyboard window.

Note: The channel settings of individual notes usually have no effect on the playback channel and therefore the sound of the MIDI Region—this is determined by the track instrument settings in the Arrange window. The channel settings of individual notes are mainly used for polyphonic score display.

Proceeding

After a note is inserted, the Song Position Line will always jump to the end of the inserted note. The following note can be inserted immediately, following the same principles.

Chords

To insert several notes at the same bar position, *Chord mode* needs to be activated. To do so, click on the button at the far left side of the window or use the *Chord Mode* key command.



Chord mode prevents the Song Position Line from moving after insertion of a note, allowing the user to insert as many notes as desired at the same bar position, one after the other. Another click on the Chord button (or the key command) will deactivate *Chord mode* (this should be done before inserting the last note into the chord), and the Song Position Line will advance as per usual, after note insertion.

Input via the Computer Keyboard

Note input with the computer keyboard follows the same principles as input via the on-screen keyboard (see “Input via Screen Keyboard” on page 53). Where it differs is that key commands are used for all functions, rather than choosing pitch, velocity, note length, and so on with mouse clicks. It is recommended that the Keyboard window should remain open when you first start using these functions, to make the learning process easier. Once familiar, you can leave it closed as it is unnecessary to open the Keyboard window when using key commands.

All key commands for step input are user definable. They can be found at the very bottom of the list, under the header *Keyboard Input*, in the *Preferences > Key Commands*.

Note: It is also possible to enter note data in realtime with the computer keyboard (see “Caps Lock Keyboard” on page 57).

Pitch

The twelve *Note C* to *Note B* key commands will insert a note (of the selected pitch) with the set length and velocity at the current song position in the selected MIDI Region. To insert chords, use the *Chord Mode* key command. You can switch off chord mode with the same key command.

Rather than assigning key commands to all twelve pitches, you also have the option to only define key commands for the seven pitches of the C major scale, and use these in combination with the *Next note will be sharp* and *Next note will be flat* key commands to insert the other pitches.

When creating a system for these key command assignments, two approaches seem obvious: either to arrange these commands on the computer keyboard similarly to a piano keyboard (C D E F G A B in one row, next to each other, and C# D# F# G# A# above these at corresponding positions), or to assign keys to pitches of the C major scale according to their note names—especially when the second approach mentioned above is used.

Octave Ranges

The octave of an inserted note depends on the current position of the insert range bar. This can be seen in the Keyboard Window: There is a small horizontal bar above the piano key image that spans one octave exactly. The chosen note will always be inserted inside the range marked by that bar.

This bar continuously changes its position in accordance with the last inserted note: The center of the insert range bar will always be aligned to the last inserted note. The next note will be inserted in that range unless the range bar is moved via key commands or the mouse.

An example: If a G is inserted immediately after inserting a C, the G will be placed below the C. Inserting the C places the range beam between G (left end) and F# (right end), with the C in the center. Regardless of which note is chosen next, it will always be inserted inside this range. The range beam will, however, move as further notes are inserted, with the (range beam) center always aligned to the most recently inserted note.

Further key commands allow you to place the range bar in different octaves: Octave 0 to Octave 6, and also Octave +1/-1/+2/-2, which move the range bar up or down one or two octaves. The range bar can also be moved with the mouse.

Note Length and Velocity

Note Length and Velocity are determined before a pitch command is used to actually insert a note. The currently selected values can be seen in the Keyboard Window.

Rests, Correction, Moving Forward and Back

The *Rest* key command moves the Song Position Line forward (in accordance with the currently set note value) without inserting a note, thereby creating a rest.

The *Step backwards* and *Step forward* key commands also move the Song Position Line forward or back by the length of the selected note value.

The *Erase* key command will delete the most recently inserted note, and move the Song Position Line back to the position where the note (previously) began. This allows quick corrections—another note can be inserted immediately, replacing the erased one.

Triplets, Dotted Note Groups

The *Next three notes are triplets* key command is self-explanatory. The rhythmic value of the triplets corresponds to the currently selected note value in the Keyboard Window. If an eighth note is selected, an eighth note triplet will be created. After three notes have been inserted, binary values will be inserted, unless the command is reused.

Next two notes are a dotted group works in a similar way. The special thing about this key command is that a pair of notes that complement each other will be inserted. A dotted eighth and a sixteenth note, for example.

Interaction with other key commands

If the input mode is activated in an editor window (Score, Matrix, or Event List), these key commands have priority over all other key commands.

This means that you may also assign keys or key combinations to these functions which are already assigned to other functions. As long as the input mode is active, these key assignments will apply; if the input mode is switched off, any other assignments (for the same keys) will have priority.

Note: As you can use key assignments that are already in use for other functions, you should take care to avoid using keys that are assigned to functions that you might also want to use when working in step input mode.

Input via MIDI

Note input via MIDI works as per input via the on-screen keyboard (see “Input via Screen Keyboard” on page 53). Obviously, you press keys on your real-world MIDI keyboard, rather than clicking notes on the on-screen keyboard. Incoming MIDI note Velocity information is stored when using MIDI Step Input. It is recommended that the Keyboard window should remain open when you first start using these functions, to make the learning process easier. Once familiar, you can leave it closed as it is unnecessary to open the Keyboard window when using key commands.

It is also recommended that you make use of the Input key commands (see “Input via the Computer Keyboard” on page 55) to quickly switch values such as the note length, or to determine the insert position.

Chords can be inserted by playing the chord on the MIDI keyboard. You don’t need to switch on *Chord Mode* in order to do so.

Caps Lock Keyboard

This feature allows you to use the computer keyboard as a realtime MIDI keyboard. This is ideal for situations where no external MIDI or USB keyboard is available, such as when travelling with your PowerBook.

The Caps Lock Keyboard supports more than ten octaves, and even includes support of Sustain and Velocity information.

The Caps Lock Keyboard is enabled/disabled by pressing the Caps Lock key on your computer keyboard. As long as the Caps Lock LED is lit, your Caps Lock Keyboard is active.

Needless to say, while in this mode, many keys have different functions and their usual key command assignments are *not* active.



This is the English version of the CapsLock Keyboard—German, Spanish, or French versions will appear, dependent on your Mac OS X Keyboard setting.

The Escape key sends an *All Notes Off* command, should you encounter hanging notes.

The numeric keys (above the QWERTY keyboard) are used to define the octave for the MIDI keyboard.

The two rows below the numeric keys function as the actual MIDI keyboard keys, starting with the note C, assigned to the alphabetical A key (or Q, as would be the case if using a French keyboard, for example).

See the black and white keys in the picture above for details.

The lowest row of letter keys sets the velocity for MIDI notes. There are preset values ranging from pianissimo to forte fortissimo. Each value can be finely adjusted via the two keys to the right of this row (these are assigned to the comma and period keys on an English QWERTY type keyboard). This keyboard configuration allows you to send any MIDI velocity value from 1 to 127.

The Space bar provides a Sustain function—played with your thumbs rather than your feet. You can freely trigger new notes or switch between octave or velocity values while notes are sustained.

The current octave and velocity values for the MIDI notes are displayed at the upper edge of the Caps Lock Keyboard window. A Transparency fader is also available for this window, making visualization clearer or allowing the window to be “ghosted” over the background.

Caps Lock Keyboard Preferences

The *Enable Caps Lock Keys* option allows you to completely enable or disable the Caps Lock Keyboard functionality.

After familiarizing yourself with the operation of the Caps Lock Keyboard for a while, you may wish to prevent the window from appearing when using it. To do so, disable the *Show Window when Active* option in the *Preferences > Global > Caps Lock Keys* menu.



Should you wish to use the Space bar key command (usually Start/Stop), rather than as the Sustain function for the Caps Lock Keyboard (when active), you can disable the *Preferences > Global > Caps Lock Keys > Space bar acts as Sustain Pedal* option.

Additional Caps Lock Keyboard Info

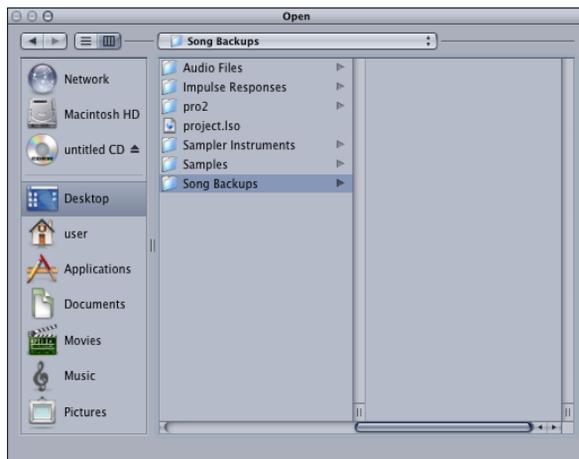
Due to technical limitations of computer keyboards, there is a maximum number of six notes that can be played simultaneously. There are further limitations regarding timing precision, and when trying to play certain note clusters (which are musically unusual, at any rate).

Please keep in mind the original intention of this facility—as a useful aid when composing on a train or plane—not as a full-on replacement for a real MIDI keyboard.

Song Administration

All events, other objects and settings (apart from the preferences and key commands) are components of a song. Songs are handled in the main File menu.

Projects



The illustration above shows a typical Project folder file structure in Logic's Open dialog.

Creating a Project

The *File > New* entry launches the following dialog:



If the *Create Project Folder* checkbox remains unchecked and no template is selected in the Templates menu, functionality is as follows:

- The Autoload Song will be opened. The search for the Autoload Song is conducted in the following order:
 - Preset Templates folder (/Library/Application Support/Logic/Song Templates/Autoload or Autoload.Iso)
 - User Templates folder (~/.Library/Application Support/Logic/Song Templates/Autoload or Autoload.Iso)
 - the Application folder (Logic 6 series/Autoload or Autoload.Iso).
- If no Autoload Song exists in any of the aforementioned locations, or the Option key is pressed, the empty default song (based on the .plist created by the Logic Setup Assistant) will be launched.

Note: The search for the Autoload Song, as you'll note from the above, takes place in the Templates folders before searching the Application folder. In earlier Logic versions, the Autoload Song needed to be placed inside the Logic program folder. While this can still be done, we encourage you to move your existing Autoload Song into the User Templates folder (see "About Templates" on page 65).

If the *Create Project Folder* box is selected, followed by a click on the *OK* button, a project will be opened, rather than a song or template. This occurs in the following fashion:

- A folder is created in the chosen location, with the desired name—as typed in by you.
- A song is opened (either the empty default song if no template was chosen, or the chosen template song).
- This song is saved into the newly-created folder.
- An *Audio Files* folder is created within the new folder.

- The audio recording path is automatically routed to the new *Project > Audio Files* folder.

The checkboxes below the *Set* button represent the Project settings (these can be changed at any time). The project settings determine how files imported from external locations (locations outside the project folder) should be handled. They either:

- stay where they are (if the checkbox is unchecked)
- or are copied into the project folder (if the checkbox is checked).

Audio files are automatically moved as soon as they are imported into the Audio window (resulting in a sample rate conversion, if necessary).

Note: The *Convert Audio File Sample Rate When Importing* option is designed to allow the automatic sample rate conversion of imported audio files.

EXS instruments, samples and Space Designer impulse responses are only moved into the project folder when the song is saved.

If you disable the *Copy EXS Samples to Project Folder* option, only the EXS instrument files will be automatically copied to the project folder when saving, not the samples associated with the EXS instrument files.

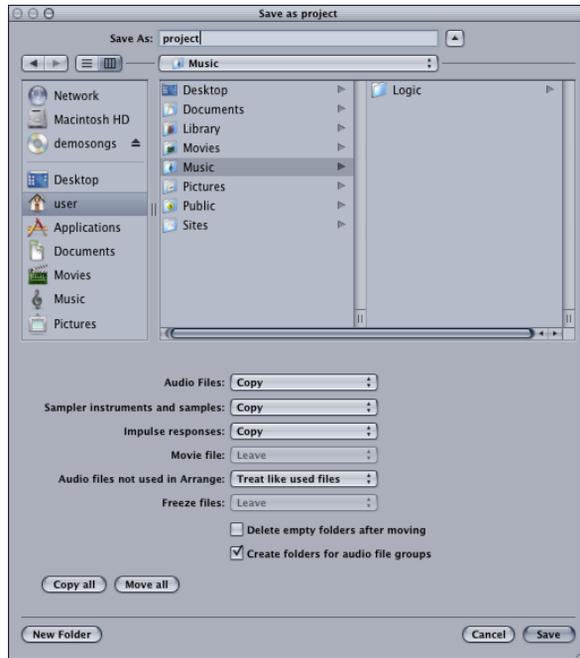
Project settings can be changed via the *File > Project > Settings* menu entry, which launches the following dialog:



If *Copy* (or *Move*, see “Saving as Project” section below) is set for audio files, sampler instruments/samples or Space Designer impulse responses, the “copy” flag will be associated with that file type in the Project settings.

Warning: If a new project is closed without saving it, you will be asked if the created files and folders should be deleted. Clicking on *Delete* will result in all files (including any newly-recorded audio files) being moved to the trash—so take care!

Saving as Project



You can use the *File > Save as Project* function to save a song or project. If the open song isn't already a project, the saved song file is assigned "project" status. This allows you to set the Project settings (*File > Project > Settings*) which determine how imported files are handled. This also makes the project "safe," allowing you to move or copy the project folder without losing any file references that point to items within the folder.

In the *Save As Project* dialog you can choose, if the project files should be copied or moved into the project folder.

The *Sampler Instruments and Samples* pull-down menu in the *Save as Project* dialog features a *Copy Instruments Only* option which leaves the samples in their existing location.

The *Copy All* button presets all pull-down menus to the *Copy* state.

The *Move All* button presets all pull-down menus to the *Move* state.

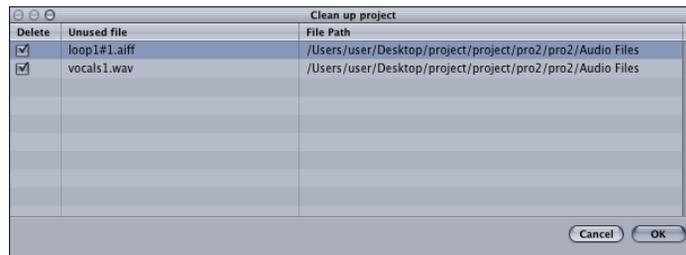
The *Create Folders for Audio File Groups* checkbox allows Logic to move or copy the audio files to subfolders named after the group that the audio file belongs to (if applicable). See the "Audio Window Groups" section on page 357 for further information.

Copying or Moving the Project Folder

If the project folder is moved or copied to another location, the files in the resulting folder will still be found correctly, provided that they are all in (or are in subfolders of) the appropriate project subfolder—audio files are found in the *Audio Files* sub-folder, samples in the *Samples* sub-folder, sampler instruments in *Sampler Instruments* sub-folder and so on.

Project Clean up

Should there be any unused audio files or EXS instruments in your project folder, make use of the *File > Project > Clean up* menu option. If any unused audio or EXS instrument files are found, the following dialog will be displayed:



The checkboxes in the first column can be used to remove/add items to/from the deletion list. The name and path of the file to be deleted is shown in the last two columns.

Only files with active checkboxes in the first column will be deleted. All unchecked entries will remain untouched.

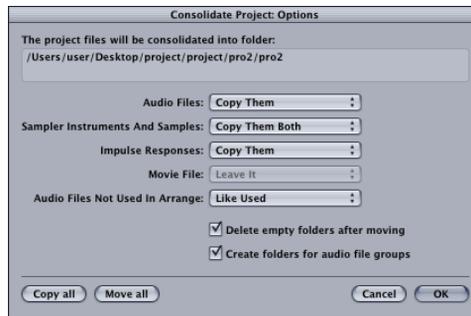
If multiple rows are selected, a click on any checkbox will switch all selected rows to the new state.

Note: Clean up will only delete unused audio files (WAVE, SDII, AIFF) and EXS instrument files. All other files will be ignored.

Note: Clean up takes into account the project currently loaded, and all other Logic songs in the project folder—only files that are not used by any of these songs will be displayed in the “Clean up” list.

Consolidate Project Settings

The *File > Project > Consolidate* function launches the following dialog:



As you can see, it is basically the same as the *Save As Project* dialog, but with the *Song File* pull-down menu missing.

How Consolidate Works

- If *Consolidate* is used on a saved song, the song will be moved into a newly created folder (named after the song). Following the consolidation, the usual *Save As Project* functions (copying or moving files) can be performed. The newly saved song is assigned “project” status (see page 62), allowing you to change the Project settings after the fact, and making the song folder safe to move or copy.
- If *Consolidate* is used on a song which is already a project, all referenced files that are not yet in the correct location within the project folder are automatically moved or copied (dependent on the specified options) to the appropriate sub-folders.

Project Preferences

The dialog options for all of the abovementioned operations are saved into the preferences file.

The default settings for these dialogs are as follows:

- Move Song
- Copy Audio
- Copy Impulse Responses
- Copy EXS Instruments
- Delete Empty Directories
- Unused Audio like Used
- Create Group Folders

Once any changes have been made to these options, and the dialog was closed by pressing the *OK* button, the default values are overwritten, and the new settings will be used.

ReCycle Import Handling in Projects

EXS instruments created via a ReCycle import are placed in a *Sampler Instruments/ReCycle* sub-folder of the project folder. All audio data generated by a ReCycle import are placed in the *ReCycle Audio* folder, alongside the song file.

About Templates

A template is a song file that is stored in either of two specific locations (see below). Any song file may act as a template. You can view templates much like having multiple Autoload Songs.

The advantage of using templates is that not all projects have the same needs, so customizing several songs to meet these needs offers an ideal “starting point” for different jobs. As examples:

- A template that is software instrument-focussed, for Dance projects. This would feature 32 Audio Instrument tracks, and say eight audio tracks.
- An audio track-centric template, featuring say 64 audio tracks, would be ideal for live recording.
- A specific live performance template that makes the job of quickly switching between parts faster, or perhaps makes heavy use of Environment Objects such as Arpeggiators or Touch Tracks.
- Several scoring templates for: choirs, a rock band, symphony orchestra, string quartet, jazz combo, and so on.
- A template containing folder tracks and modified synchronization settings for control of ADATs.
- A template for video work. This would typically contain a Video track plus specific dialog, foley, and music tracks.
- A second video template could be used for jobs where the video is running on an external video tape machine that is synchronized with Logic via SMPTE.
- Screensets can be customized for each template, or you can make use of the Import functions to copy them between templates.

To use Templates:

- Choose *File > New* and select a template in the *Template* pop-up menu, that shows all songs in the */Library/Application Support/Logic/Song Templates* (system volume) folder and the *~/Library/Application Support/Logic/Song Templates* (user) folder.

To save Templates:

- Simply select the *File > Save as Template* menu option, and type in the desired name.

Loading a Song

You use *File > Open* (Command-O) to launch a typical file selection box. If there is already a song loaded, you will be asked if the currently-loaded song should be closed (select *Close*) or not (select *Don't Close*). You can disable this prompt by selecting *Preferences > Global > Song Handling > When Opening a song, ask to 'Close current song(s)?'*

File > Open

The Open dialog offers an *Open File Type* menu, where you can activate the following options:

- All Logic document types—Displays all song file types supported by Logic.
- Logic Songs—Songs created with current or earlier Logic versions.
- GarageBand songs—Songs created in Apple's GarageBand application.
- Notator SL songs—Songs created in C-Lab/Emagic Notator or Creator SL.
- MIDI Files—Standard MIDI Files in either format 0 or 1 can be loaded.
- AAF files—Advanced Authoring Format used by other DAW applications such as Pro Tools. It allows multiple audio tracks to be imported, with reference to tracks and position, volume automation included.
- OMF Interchange files—Open Media Framework files used by other DAW applications such as ProTools. It allows multiple audio tracks to be imported, with all positional information retained.
- OpenTL files—OpenTL (Open Track List) files are used in devices such as Tascam hard disk recorders. It allows multiple audio tracks to be imported, with all positional information retained.
- XML (Final Cut Pro)—An open source standard, supported by Final Cut Pro and SoundTrack, allowing multiple audio tracks to be imported, with all positional information retained.

Direct Access to Your Current Songs

You can open any of your most recently opened songs directly without the usual file selection dialog by selecting *File > Open Recent*.

Different Songs Open at the Same Time

If you have several songs open at once, you can switch the currently active song from the *Windows* menu—the active song is the one marked with a tick. Provided that the *Preferences > Global > Hide Windows of Inactive Songs* option is switched off, you can also switch the active song by clicking on one of the other song windows.

Song and MIDI File Import by Drag and Drop

Songs and Standard MIDI files can be dragged from the Finder, and dropped into the Logic Arrange window. The mouse position—when the mouse button is released—determines the clock position (rounded by bar) and destination of the first track for placement of the imported file.

Opening pre Version 7 Songs

When loading a song created in a pre-version 7 Logic, the song format will be converted to the version 7 format. When saving this song for the first time, a file selector dialog will be opened, so that the old song file will not be overwritten automatically.

Note: Once saved in version 7 format, a song can no longer be opened with versions prior to version 7 (exception: Logic versions 6.4.3 and higher can open the song, but at the expense of all Logic 7 specific features). A song can be exported (see “Saving Songs” on page 68) as a version 4.8 song.

Special Functions

Importing Settings from Other Songs

The main menu bar’s *File > Song Settings > Import Settings* function allows you to import various settings from other songs (you can also use the *Import Settings* key command). These settings include:

- Screensets
- Transform Sets
- Hyper Edit Sets
- Score Instrument Sets
- Score Styles
- Score Settings (all Song Settings that pertain to the Score, such as *Numbers & Names* or *Clefs & Signatures...*)

To import settings from another song:

- 1 Select *File > Song Settings > Import Settings*. A dialog box appears, and you can select the desired settings, individually.
- 2 If you only want to import the Screensets from a given song, for example, then limit your selection to this particular option.
- 3 Click on *Import*, or hit Enter.
- 4 If only one song is currently loaded, a file selector box will open, enabling you to select the song that you wish to import the settings from.
- 5 If several songs are loaded, the file selector box will not appear. In this scenario, the settings from the song that was active prior to the current one are imported automatically.

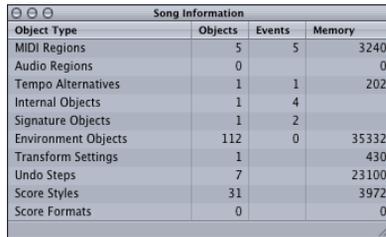
Checking/Repairing Songs

If you double-click on the remaining number of free events display (see “Tempo/Free Memory” on page 90) on the Transport Bar, the memory will be reconfigured. At the same time, the current song will be checked for any signs of damage, structural problems, and unused blocks.

If any unused blocks are found—which normally shouldn't happen—you will be able to remove these, and repair the song.

Song Information Window

The Song Information window can be opened via *Options > Song Information*.



Object Type	Objects	Events	Memory
MIDI Regions	5	5	3240
Audio Regions	0		0
Tempo Alternatives	1	1	202
Internal Objects	1	4	
Signature Objects	1	2	
Environment Objects	112	0	35332
Transform Settings	1		430
Undo Steps	7		23100
Score Styles	31		3972
Score Formats	0		0

It contains information about various aspects of your song. This information might not be directly useful for you, but you may be asked to provide this information (in case there is problem with a specific song) by the Support Team.

Saving Songs

When you select *File > Save* (or Command-S), the current song will be saved—with its current name intact.

If you don't wish to overwrite the last version of the song saved with this name (which is what will happen if you use *File > Save* or Command-S), make use of the *File > Save As* or *File > Save a Copy As* options. In the ensuing file selector dialog, you can enter a new name for the song (and select a new directory or even create a new folder).

- *File > Save as*—The next time you save using the straight *Save* (Command-S) function, the new file name and path will be used.
- *File > Save a Copy As*—The next time you save with the straight *Save* (Command-S) function, the existing file name and path will continue to be used. The “copy” is a replica of the existing song, stored in a different location. It does not update the file save path. *Save a Copy as* is ideal for archiving and moving data.

Important: Songs saved in version 7 of Logic cannot be opened in older versions.

Export Song as Logic 4.8 Song

Choose *File > Export > Song as Logic 4.8 Song* to save your song in Logic 4.8 format. This allows versions prior to version 5 to open a song file. Please note that not all song information can be stored in the older format, including any track automation data (see “Automation—Introduction” on page 313). You may wish to convert track automation data into Region data first, should you need to export in 4.8 Song format.

Automatic Backup Files

When you save a song, Logic will first make a safety copy of the previous file. You can switch off this function in the Global preferences (*Preferences > Global*), and also set the number of backup files that will be made—up to 100.

This function allows you to store up to 100 earlier versions of your song, thereby retaining a complete record of your song's development.

Backup files are saved in a backup folder within the Project folder, and are named after the song/project, but feature the “.bak” file name extension. The backup files themselves are also named after the song, but are sequentially numbered. As an example: if the song is called “My Song”, the backup folder will be “My Song.bak”, and the backup files within the folder will be called “My Song00”, “My Song01”, and so on.

Note: If you want to know what the latest version is, take a look at the contents of the Project > Backup folder in the Finder, making sure you sort the contents of the window by date (select “By Date” in the Finder’s View menu with the backup folder open, and selected). The Finder cannot distinguish between files if they were saved during the same minute.

Reverting to the Saved Version

Any time you make a mistake, you can undo it by selecting *Edit > Undo* (Command Z).

If you have made some *really* serious blunders (as unlikely as that may be), or you decide that in the 15 minutes since you last saved, your creative efforts have resulted in material too unpleasant to describe here politely, you may find the *File > Revert to Saved* function very helpful. This replaces the current song with the previously saved version.

Closing and Quitting

Closing a Song

File > Close (Command-Option-W) closes the currently active song. If you have made any changes since the last save operation, Logic will ask you if the song should be re-saved before closing, to preserve any changes you have made.

Close Window or Song

If you have more than one window open in a song, the *Close Window or Song* key command will only close the uppermost window, not the whole song. The song will only be properly closed when all windows are closed. The default key command for this is Command-W.

Quitting the Program

Choose *File > Quit* (Command-Q) to leave the program. If you've made changes, but haven't saved them, you will be asked if you want to do so before quitting (press Enter to save).

Closing the Song without Saving

The *Close Song without Save* key command closes the currently active song without saving it—and you will not be asked to do so. This command was included at the request of many experienced Logic users. Please only use it if you know what you're doing.

Standard MIDI Files

Standard MIDI files are not specific to a particular sequencer program, or type of computer. They contain the following information:

- MIDI events, including time positions and channel assignments
- Names of the individual tracks
- Names and positions of markers
- Tempo changes
- Copyright marks

Logic supports the importing and exporting of Standard MIDI file formats 0 and 1:

- Format 0 can contain one track.
- Format 1 can contain multiple tracks.

Neither format recognizes any division of a track (into several MIDI Regions, for example).

Loading Standard MIDI Files

To load a Standard MIDI file, select *File > Import*.

Note: If you select the MIDI files option in the Open file type menu, only MIDI files will be displayed in the File Selector.

If a song is loaded, you will be asked to “Create new environment or copy current environment for MIDI File? New/Copy”:

If you click *Copy*, the existing environment is copied. The tracks of the Standard MIDI file are automatically assigned to suitable instruments.

If no song is loaded, or you answer the question by clicking *New*, the default environment (the default song) is used.

Copyright

The copyright mark is read as Marker text.

Bank Select

When you open Standard MIDI files, program change and controller events occurring at the same position are moved by one tick, so that they will remain in their intended order. This prevents Logic from reversing the transmission order of events. The reason for this is that certain MIDI devices will not respond properly to program change and bank select events that do not occur in the correct order.

This also guarantees that there will be no timing problems, because the transmission of a MIDI event always lasts longer than one tick.

Saving Standard MIDI Files

If you want to play a Logic song on another sequencer, you can do so by saving it as a Standard MIDI File. Consult the other sequencer's instruction manual to see what Standard MIDI File formats it can read. Any sequencer should be able to interpret at least the type 0 file format.

Preparing the Song

Due to limitations of the Standard MIDI File format, you should prepare your Logic song in the following way:

- Neutralize all playback parameters with the normalize function (select them all by pressing Command-A, then select *MIDI > Region Parameters > Normalize Region Parameters*)
- Convert all playback quantization with the *Apply Quantization Settings Destructively* function (Command-A, *MIDI > Region Parameters > Apply Quantization Settings Destructively*)
- Convert all aliases into real copies (Command-A, *MIDI > Alias > Turn to Real Copy*)
- Convert all loops into real copies (Command-A, *MIDI > Region Parameters > Turn Loops to Real Copies*)
- Convert all MIDI Regions on each track into a continuous MIDI Region (Command-A, *Region > Merge > Regions per Tracks*)
- *MIDI > Insert Instrument MIDI settings as Events*

Additional preparations for file format 0

As Standard MIDI file type 0 format files can only save one MIDI Region, you must also merge all MIDI Regions into one (Command-A, *Region > Merge > Regions*).

Saving a Song as a Standard MIDI File

Select all of the required MIDI Regions, and select *File > Export > Export Selection as MIDI File*. You can now enter the destination directory. Remember that most hardware sequencers can only read MS-DOS formatted disks, so limit your file name to an 8.3 character name. As an example: "song0001.MID".

In File Format 0

Ensure that the *Preferences > Global > 'Export MIDI File...'* saves single MIDI Regions as File Format 0 parameter is checked. If it is, selecting *File > Export > Export Selection as MIDI File* when only one MIDI Region is selected means that file format 0 will automatically be used.

Apple Loops

Logic ships with a number of Apple Loops. Apple Loops are musical phrases that can be repeated seamlessly. In comparison to “normal” audio loops, Apple Loops have a significant advantage: they can be transposed and (automatically) time stretched. Logic allows you to import Apple Loops, using the Loop Browser. You can also create your own Apple Loops with the Apple Loops Utility.

The Loop Browser

The Loop Browser allows the import of Apple Loops. When you add an Apple Loop to a Logic song, it will automatically be matched with the tempo and key of the song. This function allows you to use several Apple Loops simultaneously, even if they are of different speeds and keys.

The Audio menu contains a Loop Browser option that launches the following window, when selected.



The new Apple Loops file format adds tags that allows you to quickly locate files by *Instrument, Genre, or Mood*. Further search refinements can be made by *Scale* and *Signature*.

The *View* buttons at the top left switch between a matrix display and a traditional Mac OS X file menu that is hierarchically separated into *All, By Genre, By Instruments, By Moods*, and *Favorites* search criteria.

The *Scale* pull-down menu offers *Minor, Major, Neither, and Good For Both* options. Use of these options limits the search for Apple Loops to the selected *Scale* type, within the chosen category. As an example, if *Country, Acoustic, and Relaxed* categories were selected, you would be presented with twenty files that matched your choices. Selection of the *Minor Scale* option would reduce this list to ten possible Apple Loops, making the task of auditioning and selecting the most appropriate material faster.

The *Signature* pull-down menu performs a similar task to the *Scale* menu, but limits searches to Apple Loops that match the selected time signature.

The *Search field* is used to find Apple Loops by name or partial name:

- Type in the desired search term, and press the Return key. Any files that match your search term will be displayed in the file browser at the bottom of the window.
- The *Cancel* button to the right (which appears as soon as any text was entered) clears any entered text. It also clears the search history.
- The *Find* menu to the left (the magnifying glass) retains a history of recently used search terms.

The categories matrix shows categories by instrument, genre, or mood. Simply click on the desired boxes in the matrix to narrow your search for appropriate Apple Loops. Selected boxes are highlighted. Multiple categories can be selected, either in conjunction with the *Scale* and *Signature* pull-down options, or without.

Note: You can switch a displayed category via the pop-up menu that opens when you Control-click the category box.

The *Key* pull-down menu determines the playback key of the selected Apple Loop.

Note: Any chord in the Chord track can affect the playback key of Apple Loops. So, if you have any chords defined in your Chord track, the *Follow Chord Track* option will automatically be selected in this pull-down menu.

The *Volume* fader adjusts the playback level of the selected file in the Loop Browser window.

The list at the bottom of the window displays all Apple Loops that match the criteria set with the parameters discussed above.

- Clicking on any of the column titles will sort the list of results by *Name, Tempo, Key*, and so on.

- Clicking on the arrow in any *selected* column title will sort the list in ascending or descending alphabetical, tempo, key, beat, or favorite order.
- Columns can be resized by dragging the vertical lines between column titles.
- Selection of any entry in the list of files will automatically begin playback. You can stop playback by clicking on the speaker icon in the left-hand column.

There are two types of Apple Loops: those featuring a blue sound wave icon and others with a green note icon. The Apple Loops that feature the blue icon can be added to audio tracks, and can be edited like other Audio Regions. These files have the major advantage of automatic tempo and key matching to that of the song tempo and key.

The Apple Loops that feature the green icon can also be added to audio tracks, where they behave exactly like their blue icon counterparts. They may further be added to all Audio Instrument and MIDI tracks. On such tracks, these files they can be edited like other MIDI Regions, including individual note editing.

Another interesting thing about the green Apple Loops is that if dragged onto a “blank” Audio Instrument track (one with an empty channel strip), the corresponding instrument, effect, and input setting are automatically inserted.

Note: The *Transpose* Global track will only transpose Apple Loops used on audio tracks by ± 36 semitones. This is a designed limitation in Logic, as Apple Loops don’t sound that great when transposed further. This is also true for the *Transpose* parameter of the Region Parameter box.

To add an Apple Loop to your song:

- Simply drag the desired loop to the appropriate track and desired position.

Apple Loops Utility

The Apple Loops Utility allows you to create your own Apple Loops. Apple Loops are simply audio loops that include metadata “tags” with your loops. These tags provide information about the audio recorded in a file.

Logic uses tags in one of two ways:

- to help locate files when using the Search features of Logic’s Loop Browser.
- to provide information that Logic uses when matching the file’s tempo and key to the project tempo and key, this ensuring the best possible playback quality.

Tagged audio files can also contain information about transients. Transients indicate where beats occur in the file, and Logic uses these transients to play back audio files at the highest level of quality. The Apple Loops Utility can detect transients present in an audio file, and you can use the utility to add markers for additional transients, and move them to new locations.

If you select a Region in Logic's Arrange window and choose *Audio > Open in Apple Loops Utility* the following window opens:

The Apple Loops Utility window consists of the *Tags* and *Transients* panes. The bottom of the window includes a set of playback controls and file management buttons. The Apple Loops Utility also includes an *Assets* drawer, located to the right of the main window, where you manage open files.

Tags Pane

The Tags pane includes areas for different types of tags. It also includes a set of playback controls that you can use to listen to an open file.

Property Tags

- Number of Beats field: Displays the number of beats in the file.
- File Type button: sets the file type, which can be *One-shot* (One-shots are audio files not suitable for repetition) or *Looped*.
- Key pop-up menu: Sets the key of the file.
- Scale Type pop-up menu: Sets the file's scale type. The choices are Major, Minor, Good for Both, and Neither.
- Time Signature pop-up menu: Sets the file's time signature. The choices are 4/4, 3/4, 5/4, 6/8, and 7/8.
- Author field: Displays the name of the file's author.
- Copyright field: Displays the file's copyright date, if one exists.
- Comment field: Displays any comments about the file.

Search Tags

These tags are used by the Search feature in Logic's Loop Browser when you search for files matching specific criteria.

- Genre pop-up menu: Displays choices for the musical genre of the file.
- Instrumentation list: Displays choices for the musical instrument or instrument category recorded in the file. Selecting an instrument category in the left column displays the list of instruments in that category in the right column.

File Info

This area of the Tags pane includes rows with Kind, Length, Date Modified, Sample Rate, Channels, Tempo, and File Location information. This information is for viewing only, and cannot be edited in the Tags pane.

Descriptors

Descriptors are complementary pairs of keywords that describe the mood or character of the music recorded in the file. Each pair of keywords offers a row of buttons, allowing you to choose either one keyword from the pair, or neither keyword.

Transients Pane

The Transients pane contains a large waveform display, with a Beat ruler and a horizontal scroll bar. Markers indicate the position of transients in the file. Typically, transients correspond to the widest parts of a sound's waveform. The Transients pane includes controls for the beat division and transient detection sensitivity. You can also listen to the file (using the playback controls) to determine where transients occur.

The Transients pane includes the following controls:

- **Transient Division pop-up menu:** Sets the beat value used for transient detection by the Apple Loops Utility. Choosing a larger beat value results in fewer transients being detected. Choosing a smaller beat value can also result in fewer transients being detected, if they are present in the audio recorded in the file.
- **Sensitivity slider:** Sets the degree of sensitivity for transient detection. When you increase the sensitivity of transient detection, the Apple Loops Utility considers points of higher amplitude in the waveform as transients, regardless of whether or not they occur at a beat value.

When you open a file in the Apple Loops Utility, it looks for transients at every 16th note position, based on the file's tempo and number of beats tags. You can change the beat value used for transient detection via the Transient Division pop-up menu.

To display a file in the Transients pane:

- Select the file in the Assets drawer, then click the Transients tab.

Note: The Transients window can only display one file at a time. If multiple files are selected, no waveform is displayed in the window.

The waveform display in the Transients pane displays both the transients detected by the Apple Loops Utility and transients you add to the file. You can add transients and move existing transients in the Transients pane.

To add a new transient:

- Click in the darker area above the Beat ruler in the waveform display.

To move a transient marker:

- Drag the marker by its handle in the area above the Beat ruler.

To remove a transient, do one of the following:

- Click the transient's handle in the area above the Beat ruler, then press the Delete key.
- Drag the transient out of the area above the Beat ruler.

Assets Drawer

The Assets drawer lists the files open in the Apple Loops Utility. The drawer contains a Name column that lists the name of each open file, and a Changes column, which indicates any files that you have altered.

Playback and File Management Controls

The bottom of the Apple Loops Utility window contains a set of playback controls, allowing you to audition the selected file. These controls do not affect the file's tags.

- Go to Beginning button: Starts playback from the beginning of the selected file.
- Play button: Plays back the selected file.
- Stop button: Stops playback of the selected file.
- Key pop-up menu: Transposes the selected file to a new key for playback.
- Tempo slider: Sets the playback tempo of the selected file.
- Volume slider: Sets the playback volume of the selected file.

Note: When multiple files are selected, the playback controls are not available. You cannot play more than one file at a time.

There are two additional buttons at the bottom of the window, the Assets button and the Save button.

- Assets button: Shows and hides the Assets drawer.
- Save button: Saves your changes to the currently selected files in the Assets drawer.

GarageBand File Import

Logic supports the importing of *GarageBand* files via the *File > Open* menu option.

On opening the file:

- Logic will automatically create the required number, and type, of tracks to mirror those used in the *GarageBand* song.
- Apple Loops audio data should import without issues.
- The tempo of the *GarageBand* song will be used.
- Software Instrument parts will be played by *GarageBand* Instruments in Logic. Further to this, any mixing data and effects (plus their Settings) used by Software Instruments or Apple Loops-based tracks in *GarageBand* will also be imported into Logic.

Once the *GarageBand* song is loaded into Logic, you may freely change parts, mixing levels, instrument, and effect parameters as in any Logic project.

GarageBand Instruments are automatically installed with Logic.

You can insert them exactly as you would with other software instruments:

- 1 Click-hold on an Audio Object's Instrument slot.
- 2 The Instrument menu appears, showing all of Logic's available instruments. Move the mouse through the different levels to *Mono/Stereo > Logic > GarageBand Instruments* and choose an Instrument by releasing the mouse.

The Channel Strip settings of GarageBand translate 1:1 into Logic—with the nice exception that you can now access the individual plug-ins that are inserted into a GarageBand channel strip. The GarageBand Channel Strip setting files are visible in Logic’s Channel Strip menu in a subfolder called GarageBand. Logic’s Channel Strip menu is accessible via a long click on the word *Inserts* on each channel strip.

GarageBand’s two bus effects (Reverb and Echo) are also translated when opened in Logic. They are replaced by the Platinum Verb and Tape Delay on Busses 1 and 2.

Note: GarageBand projects will only open in Logic Express 7 and Logic Pro 7—not in older Logic versions. It is not possible to open Logic songs in GarageBand.

More information about GarageBand file support in Logic can be found in the “Introduction to Logic for GarageBand Users” tutorial.

ReCycle Import

ReCycle is the name of a software application by manufacturer Propellerheads, which mainly serves as an editing and production tool for loops (repeatedly looped audio samples). ReCycle uses specific file formats that can be imported by Logic.

Recognized ReCycle File Formats

Logic can import the following file formats:

Old ReCycle File

- File Suffix: .rcy
- Abbreviation: RCSO

Old ReCycle export file

- File Suffix: .rex
- Abbreviation: REX

ReCycle 2.0 file

- File Suffix: .rx2
- Abbreviation: REX2

Importing ReCycle files into the Arrange Window

To import a ReCycle file to an audio track use the same options as for normal audio files:

- Select *Audio > Import Audio File* and select a ReCycle file instead of a regular audio file, or
- Command-Shift-click on an audio track and select a ReCycle file, or
- Drag a ReCycle file from the Macintosh Finder onto an audio track.

As a result, Logic will create a folder containing one audio track (using the same Audio Mixer Object as the track it is created on) which in turn contains the slices of the ReCycle file at the appropriate positions. Each of these slices will reference the same audio file, which can be found in the Audio Window, as usual.

Important: If you move the created folder to another audio track, the Audio Mixer Object references will not change accordingly! You will need to open the folder and change it manually if that is what you want to do.

Copying Audio Data into the Clipboard

You can copy audio data into the Clipboard for further use in ReCycle by selecting local window *Audio > Copy ReCycle Loop*. This option will only be active if you have selected one audio part in the Arrange window, and will copy the selected region of the referenced audio file into the Clipboard. You can then use the *Paste as new document* function in ReCycle to create a new ReCycle document using this audio data. In conjunction with the *Paste ReCycle Loop* function (see below), you can perform a complete data transfer from Logic to ReCycle, and back, without using any file selector dialogs!

The size of the transferred audio region is limited to 10 MB, due to the fact that the Clipboard resides in the computer's RAM. 10 MB, however, should be sufficient for most ReCycle loops (an eight bar stereo loop in 4/4 at 70 bpm uses approximately 5 MB, for example).

Pasting ReCycle loops into the Arrange Window

If you use the "Copy Loop" option in ReCycle to copy the loop currently being edited into your computer's Clipboard, you can paste this loop into the Arrange window by selecting *Audio > Paste ReCycle Loop*. The result will be the same as if a ReCycle file had been imported.

Recycle File Import Overlap Function

On occasion, you may encounter a dialog regarding overlaps, when importing Recycle files.

The launching of this window results from:

- The tempo used in Logic being higher than that of the imported Recycle file.
- Use of the Stretch function in ReCycle.

You may handle the imported file in the following ways:

- *Don't Fix*—imports the file as is. All "slices" of the file will overlap, to match Logic's tempo.

- *Add tracks*—will distribute the slices across multiple audio tracks, allowing you to adjust the position or delete slices freely. The *Number of additional Audio tracks* panel in the window determines how many tracks are used for the distribution of the slices. These tracks are in addition to the original audio track, on which the Recycle file was imported.
- *Crossfade*—All slices of the file are imported to the same track and automatically crossfaded. The crossfade is equal powered. The length of the crossfade is determined by the value (shown in milliseconds) displayed in the *Crossfade length* panel.
- *Render into single file*—When importing Rex files this function writes all ReCycle slices into a single audio file using the current Logic song tempo for the rendering process.

The adjustment of the numerical values is via use of the mouse as a slider, or double-clicking on the panel(s), and direct numerical entry.

Audio Export and Import

Logic has the ability to export and import song contents using the *OMF* (Open Media Framework, also known as *OMFI*—Open Media Framework Interchange), *AAF*, *OpenTL* (Open Track List) and *Final Cut Pro/XML* file formats. These functions can be found in Logic's global File menu. There, you will also find various Track and Region Export functions. The following section explains the use of Logic's Export/Import functions.

OMF Export/Import

Typically, the OMF format is used for data exchange with Digidesign ProTools software. The OMF file format only supports the exchange of audio data (audio media and the usage of this audio media in a song)—MIDI and automation data will be ignored when using the export functions.

OMF Export

To export the current song as an OMF file, select *File > Export > Song as OMF File*. This will launch a dialog with the following options:

OMF File Version

This allows you to export the file in OMF Version 1 or Version 2 format. You will usually choose Version 2 here. Version 1 is only useful for backwards compatibility with older software versions.

Include Audio

If this box is checked, all exported audio files will be integrated into the OMF file itself (Note: This can result in a very large file, and can make file export times very long). If unchecked, only file references are written to the OMF file. If this method is used and you wish to copy the OMF file to another hard disk, you need to ensure that all referenced audio files are also copied.

Convert interleaved to split stereo

As some applications don't support interleaved stereo files, Logic can convert interleaved stereo files to split stereo (when exporting an OMF file for a ProTools session, for example). Check this box if this is the desired behavior. Note that this only works if the *Include Audio* option is checked.

Pan tracks

If this box is checked, Logic adds information to the OMF file which sets the panning of the exported tracks as they appear in Logic itself—Stereo tracks in Universal Track Mode are exported as two mono tracks. Assuming this option is checked, the left mono track is panned to the left and the right one, to the right.

Warning: This does not work with OMFTool. Don't check this box if you are using OMFTool to convert the OMF file into a ProTools session, as it is unsupported by OMFTool.

Convert 24 bit files to 16 bit

This setting converts all 24 bit files to 16 bit using the Dithering Type described below. This might be necessary when using older versions of ProTools.

Dithering

When exporting 24 bit recordings into 16 bit files and the audio files are included in the OMF file, dithering (see "Bouncing and POW-r Dithering" on page 84) is recommended.

Executing Export

After pressing the *OK* button, a file dialog allows you to specify the destination folder of the OMF file to be generated. Choose a location and you're done. If you have checked the *Include Audio* option, Logic will display a progress bar for each exported audio file.

OMF Import

If you choose *File > Import* a file selector opens, allowing you to choose OMF files. Note that if you choose the *OMF Interchange Format* option in the Open File Type menu, only OMF files will be displayed. After selecting a file, a further dialog allows you to choose the location for audio data extracted from the OMF file. After confirming this dialog, the OMF file is imported into the currently open song (new audio tracks are generated for every track contained in the OMF file, and the audio parts are placed appropriately on these tracks).

OpenTL Export/Import

The OpenTL format is mainly used for data exchange with Tascam hard disk recorders, such as the MX2424. It only supports the exchange of audio data (audio media and the use of this audio media in a song)—MIDI and automation data will be ignored when using the export functions.

OpenTL Export

To export the current song's audio in the OpenTL format, select *File > Export > Song as OpenTL File*. This will launch a file selector dialog which asks if you want to create a dedicated folder for the exported OpenTL files. You can specify the destination folder, and file name, of the resulting OpenTL file. After confirming this dialog, Logic will ask you if the song's SMPTE start time should be added to event start positions. In this scenario, audio parts in the resulting OpenTL file will have the same SMPTE start time as in the Logic Song. If you choose Don't add, the part positions are calculated relative to the song start position (an audio part that starts at Bar 1 will have a start time of 00:00:00:00.00).

At the next step, Logic will ask if a copy of all audio files should be made. You should use this option if you want to copy the resulting OpenTL file, including all audio data, to another hard disk. Logic will then create two sub-folders in the folder that contains the OpenTL file: namely "Audio Files" and "Track Files" (which is the suggested structure for OpenTL exports). The "Audio Files" folder will contain copies of all exported audio files. If you choose that no copy is to be made, the file references in the OpenTL file will point to the original audio files.

Alternatively, you can have all exported files placed in one folder, which is named after the exported file. This is the convention used by the Tascam MX recorders, so it is recommended that *Create* be selected in response to the "Create a dedicated folder for OpenTL export files?" question.

OpenTL Import

To import an OpenTL file, choose *File > Import*. A file selector opens, which allows you to choose OpenTL files. Note that if you choose the *Open TL files* option in the Open File Type menu, only files with the ".TL" extension will be shown in the file selector. If the first event in the imported song starts at a time greater than 1 hour, the following dialog appears:

Set SMPTE start time of song so that events start at the same SMPTE time as they do in the imported project?

Confirm it by pressing *Set* if you want the SMPTE start time of the song to be changed accordingly, or *Don't set* if the song's SMPTE start time should not be changed.

Should the first audio part found by OpenTL import have a start time greater than zero (less than zero is impossible), Logic will ask if you wish to: *Set the start time of first imported event to start of song?* If you answer with *Set*, the first audio part imported will be placed precisely at the song start position.

This solves the problem of the song on the Tascam machine starting at a large time value, but less than 1 hour (such as 59 minutes). In this situation, the user can't immediately see the imported audio parts because they are usually imported beyond the song's end point (possibly even beyond the largest possible song end point, depending on the song tempo).

AAF Export/Import

To export the current song as an AAF file, choose *File > Export > Song as AAF File*. This will launch a standard file selector dialog, allowing you to name the export file.

The export includes all used Regions, with reference to tracks and position, volume automation included.

To import an AAF file, choose *File > Import*. This will open a file selector, which allows you to choose AAF files.

Final Cut Pro/XML Export/Import

The Final Cut Pro/XML format is used to import/export audio data between Final Cut Pro and Logic. The Final Cut Pro/XML format supports automation data.

Final Cut Pro/XML Export

To export the current song as a Final Cut Pro/XML file, select *File > Export > Song to Final Cut Pro/XML*. This will launch a standard file selector dialog, allowing you to name the export file.

Note: Audio Instrument tracks are always bounced to audio files. MIDI tracks are ignored. Bouncing will automatically switch to realtime mode, if necessary (such as when an I/O or External Instrument plug-in is used).

Final Cut Pro/XML Import

To import Final Cut Pro/XML files, choose *File > Import*. A file selector opens, which allows you to choose XML files. Note that if you choose the *XML (Final Cut Pro)* option in the Open File Type menu, only XML files will be displayed.

Track/Region Export

The *File > Export* menu also features several Export functions for Regions and tracks. These allow you to render audio or Audio Instrument tracks with all active effects and automation into a single new audio file. All export functions launch a file selector window, allowing you to name the exported file(s) to specify the export file format (SDII, AIFF, and so on) and bit depth, where applicable. The default save location for exported files is the *Audio Files* folder of the Project. If no project is specified, the source folder (of the audio) is the default target.

- *Export > Region as Audio File*: Exports selected Regions as the specified file type.
- *Export > Track as Audio File*: Simply select the desired audio track in the Arrange window's Track List. All Regions on the track will be selected, and you can use this export function to merge all Regions into a single contiguous audio file.

- *Export > All Tracks as Audio File*: This function exports all audio tracks to an audio file.

Bouncing and POW-r Dithering

Logic provides you with the leading professional POW-r dither algorithm, designed for the conversion of 24 bit recordings to 16 bit files—as required for CD burning, for example. POW-r (Psychoacoustically Optimized Wordlength Reduction) is licensed from the development team of the POW-r Consortium LLC.

POW-r dithering is applied when:

- bouncing audio files to disk
- exporting OMF files (see “OMF Export/Import” on page 80)

Bouncing can be performed directly in the Arrange (and other) windows by selecting the *File > Bounce* menu option, which will launch the Bounce dialog. Bouncing can also be initiated by clicking on the *Bounce* button found on Audio Output Objects (see “Bounce” on page 285).

POW-r offers three distinct dithering modes.

- *No Dithering*: No dithering is applied.
- *POW-r #1*: uses a special dithering curve to minimize quantization noise.
- *POW-r #2: (Noise Shaping)*: uses additional noise shaping over a wide frequency range, which can extend the dynamic range by 5 to 10 dB.
- *POW-r #3: (Noise Shaping)*: uses additional, optimized noise shaping which can extend the dynamic range by 20 dB within the 2 to 4 kHz range—the range the human ear is most sensitive to.

Note: Noise Shaping minimizes side effects caused by bit reduction through spectral displacement of quantization noise above 10 kHz—the range the human ear is least sensitive to.

The mode which will sound the best to you is primarily dependent on the program material and on your personal taste. The “right” setting is best determined by auditioning the audio material with each of the dithering modes.

Important: Dithering the same audio signal multiple times should be avoided.

In this section, you will learn how to move to different parts of the song, start and limit passages, and to isolate and audition specific portions and components within the song.

In short, you'll learn all about Logic's Transport window. This also includes a brief introduction to Logic's Recording functions.

The Transport Window

The Transport window is used to control and display Logic's recording and playback functions.

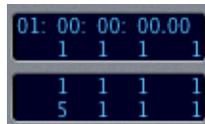
These are the different sections of the transport window:



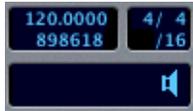
Transport buttons (see "Transport Buttons" on page 94)



Mode buttons (see "Mode Buttons" on page 96)



Position display, Locators (see “Position Display” on page 89)



Tempo and Time Signature display (see “Tempo/Free Memory” on page 90)



MIDI Input—Output/Song End (see “MIDI Monitor/Song End” on page 93)

Note: As a floating window, the Transport window is always in the foreground, and can not be covered by other (non-floating) windows.

All display fields in the Transport window (apart from the song name) can be used for data input. You can either: double-click on the desired display field and input the numbers with the keyboard, or adjust the individual numbers by using the mouse as a slider.

Note: All Transport functions are also available as preset (but also user-definable) keyboard commands, even if the Transport window is not open.

To open the Transport window:

- Select *Windows > Transport*, or press Command-7.

Note: Logic allows an unlimited number of Transport windows to be simultaneously opened. Additional Transport windows can be used as giant displays for the Bar or SMPTE position, as examples.

To close the Transport window

- Click the close button at the top left of the Transport window.

Note: The bar that contains the close/open and minimize buttons is normally found at the top of most windows. In the Transport window, this bar is located to the left.

To reposition the Transport window onscreen:

- Grab anywhere in the gray area of the Transport window (not on a function or field), and drag it to the desired position.

The Transport Bar in Other Windows

You can also configure a fixed Transport window in the Arrange and Matrix windows. Select *View > Transport* and a Transport field appears in the top left corner of the window. The number of visible buttons and displays is dependent on the size of the area available. You can adjust this area by click-holding on the intersection of the Track List, Arrange area and Bar Ruler (the cursor will change to a four-headed arrow), and dragging.



Altering the Display

The Transport window pull-down menu opens when you click on the arrow at the bottom right. This menu is used to reconfigure the Transport window's appearance.

Smaller/Larger

You can adjust the size of the Transport bar to nine different size settings. This is achieved by dragging the bottom right corner of the Transport window.

Legend



This display option conceals/reveals a description of all window elements, and is very helpful if you are still getting to know the program.

Position Slider



This hides/shows a bar along the bottom edge of the window. The size of the bar is directly related to the current portion of the song shown in the Arrange area, and this portion's relationship to the overall song length (see "MIDI Monitor/Song End" on page 93). You can click-hold on the bar and drag left or right to quickly move to a different song position.

Use SMPTE View Offset

This alters the display of the SMPTE time shown at the song startpoint, regardless of the true SMPTE start time being read from an external time code source. More information on this can be found in the SMPTE View Offset section (see "General" on page 607).

SMPTE View Offset

This menu option launches the *Song Settings > Synchronization > General* tab, allowing you to define the Bar Position and/or SMPTE time for *both* the actual song position and the SMPTE view offset.

Giant SMPTE Display/Giant Bar Display



This converts the Transport window into a large display of the current SMPTE time, or current bar position.

You can switch back to the normal display, by reusing the same menu functions.

Sections in the Transport Window

The following options allow you to hide/show different parts of the Transport window independently. This in turn, allows you to control the size of the Transport window.

- Control Buttons Display (Play, Stop, Rewind,...)
- Mode Buttons Display (Cycle, Autodrop,...)
- Position Display
- Locator Display
- Tempo/Signature Display
- MIDI Activity Display

If several parts are used, the individual elements are displayed horizontally, next to one another. This allows you to configure a long, narrow, horizontal Transport window.

When you switch to *Giant SMPTE Display* or *Giant Bar Display* the whole window is used for the giant display of either the SMPTE time, or the bar display. These options, plus the ability to open several Transport windows provides a great deal of freedom in sizing and shaping these displays to meet your needs.

All Elements Horizontal

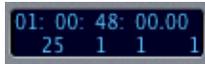
This option achieves the same effect as if you had selected all available display sections, one after the other: a very narrow, horizontal Transport bar.

All Elements Normal

This option arranges all available display sections in two rows, resulting in a standard (or “normal”) Transport configuration.

Position Display

The current song position is shown in two formats:



Above: SMPTE time

Hours: Minutes: Seconds: Frames/Subframes.

Below: bar position

Bar—Beat—Division—Ticks.

A beat corresponds to the denominator in the time signature, a division is a freely-definable part of a beat. A tick is the smallest possible bar sub-division or system quantization—of just 1/3840 note.

Under *Preferences > Display > General* you'll find the *Clock Format* pull-down menu, which offers options that allow you to change the Bar Position display considerably:

The various options are:

- Clock Format 1 1 1 1
- Clock Format 1. 1. 1. 1
- Clock Format 1 1 1 0
- Clock Format 1. 1. 1. 0
- Clock Format 1 1. _ 1
- Clock Format 1. 1. _ 1
- Clock Format 1 1. _ 0
- Clock Format 1. 1. _ 0

Locators



You can define two sets of locator points: one for the Cycle (see “Cycle Mode” on page 100), and the other for the Autodrop (see “Autodrop” on page 104) zone. The left-hand side locators on the Transport window define the Cycle—a passage that is constantly repeated.

The locators shown at the bottom/to the right on the Transport window define the *Autodrop* range (see Autodrop)

Note: Both sets of locators are only displayed when the Cycle and Autodrop functions (buttons on the Transport) are switched on.

Note: Any mention of the “left or right locators” refers to the Cycle locators, rather than the Autodrop locators. The top value denotes the left locator position, and the bottom one, the right locator position.

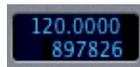
Adjusting Locators to Fit Selected Regions

Set Locators by Regions matches the locator positions with the start and end points of one (or more) selected Region(s). The *Set Rounded Locators by Regions* key command rounds the locator positions to whole bars.

Key commands for Locators

- The global *Move Locators forward by Cycle Length* and *Move Locators backwards by Cycle Length* key commands move the cycled passage by its own length.
- The *Swap Left and Right Locator* key command exchanges both cycle locator points.
- The *Set Locators by Marker & Enable Cycle*, *Set Locators by previous Marker & Enable Cycle* and *Set Locators by next Marker & Enable Cycle* key commands are self-explanatory.

Tempo/Free Memory



Tempo

Tempo is displayed as quarter notes per minute, or beats per minute (bpm). It ranges from 5 to 9999 bpm, and is adjustable to four decimal places after the whole value.

Programming Tempo Changes

This functionality is described in the Tempo chapter (see “Display and Functions” on page 597).

Free Memory

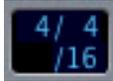
Below the Tempo display, you will see the amount of free memory (events) available in the record buffer. You can increase the amount of free memory by reconfiguring the memory.

To reconfigure the memory:

- 1 Use the *Empty Trash* key command. This is necessary, as the items in Trash memory aren’t reconfigured/reclaimed as usable “events”.
- 2 Double-click on the free memory display.
- 3 A “Reorganize Memory?” dialog will appear.
- 4 Confirm by clicking the Reorganize button.

This reorganization is also carried out automatically after saving or loading a song. A common (and good) use of this feature is to free up memory after closing a song, if two or more songs were open at the same time.

Time Signature and Division



This is where you can see, and set the time signature of the song. The format is:

Bar numerator—Bar denominator—Division

The division defines the third format value in all position displays (such as in the Event Edit window), and forms the grid for various length and placement operations. The division is normally set to 1/16 notes, but has a value range of 1/4 to 1/192 note. If the note value of the division is equal to or greater than the bar denominator, the third value of the position display is automatically removed.

The *Set Next Higher/Lower Format* key command can be used to switch to the next highest or lowest division.

Apart from the features described below, you can also use the Global Signature Track to edit Time Signatures.

Time Signature Changes

If you alter the bar numerator or denominator in the Transport window, a time signature is created at the start of the bar occupied by the current song position. This is shown in the Bar Ruler, to the left of the bar number and in the Global Signature Track, if visible. A time signature change does not affect the absolute positions of any existing time signature events that are already inserted.

Note: You can also add time signature changes directly in the Score Editor (see “Time Signatures” on page 509) by double-clicking on any MIDI Region that spans the signature change.

To edit time signature changes:

- Move the Song Position Line to the target bar, and set the new time signature in the Transport window. Alternately, you can activate the Signature Track via the *View > Global Tracks* menu option, and manually insert them (see “Signature Track” on page 341).

You can also edit the time signature in the Score Editor.

To erase time signature changes:

- Simply change the time signature to match the value of the preceding/previously used time signature.

Note: You can also erase time signatures in the Score Editor by selecting them, and hitting Backspace. To erase all time signature events, select *Edit > Select Similar Objects* before doing so.

To copy time signatures between songs:

- 1 Activate the Signature track via the *View > Global Tracks* menu option.
- 2 Select the desired time signatures.
- 3 Choose *Edit > Copy* (or press Control-C). All time signature changes of the source song are copied to the Clipboard.
- 4 Switch to the desired target song.
- 5 Activate the Signature track and choose *Edit > Paste* (or press Control-V). The copied meter changes are pasted into the target song.

Note: As any copied time and key signature changes are mixed with those of the destination song when pasted, this procedure should only be used to copy such changes to a song that contains no time and key signature changes.

To move time signature changes within a song:

- 1 Set the locator positions as desired.
- 2 Ensure that no Regions are selected, and then select *Region > Cut/Insert Time > Snip: Cut Time and Move by Locators* in the Arrange window. All meter changes between the locators (if any exist) are deleted, and subsequent key and/or time signature changes are correspondingly moved to the left.
- 3 *Region > Cut/Insert Time > Insert Time and Move by Locators* will do the opposite: A section without any meter changes will be inserted between the locators, and previously existing meter changes are moved to the right by the length of the cycle area, as defined by the locator positions.

MIDI Monitor/Song End



MIDI Monitor and Panic Function

MIDI Monitor

The top line shows the last MIDI message received, and the bottom line the last MIDI message transmitted. The monitor is mainly used for checking MIDI connections.

Automatic Chord Interpretation

The MIDI activity panel of the Transport window shows chord symbols when Logic receives more than one MIDI note simultaneously. The respective, held intervals (between notes) are interpreted and displayed as chords.

Panic Function

Click on the MIDI monitor to silence any hanging notes. If this doesn't work, double-clicking on it will initiate a Full Panic reset, which should do the trick (see "Reset Functions" on page 173).

Song Title

The title of the active song is shown below the MIDI monitor.

Song End

Below the song title, you'll see a numerical field that indicates the song end position. As soon as Logic reaches this position, it will stop automatically, except when recording. In this situation, the song end point is automatically moved to the end of the recording.

The maximum length of a Logic song is 8550 quarter notes, or about 2158 bars in 4/4 time.

A song can therefore last a maximum of around 70 minutes at a tempo of 120 bpm. At 95 bpm, the maximum length is over an hour and a half.

If you need to increase this length, for film synchronization as an example, just halve the tempo. You can achieve the same result by using 4/8 time instead of 4/4 time, and treating quarter notes as eighth notes. A 4/8 song at a tempo of 60 bpm (equivalent to 4/4 at a tempo of 120) has a maximum length of more than 4273 bars, or over 2 hours and 22 minutes.

Transport Buttons

Record

Recording normally starts after the count-in, at the start of the current bar. In Cycle mode, it starts at the left locator. You can also choose to have one beat constantly repeated, until a MIDI message is received, at which point recording begins.



Pause

Pauses recording or playback, until you press pause or play again. During paused recording, you can add individual events which will be recorded.



Play

Starts playback at the current position, or from the left locator position when in Cycle mode.



You can use the *Play from beginning* key command to start playback at the beginning of the song. *Play from previous bar* starts at the beginning of the previous bar, *Play from Selection* starts from the first selected Region, and *Play from Left Locator* and *Play from Right Locator* always start at the left or right locator, regardless of the Cycle mode status.

In addition to the above play commands, you can use the global *Play from left window corner* command to play from the beginning of the visible area in the Arrange and Matrix windows.

Stop

Ends recording or playback—the sequencer stops. If the sequencer is already stopped, pressing stop moves the song position line to the song start point, or to the left locator position if Cycle mode is active.



The *Stop Goto Left Locator* key command stops playback, and moves the SPL to the left locator position.

The *Stop Goto Last Play Position* key command stops playback, and moves the SPL to the last position reached with a positioning command, or direct positioning of the SPL, using the mouse or Bar Ruler. The default for this command is the space bar.

Play or Stop

This key command toggles the status of play or stop, depending on the play or stop status when the command is used.

Note: This command is particularly helpful if you are using a PowerBook or iBook that doesn't feature a separate numerical keypad.

Rewind/Forward

If the sequencer is stopped, these buttons work as you would expect. If the sequencer is running, you can monitor as you go (cueing/scrubbing), with MIDI events being output at a faster rate. This also occurs when rewinding.



A short mouse click on either button will jump to the next or previous marker. If no markers exist, a short click will jump one bar forward or backward. Click-holding on either button will rewind or forward. Moving the mouse left or right will increase or decrease the rewind/forward speed.

Note: Both normal (*Rewind/Forward*) and fast (*Fast Rewind/ Fast Forward*) winding are available from the keyboard.

Shuttle—Winding Like a Reel-to-Reel Tape Recorder

There are two key commands for “winding the reels”—moving the Song Position Line—called *Shuttle Rewind* and *Shuttle Forward*. You will find them in the Key Commands window (see “Key Commands” on page 44) by searching for the *Shuttle* character string. Repeated hits of the key will increase the winding speed. Repeated hits of the opposing “shuttle” key will slow down the shuttle speed, and eventually change the winding direction. Shuttle disables Cycle mode. Shuttling is halted by the Stop command.

Mode Buttons

The mode buttons do not immediately trigger an action. Rather, they switch operating states. The relevant button will illuminate to indicate that the mode is activated.

Cycle, Autodrop, and Replace



More information about the Cycle switch can be found in the Cycle Mode section (see “Cycle Mode” on page 100). For more details about Autodrop (see “Autodrop” on page 104), and the Replace switch (see “Options” on page 103).

Solo and Solo Lock

In Solo mode, only the selected Regions are played. The data output from all other Regions is muted. This is known as: “soloing the Regions”. You can of course, change the Solo mode of Regions by changing your selection (default key command: S).



If you want to carry out specific functions on individual Regions, regardless of the solo status of other Regions, you need to be able to select these Regions without affecting the Solo status of others.



This is what the Solo Lock function is for. After soloing the desired Regions, double-click on the solo button, and a padlock symbol will appear on it to indicate “solo lock” status. You can now alter the selection without affecting the solo status of other Regions.

The *Reselect Solo-locked Regions* key command selects all currently solo-locked Regions. This command is very useful if you want to add or remove several Regions to/from your solo-locked selection.

Sync

This button allows you to synchronize Logic with an external source (make Logic the synchronization “slave” to another device). If Logic is running by itself, or acting as the synchronization source (it is the synchronization “master”), this button should not be activated. When you first boot Logic, manual Sync mode is automatically switched off.



Click-holding the Sync button opens a pull-down menu, where you can define the following:

- the type of external synchronization.
- whether MMC commands (see “MIDI Machine Control” on page 616) should be transmitted by Logic’s Transport buttons, allowing remote control of MIDI capable tape machines.
- direct access to the tempo editors (see “Display and Functions” on page 597).
- direct access to the Synchronization settings.

Metronome

This button (default: C) is used to turn the metronome on and off. Logic remembers the Metronome status for recording and playback.



Click-holding the Metronome button offers pull-down menu access to the *Recording* and *Metronome Settings*.

The Bar Ruler

There is a Bar Ruler at the top of the Arrange, Matrix, Hyper, and Score windows.



This ruler is used to display, and set, the:

- song position.
- start and end of the song or folder.
- cycle and autodrop locators.
- markers (see “Markers” on page 157).

Color and Display

The Bar Ruler changes color depending on the transport mode:

- Red—Record
- Yellow—Solo
- Blue—External Synchronization.



Dependent on the zoom settings (see “Zooming” on page 24), the bars are shown at the top edge in units of 1, 4, 8, or 16. Changes in time signature are also shown here.

In the bottom third, there is a vertical line for each bar. The shorter lines represent one beat, but are not always visible (depending on the zoom setting).

Start and End Markers



The song start point is normally at position 1 1 1. You can move the song start point to an earlier position for playing upbeats or program change commands, by grabbing and dragging it with the mouse. The position display in the top left of the window will indicate where it is. The song end (default: bar 201) can be set using the same method, or with the numerical Song End display (see “MIDI Monitor/Song End” on page 93).



In folders, the start and end markers refer to the folder rather than the song. The length of a folder can also be adjusted from within the folder itself.

Song Position Line

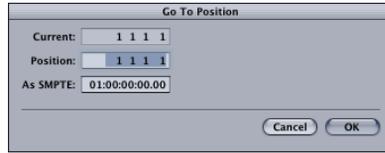
The Song Position Line (SPL) is a vertical line which indicates the current song position in all horizontal, time-based windows. You can grab the line with the mouse, and drag it to the desired position (but only if there is no Region or event at the mouse position when you drag it). Selecting *Wide Song Position Line* in the *Preferences > Display > General* page switches to a thicker SPL.

Direct Placement

As it can be difficult to grab the SPL in the window itself, you can also directly position it by using the bottom third of the Bar Ruler. Just click at the desired position in the lower third of the Bar Ruler to make the SPL jump to the point you’ve clicked.

Double-clicking on the bottom third of the Bar Ruler repositions the SPL, and also toggles between playback (or record) and stop modes.

Numerically



Selecting *Go to Position* opens the dialog box shown above, allowing you to input the song position numerically. The last division used (bar position or SMPTE time) is automatically selected, with the last input value as a default. As the numbers are registered from the left, it is enough just to enter the bar number.

In the Score Window, you can set the SPL position directly by clicking into a staff at the desired point while pressing Option. This function is only available when the sequencer is stopped. The selected position is displayed in the help tag for as long as the mouse key is pressed. This method is especially handy when working in page view mode, as no Bar Ruler is visible in this mode.

Placement at a Marker

If you have labelled a passage with a marker, clicking anywhere on the marker while holding down Option, positions the SPL at the start of the marker. If Logic is stopped, holding Command and double-clicking it begins playback at the start of the marker.

Scrubbing

Start playback, and grab the bottom third of the Bar Ruler. By moving the mouse to the left or right, you can now scrub through the song, moving the SPL to hear all “cued” events. As soon as you stop moving the mouse, normal playback is resumed. You can also do this by using the *Scrub Rewind* and *Scrub Forward* key commands.

The *Scrub by MIDI value (-2-)* command is designed to allow scrubbing via external MIDI control, but you can use any MIDI controller number. Data bytes over 64, scrub forward and those under 64, scrub backward.

Cycle Mode

In Cycle mode, a selected passage of the current song is constantly repeated. This is useful for:

- composing a song section.
- practicing a recording.
- recording individual tracks consecutively.
- editing events.



The Cycle area is shown as a green stripe in the top part of the Bar Ruler.

There are four ways of switching Cycle mode on and off:

- clicking on the Cycle button.
- using the *Cycle* key command.
- clicking on the top part of the Bar Ruler.
- inputting a Cycle area graphically in the Bar Ruler.

How Logic behaves in Cycle mode:

- The Song Position Line jumps from the end of the Cycle to the beginning.
- When this happens, the playback from Environment Objects that are generating notes is interrupted.
- The Play command starts playback from the beginning of the Cycle.
- To start playback from another position, hit Pause twice, or Pause and then Play.
- At the cycle jump point, you can use the Chase Events (see “Chase Events” on page 106) function—*File > Song Settings > MIDI > Chase > Chase on Cycle Jump*.
- You can determine the way recording works in Cycle mode, by using the various options on the *File > Song Settings > Recording* page.

Defining the Cycle

There are a number of different ways to define a Cycle.

Defining the Cycle graphically in the Bar Ruler:

- Click-hold in the top third of the Bar Ruler, and define the desired Cycle area by dragging the mouse from left to right. Dragging from right to left generates a Skip Cycle (see “Skip Cycle” on page 102).

Grab the Cycle “bar” in the middle to reposition it.

Grab the bottom corners to move the start or end points of the Cycle (you can even do this while the sequencer is still running.). If you set the start and end points to the same position, Cycle mode is switched off.

Note: You can reset the nearest edge of the Cycle beam by clicking on it while holding down Shift, even if the beam is outside the visible range, or Cycle mode is switched off.

Note: You can also define the Cycle area by dragging a marker (see “Markers” on page 157) into the top part of the Bar Ruler.

When you set the size of a Cycle graphically in the Bar Ruler, its size is quantized to the nearest bar. Locator positions can only be changed by division at high zoom resolutions, or if you hold down Control as you drag (the Cycle). If you hold down Shift and Control, at a really high zoom resolution, you can drag and change the size of the Cycle in ticks.

To set locator positions that do not lie on whole bar lines, regardless of the zoom resolution, enter your locator positions numerically in the Transport window.

Numerical Entry

The positions of the left and right locators (start and end points of the Cycle) are shown in the Transport window, where they can also be altered.

There are also two key commands available (*Set Left/Right Locator*) that allow you to directly enter either of the points in the dialog box (default = last input).

By Regions

You can use the *Set Locators by Regions* (default: B) and *Set Locators & Play* key commands to set the locators at the start and end of selected Regions; the latter command also starts playback.

- *Set rounded Locators by Regions* rounds the position of the locators to the nearest bar.
- The *Set rounded Locators & Play* and *Set rounded Locators & Record* key commands achieve the same result, and simultaneously start playback or recording.
- *Set rounded Locators & Cycle Play* and *Set rounded Locators & Cycle Record* key commands achieve the same results, and switch to Cycle play or record mode.

By Markers

You can set the left Cycle boundary to the currently selected marker position with the *Set Locators by Marker & enable Cycle* key command. You can also select the next or previous marker with the *Set Locators by next/previous Marker & enable Cycle* key command (in relation to the current song position).

Note: These commands are ideally suited for a spontaneous repetition of passages in live performances. Define markers for all parts of the song that you might want to repeat in this way during your performance.

Skip Cycle

You can skip a passage in play mode, which is useful for trying out the musical effect of various transitions.

To set up Skip Cycle:

- Drag the Skip Cycle area from right to left in the Bar Ruler. If a (normal) Cycle area already exists, just move the left locator to the right of the right locator.



The Skip Cycle area is shown as a very thin strip at the top edge of the Bar Ruler.

Note: You can change a Cycle into a Skip Cycle with the *Swap Left and Right Locator* key command.

Features of Skip Cycle Mode

When the SPL reaches the right locator position, it skips to the left locator (the “right” and “left” locators swap positions).

You can use Skip Cycle mode when editing, to leave out parts of the song that you don’t want to be affected by the edit.

Recording

Selecting a Track

To select the desired recording track, simply click on it.

You can record on several tracks simultaneously (see “MIDI Multi-Track Recording” on page 121). Recording tracks have record enable buttons, which turn red if enabled. These are enabled automatically if you select a MIDI or Audio Instrument track. When you want to record additional tracks, click on each track’s record enable buttons directly.

Note: Despite being able to record enable (arm) multiple tracks, only one may be the “selected” track.

During recording, incoming events are stored in a Region on the selected track.

Note: Audio tracks must be record enabled, and a recording path (a hard disk drive) defined before audio files can be recorded.

Changing MIDI Tracks

If you record MIDI information, you can change the record track, without stopping recording—just select a new track, using the *Select previous/next track* key commands (default keys: *Up* or *Down Arrow*).

Count-In

The *Count-in* and *Record Pre-roll* values can be defined in *File > Song Settings > Recording* (see “*Metronome Settings*” on page 626).

This is often useful if the section of the song (just before the part you’re recording) lacks the sort of rhythmic information necessary to play new parts in time, but there’s plenty of rhythmic material, once the section you’re recording to gets going.

Options

Record Toggle—Record Repeat

The *Record Toggle* key command switches between playback and record mode. *Record Repeat* repeats the recording from the previous drop-in point.

Record into Selected MIDI Region

Normally, a new MIDI Region is created during every recording. In the Recording Options (see “Recording Settings” on page 628) of the *Song Settings* you can activate *Merge New Recording With Selected Region*, so that any new data is incorporated into an existing (and selected) MIDI Region.

Retrospective Recording of MIDI Regions

If you played a great solo while playback was running, but weren’t in record mode—don’t worry. Simply use the *Capture Last Take as Recording* key command. All events you played (after the last Song Position Line change) will belong to the recorded MIDI Region—just as if you had been in record mode.

All events played live after the last song position line change are included in the recording. If you move the song position line, the next incoming event will delete the “Recording Play Mode Buffer”.

Replace Mode

To activate Replace mode, press the *Replace* button. In replace mode, any newly recorded data is always stored in a new Region. In addition, any existing Region on the destination track are cut at the punch in/out points of the recording, and any data between these points is deleted.



Destructive MIDI Recording

If you select *File > Song Settings > Recording > Merge New Recording With Selected Region (r)*, and switch on Replace mode, newly recorded events will replace those in existing MIDI Regions.

The Merge/Replace combination can itself be coupled with the Autodrop and/or Cycle functions.

Recording in Cycle Mode

All settings for recording in Cycle mode can be made in the *Song Settings > Recording Options* (see “Recording Settings” on page 628). You can either use several cycle passes to record a single Region (*Merge only New Regions in Cycle Record* (checked)), or you can create a new Region for every cycle pass (unchecked).

A new track can be automatically created for each of these Regions (*Auto Create Tracks in Cycle Record*). The Regions you create can also be automatically muted (*Auto Mute in Cycle Record*). This mode is very well suited to recording several consecutive versions of a solo, and then picking the best one.

Cycle and Replace

During a cycle recording in Replace mode, existing Regions are deleted during the first cycle pass—from the punch-in point to either; a punch-out point or the end of the Cycle. When the second cycle pass begins, recording continues, but no further Regions are deleted. If you want to replace the end of an existing Region, you don’t need to stop recording before the second cycle pass begins: the start of the existing Region remains intact.

Recording with Skip Cycle

If Skip Cycle is switched on, the Cycle area is bypassed during recording.

Autodrop

The term Autodrop means the automatic activation and deactivation of record mode at predefined positions. Autodrop mode is most commonly used to re-record a badly played section of an otherwise flawless recording. The advantage of Autodrop mode is that you can concentrate on your playing, rather than starting and stopping record mode.



If Cycle mode is inactive, the left and right locators serve as drop-in and drop-out points. Autodrop is activated by clicking on the *Autodrop* button.

Defining the Autodrop Area



If both Cycle and Autodrop modes are active, you will see an independent pair of locators available for the Autodrop range. There are two stripes in the Bar Ruler, the top one representing the Cycle area, and the bottom one the Autodrop range. The Autodrop range can be graphically altered in the Bar Ruler, just as you would with a Cycle area.

Note: If the Bar Ruler display is narrow, hold down Option to ensure that any alterations made to the Cycle only affect the Autodrop range.

The grid scale—for graphic operations in the Bar Ruler—can be reduced to division resolution by holding down Control, and to tick resolution by holding down Shift-Control.

Setting Autodrop Numerically

The positions of the Autodrop locators are displayed numerically, to the right of the Cycle locators on the Transport window. These positions can be altered by using the mouse as a slider, or by direct numerical entry in this display window.

Recording in Autodrop Mode

To make an autodrop recording, place Logic in Record mode at any position before the drop-in point. Any events played before the drop-in or after the drop-out points are channelled through the sequencer as usual, but are not recorded.

If the SPL is positioned after the right locator when you start recording, recording automatically begins at the drop-in point, following the count-in.

If Autodrop is enabled during recording, the *Record* button will flash while the song position is outside the drop locators. This indicates that no recording takes place.

Combining Cycle and Autodrop

If you want to improve a difficult part of a certain passage, you can use a combination of the cycle and autodrop functions. Cycle mode allows you to practice as many times as you like before the “final take.” On each cycle pass, only events that fall within the autodrop range are recorded. This allows you to make use of the preceding song section to “get into the groove.”

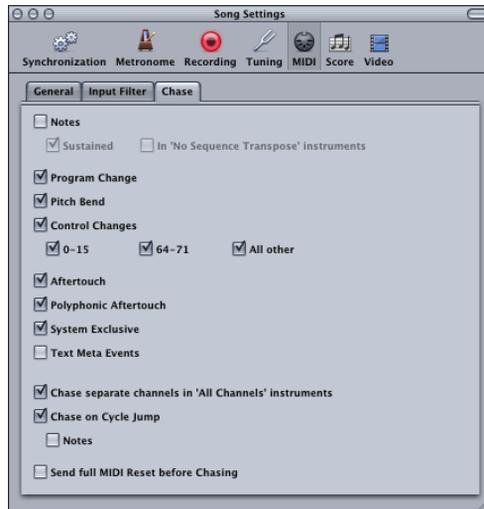
Chase Events

Chase Events searches all MIDI Regions playing at a specified “jump-in” point. The function examines what all MIDI Regions are doing before the jump-in point, to determine which events would have affected playback at the jump-in point, if reached by playing through the song, rather than by just jumping there.

This is a difficult concept to grasp, so here’s another explanation:

If you start playback in the middle of a song by jumping straight to that point (via Cycle mode looping or by direct SPL placement), you might expect a problem or two with note playback. If an important note started playing just before the playback start point, you would expect Logic to overlook it, and the note wouldn’t be heard. Notes, however, are not the only potential problem. If there were a maximum pitch-bend message just before the playback start point, you would miss out on this too. Fortunately, Logic is smarter than your average MIDI sequencer, to misquote Yogi Bear...

Open the *File > Song Settings > MIDI > Chase* page, to set up the *Chase Events* function.



The Chase Events function searches all MIDI Regions at the playback start point. It looks for a selection of the following *before* the playback start point:

- any notes due to start playing at the playback start point.
- any notes that are still playing at playback start point—held-down sustain pedal (Chase sustained Notes).
- program changes.
- pitch-bend information.
- continuous controllers 0 to 15.
- continuous “switch” controllers 64 to 71.
- all other controllers (all other Controls).

- monophonic (channel) aftertouch.
- polyphonic aftertouch.
- SysEx data (the last SysEx message before the play-start point is transmitted).

There is a potential problem when chasing notes that are used to trigger a drum loop in a sampler. Unless you are lucky enough to start the MIDI Region precisely at the beginning of the sample loop, the sample will be triggered at the wrong time and will, therefore, be played out of sync with the rest of the MIDI Region (at least until the next trigger note). The problem is that most samplers can only play samples from the beginning, and cannot synchronize them to the beat when started in the middle.

To solve this potential issue:

Activate the *No Transpose* parameter of your drum loop instrument, in the instrument's Object Parameter box, and switch off the *In 'No Transpose' instruments* option in the *MIDI > Chase* page of the *Song Settings*. The result of this selection is that whenever the song jumps to a new position, your drum loops will not play until they reach the next "trigger note".

The *No Transpose* parameter actually prevents transposition by the Region playback parameters, which is also not desirable for drum sounds or loops.

The Arrange window is the heart of Logic. It is the view that you will see most often when working with the program.

You will learn all about the different interface elements, functions, and features of the Arrange window in this section. You will also discover how to handle both MIDI and audio tracks plus a number of other important techniques.

Overview



The *Arrange area* is where all MIDI and audio information is recorded, on horizontal *tracks*. Individual MIDI recordings are called *MIDI Regions*, audio recordings are called *Audio Regions*. Both Region types are displayed as horizontal “beams”. Above the Arrange area is the *Bar Ruler*, which displays position information.

To the left of the Arrange area is the *Track List* (see “Tracks” on page 110). This is where you determine which (Audio) Object should play the MIDI or audio information on each track. You can make various settings for these Objects in the *Object Parameter box* in the lower left corner.

As the Regions are arranged graphically, you can also use specialized mouse tools from the Toolbox to help you perform different operations.

The *Region Parameter box* (see “MIDI Region Playback Parameters” on page 141) is used to set playback parameters, such as transposition and quantization (see “Quantization” on page 147), for individual Regions.

The channel strip at the bottom left corner of the Arrange window always shows the mixer channel strip of the currently selected track.

Opening the Arrange window

The Arrange window can be opened by selecting *Windows > Arrange* in the main menu, or by pressing Command-1.

If preferred, you may define an alternate key command for *Open Arrange Window* in the Key Commands window (see “Key Commands” on page 44).

Note: Many Arrange window features apply to MIDI and Audio Regions, but some are only relevant to one or the other. This chapter describes general and MIDI features. Specific audio features are dealt with in Chapter 4, “Audio in the Arrange Window,” on page 175.

Tracks

A track is where audio signals and MIDI events are recorded (into Regions and MIDI Regions, respectively). They are stacked vertically and extend horizontally across the Arrange area. Most of the functions described in this section are identical for MIDI and audio tracks.



Overview

There are basically three types of tracks:

- Audio tracks: for playback, recording, and automation of audio signals.
- Audio Instrument tracks: for playback, recording, and automation of MIDI data sent to software instruments.
- MIDI tracks: for playback, recording, and automation of MIDI data sent to external MIDI devices.

In addition to these tracks, there are also tracks with very specific functions, such as the Global tracks (see “Global Tracks” on page 329). The descriptions in this section don’t deal with these special tracks.

Each track is numbered from top to bottom in the Track List. During playback, a small level meter appears next to the track number.

For MIDI or Audio Instrument tracks:

This indicates the velocity of the recording, and turns red to denote a maximum velocity value. MIDI tracks also indicate MIDI controller data playback via a small *c* that appears temporarily over the track number.

For audio tracks:

The level meter denotes the output level.

Note: The level indicator is only displayed if selected via the Arrange window *View > Track Numbers/Level Meters* menu option.

To the right of the track number (and possibly, the *Mute*, *Record*, *Solo*, and *Freeze* buttons—dependent on track type and *View* menu settings) is an icon and a name. Click-holding on the track name allows you to assign a *destination* for the track—regardless of track type.



If you wish to route a track (containing MIDI events in a MIDI Region) to a MIDI sound generator or software instrument, select a suitable *instrument* as the track destination.

If you wish to route a track (containing audio data in an Audio Region) to a specific audio channel number, select the desired *audio channel* as the track destination.

Note: Strictly speaking, tracks don't need to be routed to an *instrument* or *audio channel*, as you can assign any Environment Object to the output of a track. The track data could conceivably be sent to a folder, or directly to a MIDI port (a MIDI Region). Obviously, audio data would not be understood by a MIDI sound module, so there is no point in routing a track that contains audio data (in a Region) to an *instrument*. Similarly, there is no point in routing a track that contains MIDI data (in a MIDI Region) to an *audio channel*.

To aid understanding, we will use the term “instrument” rather than “audio channel” (or the correct, but long-winded, “track data destination object”) in this section.

A MIDI track is automatically record enabled when selected. The Record Enable button turns red to indicate this “armed” state. During recording, a MIDI Region (containing the recorded MIDI events) is created on the selected (and armed) track.

An audio track is *not* automatically record enabled when selected. You must press the Record Enable button on the desired track, which will turn red to indicate an “armed” state. During recording, an Audio Region (a pointer to the recorded audio file) is created on the selected (and armed) track.

Track Icons

Logic offers high resolution, scalable (from 128 × 128 pixels downwards), and user-definable icons.



User-Definable Icons

You can create your own icons for tracks. These icons must be of 128 × 128 pixels in size, must have an alpha channel for transparency and must be saved in the *portable network graphics* format (with the “.png” suffix). The filename must also start with a three-digit number. If this number is below 325, the corresponding built-in Logic icon will be replaced with your new graphic (you can check the number of existing Logic icons by clicking on them in the Object Parameter box).

There are two possible locations for user icons:

The `~/Library/Application Support/Logic/Logic Resources/Icons` folder can contain icons which are only valid for the particular user (~ is the user name). If you save your icons in the root directory—`/Library/Application Support/Logic/Logic Resources/Icons`—the icons are valid for all users. If icons with identical numbers exist in both folders, the icons found in the user folder have priority.

Icon Color

The small, monochromatic icons adopt the color of their “parent” Audio Object or MIDI Instrument Object—which is also used for newly recorded Regions in the Arrange window.

The high resolution Arrange icons have their own color and, therefore, cannot adopt the color of the “parent” Object.

Selecting a Track

You can select a track by clicking on its name or icon in the Track List. This also selects all Regions on the track (or if the Cycle function is switched on, it only selects the Regions that fall within the defined Cycle area).

Use the *Select Next/Previous Track* key commands to select the track above/below the selected track in the track list (default key assignments: *Up Arrow/Down Arrow*).

Changing tracks while retaining your selections

If you click on a new track while holding down Option, the track will be selected without changing the existing selection of Regions.

Selecting Regions of the same color

If you have selected a Region of a certain color, you can use the *Edit > Select Equal Colored Regions/Events* command to select all other Regions of that same color. One use for this would be to compile mute and solo groups based on color.

Sorting Tracks

To change the position of a track in the Track List, grab the track number, and drag it up or down. The cursor will turn into a hand graphic, to indicate that the track can be repositioned vertically.

Creating Tracks

To create a track, use the *Track > Create* command. The new track is created at the currently selected track position, and all ensuing tracks (below it) are moved down the Track List.

To create a track at the bottom of the Track List, double-click below the lowest track in the track list (*Append Track to Track List* key command).

Creating a Track with the Next Instrument

The *Track > Create with next Instrument* function, creates a new track below the selected track, and assigns the next instrument to it (from the instrument selection list). Under most circumstances, this would be the next MIDI channel in the same sound module.

You can also hold down Option while double-clicking under the Track List when you create a new track. Alternatively, you can use the *Append Track with next Instrument to Track List* key command.

Copying a Track

If you hold down Option when moving a track, a copy of the track is created at the destination position. All selected Regions on the old track are also moved to the new track.

Note: If you hold down Option before grabbing the track number, no extra Regions on the track will be selected. If no Regions were selected in the first place, an empty track with the same track instrument is created at the destination position.

If the Cycle function is switched on, all Regions in the Cycle area are moved from the old track to the new track. The musical result is not any different, because the new track is played by the same track instrument.

Moving Regions onto a Track

The function *Region > Move Selected Regions to Current Track* moves all selected Regions from different tracks onto the selected track. The time position of all Regions is retained.

Special Methods for Creating Tracks...

...for overlapping Regions

The function *Track > Create for Overlapped Regions* creates new tracks for wholly or partly overlapping Regions. The Regions are distributed onto these tracks so that no more overlaps occur.

...for selected Regions

Use the function *Track > Create for Selected Regions* to create new tracks for all selected Regions. The Regions then appear on these new tracks. Only one new track is created for any selected Regions which were previously on the same track.

Deleting Tracks

To delete the selected track, use the *Track > Delete* function. If there are any Regions on the track, a warning message appears first.

If there is no Region selected in the Arrange area, you can perform the same function by pressing Backspace.

A third method is to grab the track as if to reposition it (see above), and remove it from the Track List by dragging it to the left.

Deleting Unused Tracks

Use the *Track > Delete Unused* function to delete any tracks that don't contain any Regions.

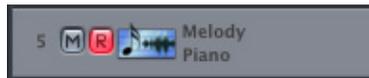
Naming Tracks

To name a track independently of its assigned instrument, select *Track > Create Track Name*.

You can also change the name of an existing track by double-clicking on the instrument name in the Track List, while holding down Command, and typing in the text input field that appears.

The track name is then displayed in place of the instrument name in the Track List, and will be used as the default name for recorded Regions.

If there is enough room vertically (achieved by zooming in vertically), both the track and instrument name will be displayed.



You can see the instrument name in the Object Parameter box, or check it by clicking on the track name and holding down the mouse button.

Name while creating a track

When you create a track (by double-clicking below the bottom track in the Track List) you can hold down Command at the same time to open the input box for the track name.

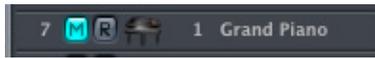
Deleting Track Names

To delete a track name, select *Track > Delete Track Name*.

You can also double-click on the track name while holding down Command. This opens the text input field for the track name. The name can be deleted using Backspace. The instrument name will then appear in the Track List again.

Muting Tracks

Both MIDI and audio tracks have Mute buttons to the left side of the Track List, between the track number and the icon. Muting a track stops it from playing. To show or hide the blue Mute buttons, select *View > Track Mute Buttons*.



Muting when the Mute buttons are hidden

If the Mute buttons are hidden—to save space—you can still mute a track to the left of the track number.

If you move the mouse to the left edge of the Track List by the track number, the mouse pointer turns into a hand; clicking the mouse shortly now mutes the track (or if the track is already muted, it cancels the mute). Muted tracks are then indicated by a •.

You can also use the *Mute Track* key command to mute a track.

Muting All Tracks

If you hold Command while clicking on a Mute button in the Track List, all tracks in the currently-selected display level (or folder) are muted. If they were already muted, they will be unmuted.

There is also a *Mute all Tracks of Folder* key command available.

Mute Instrument

If you mute a track while holding down Command-Option, all tracks in the current song with the same track instrument (including those in all folders) are muted.

There is also a *Mute all Tracks with Same Instrument* key command available.

Soloing Tracks

Both MIDI and audio tracks (and folders) offer *Track Solo* buttons to the left side of the Track List, between the track number and the icon. Soloing a track isolates it while playing—and mutes all other tracks. To show or hide the yellow *Track Solo* buttons, select *View > Track Solo Buttons*.



Activating any Track Solo button enables Solo Lock mode (see “Solo and Solo Lock” on page 96), if necessary, and adds all Regions on that track to the Solo Lock Group. The button turns yellow when active. Deactivating a Track Solo button removes all Regions on the track from the Solo Lock group and—in cases where no other Track’s Solo button is active—disables Solo Lock. Disabling the global Solo (Lock), sets all individual Track Solo buttons to the *Off* position.

Soloing When the Track Solo Buttons are Hidden

If the Track Solo buttons are hidden—to save space—you can still solo a track with the Solo button on the Transport bar.

Simply press the Transport Solo button, and click on the desired track. Soloed tracks are indicated by a yellow outline.

Soloing Multiple Tracks

If you hold down Shift while the Transport Solo button is active, and click on the desired track names, you will solo them (when the track Solo buttons are hidden).

If you hold any modifier while clicking on a Solo button in the Track List, all tracks in the currently-selected display level (or folder) are soloed. If they were already soloed, they will be unsoloed.

Note: You can make use of the Track Button Slide Activation feature for both the Track Solo and Mute button functions (see “Track Button Slide Activation” on page 118).

Hiding Tracks

If there are tracks in the Arrange window that you do not need or want visible, you can use the Hide Track function to hide the tracks. Hidden tracks will still be played back when hidden.

There is a global Hide View button in the upper left corner of the Arrange window. This is the big *H* button to the right of the Link button.



When you activate this button by clicking on it, the Hide (small *H*) buttons on each individual track become available.



You may now activate the individual Hide buttons on the desired tracks, and when you de-activate the global Hide View button, all Arrange tracks with Hide activated will be invisible. When you wish to see the hidden tracks again, simply re-activate the Hide View button.

There are a number of menu functions and key commands that relate to the Hide Tracks feature. Even when the global Hide View button is deactivated, you can still hide an individual track with the *View > Hide Current Track and Select Next Track* menu option or key command. Finally, there is a menu function/key command to *Unhide all Tracks* which will reset the Hide buttons of each track, making them all visible.

Note: Hiding tracks does not affect their playback in any way. You can also link the Hide functions of all tracks belonging to a Group by selecting *Hide* in the Group Property Settings. Another thing to keep in mind is that there is no key command for *Unhide Selected Arrange Track* because there is no way that you can select a hidden Arrange track—it is hidden, after all ...

The color codes of the global Hide View button:

- *Gray*—no tracks hidden.
- *Turquoise*—setup mode, all tracks with individual hide buttons visible.
- *Orange*—one or more tracks are hidden.

Track Button Slide Activation

Buttons on Arrange tracks (Solo, Mute, Record Enable, Hide, Track Protect, Node, Freeze) support “slide activation,” which is similar to running your finger across several channel strip buttons on good hardware mixing consoles.

As a usage example of slide activation in Logic, click-hold on the Mute button of one track, and drag the mouse up or down. The Mute buttons of all “swiped” tracks will switch to the same state.

Simply drag over the Mute buttons of the same tracks to undo the Mute.

Selecting an Instrument

Click-holding on an Instrument’s name (or icon) in the Track List opens a hierarchical pull-down menu. The sub menus of this pull-down menu correspond to the Environment layers (see “Layers” on page 202) of your song. This is where you select and assign Instruments to a track.

Changing an Instrument Assignment Globally

If you hold down Option while selecting an Instrument, the previously selected Instrument will be replaced in every track in the current song by the new Instrument (even in tracks in folders).

Selecting Track Instruments by Drag and Drop

You can select any of the Objects in the Environment window to be the current track Instrument, by simply dragging one out of the Environment window, and dropping it onto the Track List.

If you move a Multi Instrument into the Track List, the selected sub-channel is set as the track Instrument. If no sub-channel is selected, all initialized (the sub-channels that are not crossed out) sub-channels are set for the destination track, and the tracks below that. If there are no tracks below the destination track, new tracks will be created.

In all cases, the Environment Objects involved are completely unaltered.

Special Types of Instruments

In addition to the normal instruments which are described in the Instruments section (see “MIDI Instruments” on page 123), there are two other possible track settings for which there is no corresponding Environment Object:

No Output

Tracks assigned as *No Output* send no data. This can be useful in situations where you wish to store data (such as SysEx) that you don't wish to send.

Folder

This setting is used when you want the track to play a folder (see “Overview” on page 152). Normal Regions will not play on a track set to the Folder instrument.

Zooming Individual Tracks

Tracks in the Arrange window can be zoomed individually. In addition, all MIDI or all audio tracks can be zoomed as a group. In this way, you could, for example, zoom in on an individual track to edit its Regions with Hyper Draw, or zoom in on all Audio Regions to get a more detailed view of the waveform displays.

Zooming on a Track

Move the mouse in the Track List to the bottom left corner of a track. The mouse pointer will change to an index finger. You can now zoom in or out on this track—the zoom factor, compared to the normal settings in the Arrange window, will be shown in the help tag while zooming.

Auto Track Zoom

The function *View > Auto Track Zoom* automatically enlarges the currently selected track.

Zooming all MIDI/Audio Tracks

Hold Command when zooming a MIDI or audio track. This zooms all tracks of the same type.

Restoring Individual Zoom Settings

When zooming on a track, hold Shift down.

Zoom Setting Key Commands

The *Individual Track Zoom In/Out* key command adjusts the display of the selected track.

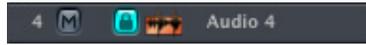
The *Individual Track Zoom Reset* key command resets the selected track to the global (default) zoom factor.

The *Individual Track Zoom Reset for all Tracks* key command resets all tracks to the global (default) zoom factor.

Protecting Tracks

Tracks can be protected, preventing any alterations:

- Existing Regions and their contents cannot be altered.
- No recording is possible on protected tracks.
- New Regions cannot be created.



If the Track Protect button is not visible in the Track List, you can switch it on via the Arrange menu *View > Track Protect Buttons*. Clicking on the Lock button(s) toggles between locked and unlocked mode.

If you hold Command while clicking on a Track Protect button in the Track List, all tracks in the currently-selected display level (or folder) are protected. If they were already protected, they will be unprotected.

Arrange Channel Strip

The channel strip of the currently selected Arrange track will appear in the Parameters area of the Arrange window, provided that there is sufficient space to display it.



If there is not enough vertical room, click the upper left triangles in the Region Parameter and/or Object Parameter boxes and/or hide the Toolbox (*View > Toolbox*).

Note: The *Channel Strip Only* option in the *View* menu (and key command) allows you to hide all elements of the Parameters area — except the Arrange channel strip.

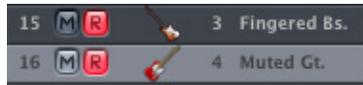
The Arrange channel strip allows you to access all of the mixer channel functions (volume, pan, sends, inserts, and so on) directly from the Arrange window. Any adjustments you make to a track’s Arrange channel strip will be reflected in the corresponding Track Mixer and Environment channel strip as well.

Resizing the Arrange Channel Strip

You can alter the size of the Arrange channel strip (and the entire Parameters area), by moving your mouse cursor over the “resize bars” (two vertical lines) between the Parameters area and the Track List. The cursor appearance will change, allowing you to click and drag horizontally. As you do so, the Parameters area is resized, and both it and the Track List will move left or right, until the mouse button is released.

This facility makes reading parameter names and labels clearer.

MIDI Multi-Track Recording



You can record multiple MIDI tracks simultaneously. MIDI tracks feature a Record Enable button to activate the recording function. This is automatically activated by selecting a MIDI track. To record additional tracks, just click on their respective Record Enable buttons.

In Stop—or pure MIDI Thru—mode, you can layer the sounds of your instruments easily—or create split or velocity switched sounds, by setting the appropriate Instrument Parameters (see “The Instrument Parameters” on page 123).

Only one track can be selected, and only one track’s Instrument Parameters can be displayed at a time. You can freely select any of the record enabled tracks. Selecting a track which has not been record enabled will turn off the record function for all other tracks.

Layer and Multiplayer Mode

There are two modes of operation for simultaneous recording of multiple MIDI tracks: Layer or Multiplayer recording.

To switch from the Layer recording mode (default) to the Multiplayer recording mode, select the *File > Song Settings > Recording > Auto Demix by Channel if Multitrack Recording* option.

Layer Recording

Incoming MIDI events are sent to all record enabled MIDI tracks. You can listen to all selected instruments before, and during, recording. Only the selected track will display a MIDI Region after recording. On the other tracks, aliases of the MIDI Region on the selected track will be recorded.

The advantage of this is that any subsequent edits to the MIDI Region will affect all aliases, and all layered tracks will remain identical.

Multiplayer Recording

Incoming MIDI events are distributed to the various record enabled tracks, according to their transmitted MIDI channel numbers. The channel of the incoming event must correspond to a record enabled track's channel, in order for this functionality to work. If no track is found with the corresponding channel number, the event will be routed, and recorded, onto the selected track.

Be sure that the different MIDI controllers transmit on different channels. If this is not possible, simply use different inputs on your MIDI interface, and change the MIDI channel of each input, using a Transformer Object between the Physical Input and Sequencer Input (see "Physical Input/Sequencer Input Objects" on page 236).

Switching MIDI Thru off

The Record button makes it very easy to switch off the MIDI Thru function—simply deactivate the Record button of the selected track.

You can use *File > Song Settings > MIDI > General* to select an instrument with a permanently disabled MIDI Thru function.

MIDI Instruments

In order to know where specific MIDI messages are to be sent, Logic needs to have some idea of how the MIDI devices in your setup are connected. This is portrayed graphically in the Environment, which shows the sequencer's connection with many other Objects, which we will refer to as "Instruments" in this section. Each instrument is an Environment Object, which represents a physical MIDI device. You can think of the Instrument Object as being a virtual instrument, or a representation of a real instrument.

To learn how to configure the Environment, refer to the Environment section (see "Environment—Introduction" on page 201).

To make an instrument visible:

- Double-click on the instrument name in the Track List. This directly opens the Environment window, with the Object selected.

Creating a New Instrument

It is best to create Instruments directly in the Environment, but you can also do so from the Arrange window, by using the Create New Instrument key command. The selected track will then contain a new Instrument, whose parameters can be adjusted in the instrument's Object Parameter box. The new Instrument will also be present in the Environment. All Instruments in the Arrange window exist in the Environment, no matter where they were created originally.

The Instrument Parameters

The Instrument's Object Parameter box is located at the bottom left corner of the Arrange window.



The Instrument parameters belong to the Instrument Object, not to the track per se, so if you alter the parameters here, it will affect all tracks playing (addressing) the Instrument.

Note: The Instrument's Object Parameter box in the Arrange window is identical to the corresponding Object Parameter box for the same Instrument in the Environment.

To open/close the Instrument's Parameter box:

- Click the small triangle at the top left to open or close the Instrument's Parameter box.

Name

The top line shows the instrument name, which can be edited by clicking on it.

Object Type

The Object type is shown in brackets, and cannot be altered. Normally this will be: (Instrument) or, if you're using Multi Instruments: (Sub Channel).

Selecting an Icon

Grabbing the icon opens a pop-up menu, where you can assign a new icon to represent the Instrument.

Note: If you have closed the Object Parameter box, or it is hidden from view, you can select an icon directly from the Track List by clicking on the icon while holding down Option-Command.

Color of the Instrument Icon

If you selected a single-colored icon, you can change its color, using the usual color palette with: *View > Colors*, as long as no Region is selected. The color of the instrument icon serves as the default color for all Regions recorded on this track.

Hiding an Instrument

The small box to the left of the icon determines whether the instrument appears in the instrument selection pop-up menu of the track list. You will generally always have this checked for Instrument Objects.

Note: This option is primarily used to reduce the size of the instrument pop-up menu, by hiding other Environment Objects, such as faders or MIDI ports.

MIDI Channel and Port Connection

The *Port* parameter, found in the Instrument's Object Parameter box (see "Global Preferences" on page 640), defines the MIDI Output that the instrument's data is sent to. Your MIDI sound module is connected to this output jack.

Note: If the instrument has not been connected with cables in the Environment, this line can be used to set the Instrument's output port via a pop-up menu (containing the names of all installed MIDI drivers). This means that the instrument is directly connected to one of your MIDI interface's MIDI Out ports. As such, this line represents an unseen direct connection, as there is no visible cable connection for the instrument in the Environment window.

The purpose of a hidden direct connection is to enable you to address the individual MIDI ports directly from the Arrange window without needing to access the Environment window. For most situations, this is the best way to assign instruments to ports, as it eliminates the need for cabling.

Keep in mind that if you directly assign a port, and also connect the instrument to a MIDI Out Object with a cable, all MIDI data sent via that instrument will be doubled. If you attempt to do this, Logic displays a dialog box asking whether or not you should “Keep or Remove?” the direct connection. You will generally select Remove in this situation.

The MIDI channel is set with the *Channel* parameter. This defines the channel used for MIDI data output by the instrument, allowing your “real” instrument to receive the data.

Setting the MIDI Channel: Multi Instruments

In the Instrument’s Object Parameter box, you can also alter the MIDI channel of an instrument part (a “sub-channel” or “part” of a Multi Instrument). This does not reassign the channel for the current part, but rather selects another sub-channel from the current Multi Instrument.

You can’t actually change the receive channel of a part in the multitimbral synthesizer. This is only possible in a few models (and is not particularly useful when using a multitrack sequencer, at any rate). The Channel parameter is really an alternative way of changing the track instrument, allowing the track to be played by a different part (sub-channel) in the multitimbral synthesizer.

If the MIDI channel is set to *All*, you can edit the parameters of the whole multi instrument. A useful facility for globally changing the MIDI port, for example.

Adjusting the Sound of a Track

The *Program*, *Volume*, and *Pan* parameters transmit program changes, volume controllers (#7) and pan controllers (#10) respectively.

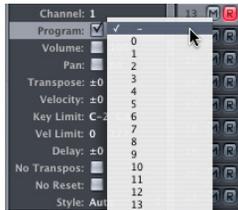


If the respective box is unchecked, the default value of the MIDI device itself is used. The corresponding value is only transmitted if you place a check in the box, by clicking in it. If the box is already checked, any value changes are transmitted immediately.

A program change may be selected on the right, via a pull-down menu. Volume and panorama are set by using the mouse as a slider. When dealing with multi instrument sub-channels, sounds can be selected from a pull-down menu by name. Control-clicking just above or below any current value increases or decreases it.

To the left of the program number, there is an extra parameter which is used for Bank Select. If your sound source can receive Bank Select messages (MIDI controller #0 or #32—check your synth manual for format details), you can switch between different banks, each containing a maximum of 128 sounds.

As many devices cannot receive these messages, you can deactivate this parameter by making the setting shown here.



For more on the other instrument parameters, take a look at the descriptions in the Standard Instrument section (see “Standard Instrument” on page 212).

Recording Program Changes, Volume, or Pan Controllers

Any of the listed event types available in the Instrument’s Object Parameter box can also be stored when in Record mode.

As an example, in Record-Pause mode, you can store program changes at specific positions in the following way:

- 1 Deactivate the Program (or Volume/Pan) checkbox.
- 2 Click on the Pause button in the Transport bar.
- 3 Activate the Record button in the Transport bar.
- 4 Move the Song Position Line to the desired song position.
- 5 Select the desired sound (program) and/or the volume/pan setting you want to use.
- 6 Activate the Program (or Volume and Pan) checkbox(es). Each selected event will be sent and recorded.
- 7 Click the Stop button in the Transport bar to exit recording mode.

The values of the *Program*, *Volume*, and *Pan* parameters will not be updated every time such control change events are played back. These parameters are initial values, when you load a song, or use the *MIDI > Insert Instrument MIDI Settings as Events* command—before you begin to record mixer automation data.

Further Parameters

You also find the following parameters in the Instrument's Parameter Box:

Transpose

The *Transpose* parameter allows you to define the number of semitones that all note events will be transposed by on output. Negative values transpose downwards.

Velocity

The *Velocity* parameter allows you to increase or decrease the "note on" velocities of all note events by an amount adjustable between -99 and 99.

Key Limit

The two note values of the *Key Limit* parameter define a pitch range. All notes outside this range will be ignored by the instrument when it plays a MIDI Region.

Vel Limit

The two values of the *Vel Limit* parameter define a velocity range. All notes whose velocity is outside this range will not be played by the instrument.

Delay

The *Delay* parameter causes all MIDI events to be sent early or late by from -99 to 99 ticks. This allows you to adjust for any differences in reaction time between your various MIDI devices. For delay effects use the *Region* parameter of the same name, as this allows longer delay times.

No Transpose

If the box next to the *No Transpose* parameter is checked, all Regions on any tracks played by this instrument are protected from transposition. In other words, the *Transpose Region* parameter is ignored. This is very useful for instruments assigned to drum or other multi-timbral samples, as transposition will cause the sounds rather than the pitches to change for these instruments.

No Reset

If the box next to the *No Reset* parameter is checked, no reset messages will be sent to this instrument. This can be useful if controllers are being used for non-musical purposes, for example when an Instrument is used for mixer automation. The *Preferences > MIDI > Reset Messages* window controls what reset messages are normally sent, but these messages are not sent to "No Reset" instruments.

Style

The *Style* parameter is located at the bottom of the Parameter box. It displays *Auto* by default but can be changed to any of the available score styles. Whenever a Region is created on one of the Instrument's tracks it will be assigned the score style displayed here. In the case of *Auto*, Logic will pick an appropriate style based on the pitch range of the notes in the Region.

Don't forget: you can change a MIDI Region's Score Style at any time in the Display Parameter box in the Score window.

You can change the score styles of all MIDI Regions on an Instrument's tracks by holding down Option when selecting the Instrument's default score style.

Additional Audio Instrument Object Parameters

All of the abovementioned parameters are available for Audio Instrument Objects, which also share the following additional checkboxes with Audio tracks/Objects. There is one exception, however: Audio Instrument Objects have a *Device* parameter instead of a *Port* parameter, which allows you to specify the audio device, rather than a MIDI port.

- *Show EQs*: Hides/shows the Track EQ button at the top of the channel strip.
- *Show Inserts*: Hides/shows Insert slots on the channel strip.
- *Show Sends*: Hides/shows Sends on the channel strip.
- *Show I/O*: Hides/shows the Input and Output slots on the channel strip.

A further *Value as* pull-down menu is available, which allows you to display parameters numerically (Num) or in decibels (dB).

The *No HMT* checkbox disables Hermode Tuning (see “Hermode Tuning (HMT)” on page 634) for the associated track/Object when checked. This facility is ideal for an EXS drumkit that you don't want to be tuned like your melodic software instrument parts, for example.

MIDI Regions

MIDI Regions are containers for the MIDI events within them. Containers for audio data are referred to as Audio Regions (or simply Regions). Audio Regions can be compared (see “MIDI and Audio Regions compared” on page 183) to MIDI Regions as far as how they are used and edited. The purpose of MIDI Regions is to make things clearer and easier to deal with. They also correspond to the musical convention of treating a phrase or a riff as a single unit. It's often better to perform operations (such as quantization) on these units, rather than on individual notes.

Note: MIDI Regions can overlap one another, partly or completely, within a track. This should generally be avoided, for clarity's sake.

Remember that all operations described in this section with a plural in the heading (MIDI Regions, for example), apply to one or more *selected* MIDI Region(s).

Creating a MIDI Region

Normally a MIDI Region is created automatically when you record on the selected track. It begins at the start of the bar in which the first event was recorded, and stops at the end of the bar in which the last event was recorded.

Note: MIDI Regions can also be created by directly inserting events (see “Special Functions” on page 140) from the Clipboard into the Arrange window.

Capture Recording

You can also create a MIDI Region using the *Capture Last Take as Recording* key command. Please refer to the Retrospective Recording section (see “Options” on page 103).

Creating an Empty MIDI Region

Click at the desired position in the Arrange area with the Pencil tool to insert the empty MIDI Region. You can now manually enter events into this new MIDI Region in one of the editors.

Deleting MIDI Regions

You can delete all selected MIDI Regions by clicking on them with the Eraser tool, or by pressing Backspace. You can also delete any non-selected MIDI Region by clicking on it with the Eraser.

Deleting Muted Regions

The *Edit > Select Muted Regions/Events* function, as the name suggests, selects all muted Regions. Pressing Backspace will then delete these Regions.

Retrieving Deleted MIDI Regions

Should you accidentally delete a MIDI Region, you can restore it by selecting *Edit > Undo* (Command-Z) immediately after making the error.

Even after several editing operations, it is still not too late to retrieve a MIDI Region, because all deleted Regions actually end up in the Trash. The *Open Trash* key command opens the otherwise invisible Trash folder. You can then transfer the desired Regions to the Clipboard (Copy or Cut), and add them back to the song (Paste). An even neater method is simply to drag the Regions from the Trash window into the Arrange window!

The *Empty Trash* key command irreversibly deletes the contents of the Trash folder, thus using less space when the song is saved.

The *Preferences > Global > Empty Trash after Saving a Song* option (when checked), deletes the contents of the Trash after a song is saved. Depending on the selection made here, this means that you will/won't have access to the deleted Regions from the previous session, the next time you load the song.

Snap and Drag Menus

Before looking at moving and editing Regions in the following sections, we'd like to cover the *Snap* and *Drag* pull-down menus. These allow you to set preferences for edits and moves that you may perform on Regions within the Arrange window.



The Snap pull-down menu provides: Smart, Bar, Beat, Format, Ticks, Frames, and QF (Quarter Frames) options. Any edit or movement of a Region will be “snapped” to the nearest bar, beat tick and so on, as determined by the selected Snap format value.

The Drag pull-down menu provides: No Overlap, Overlap, X-Fade, Shuffle L(ef) and Shuffle R(ight) modes. These are all audio editing modes that alter the behavior of Audio Regions when different operations are performed:

- The Shuffle L and R modes will automatically align Regions (to the left and right, respectively) when a cut or move is made. As an example; when using Shuffle R, moving a grabbed Region to the right aligns the Region endpoint with the startpoint of the following Region.
- X-Fade mode will automatically crossfade two Regions when they are moved to an overlapping position.
- No Overlap is used in situations where you don't want Regions to overlap. In this mode, the first Region (the one positioned earlier on the track) will be “clipped” (shortened) so that no overlap occurs.
- Overlap mode will preserve the original Region borders, even when you move Regions to overlapping positions. This was the standard mode of earlier Logic versions.

Note: The Snap and Drag menus are also available in several other editors.

Moving Regions

Regions may be moved by grabbing and dragging them with the mouse pointer. You can move Regions along the timeline and from one track to another. You can also move them between two Arrange windows, even if they belong to different songs.

Note: If Hyper Draw is enabled for the Region, you'll need to grab above the blue area in order to move it.

Between different Songs

If you move a Region from one song into the Arrange window of another, the Region is automatically copied, in much the same way that the Mac OS automatically copies files with drag and drop, if they're located on different drives.

Limiting direction

You can limit the movement or copying of Regions in the Arrange window to either the horizontal or vertical axis—just as in the Score and Matrix editors. To do so, activate the *Preferences > Global > Editing > Limit dragging to one direction in Arrange* option.

Note: You can toggle the direction limitation on and off, by pressing Shift while moving Regions.

Tying Regions by Length Change

The *Region > Tie Regions by Length Change* option lengthens the selected Region(s), making them end exactly at the startpoint of the next Region on the track.

Removing Gaps between Regions

The *Region > Tie Regions by Position Change* option removes empty space between selected Regions. When you do this, the first Region remains unchanged, and all subsequent Regions are moved to the left. This is particularly handy for seamless joining of Audio Regions.

Note: This feature can be used to accelerate spoken word recordings that have been processed with strip silence (by closing the gaps between words).

Tie Regions within Locators

Region > Tie Regions within Locators makes all selected Regions within the Locators longer, closing the gaps between them. The last Region on each track (within the locator boundaries) won't be affected.

Moving Regions to the Current Song Position

The *Pickup Clock Position* key command allows you to move the selected Region (or the first of several selected Regions) to the current song position.

Editing the Start Position Numerically

You can edit the start point of a MIDI Region (and its length) numerically. This can be done from an Event List set to view objects at the same level (see "... on Arrange Level" on page 446) as the Arrange window or in a floating event window (see "Event Float Window" on page 453).

Copying Regions

To copy Regions to another point in the song, or to other tracks, hold down Option while moving the Region.

Note: Holding Option-Shift while moving a MIDI Region allows you to create an Alias (see “Aliases” on page 155) of it.

If Hyper Draw is enabled for the Region, you’ll need to grab above the blue area in order to copy it.

Note: Copy/paste and Option-drag create a independent copy of the Region. This copy will not reflect changes made in the original Region. If you want this type of behavior, make use of the *Loop* parameter.

Making Multiple Copies of Regions

The *Region > Repeat Regions* menu allows you to repeat one or more selected Regions. The repetition always starts at the end of the Region itself, or at the end of the last (along the time line) Region.

Number of Copies

This is where you enter the number of copies (excluding the original).

Adjustment

Used to determine whether you want a copy to begin exactly at the end of the original or the previous copy (setting: None), or whether you want the startpoint to be “quantized”. In most cases, the Auto setting will be suitable.

“as”

This parameter determines whether the repeats are copies or aliases of the original.

There’s an even more extensive copy function that is strictly for MIDI events, called *Copy MIDI Events*. For more on this, check out “Copying Events Selectively” on page 168.

Editing Parts of a Region

The Marquee Tool, which looks like a crosshair, allows you to edit parts of a Region. It can be selected in the Toolbox or via the *Set Marquee Tool* key command. You can use the Marquee tool by clicking in the Arrange window (on the background or on Regions) to begin your selection, which is indicated by the shaded selection rectangle. You can drag the selection rectangle freely, allowing you to make selections— independent of existing part/Region boundaries. When you release the mouse button, only the area that falls inside the “marquee” is selected. In other words, you can use the Marquee tool to make selections inside existing Regions; your selection is determined completely by the selected area.



Within the selected area, you can perform almost all standard Arrange edit options, including:

- Delete (Backspace or click with the eraser tool)
- Move (drag selection or using a Nudge key command)
- Copy (Option-drag) using the pointer tool
- Cut/Copy (Command-X, Command-C)
- Paste (at SPL, quantized to the nearest bar divisions)
- Copy/Paste via pencil tool (quantized to current format value)
- Cut at selection border (click inside the selection with the scissors tool)
- Mute (key command or tool; will also result in a cut at the selection borders)
- Solo (key command or tool; will also result in a cut at the selection borders).

If your selected area falls between musically relevant values, the Marquee tool's selection rectangle will automatically snap to the nearest musically relevant position. The snap resolution is adjusted in accordance with the current Snap menu setting. If you make your selection while holding Control the selection will snap to the finest resolution possible within the chosen Snap factor. By holding down Shift, the current Marquee selection can be altered from either the left or right side, as well as up or down.

In the case of a Marquee selection, the *Region > Set locators by Region* function (and corresponding key command) sets the locators to the Marquee selection, rather than the whole Region.

The *Crop Regions outside Marquee Selection* key command removes all unselected areas from Regions which are partly marquee-selected.

Altering the Length of Regions

Grab the Region at the bottom right corner, with the pointer or pencil tool, to move the endpoint of the Region to the desired position. The data in Regions is never deleted, even when they're shortened; playback simply stops at the end of the Region. Restore the length of the Region in the same fashion to hear the playback of events/ audio data at the end of the Region.

If Hyper Draw is enabled for the Region, you'll need to grab above the blue area, in order to adjust the endpoint.

The *Clip Length* extended Region parameter (see "Extended Region Parameter Box" on page 146) determines whether notes sounding when the Region ends should be abruptly cut off (on), or whether they should be played to their normal end point (off), regardless of where the Region ends.

Multiple Selection

You can change the length of multiple Regions in the same way. The length will be changed by the same absolute amount.

Same Absolute Length

If you want to make all selected MIDI Regions the same absolute length—even if they had different original lengths—simply hold Option-Shift while changing the length (just as in the Matrix Editor or the Event List).

Adjusting the Region Startpoint

You can also adjust the length of the MIDI Region by grabbing it at the bottom left corner. It should be noted that you can never move the left corner beyond the first event in the MIDI Region—you can never "hide" events from the beginning of the MIDI Region. If you want to remove the start of a MIDI Region you need to cut it, and mute or delete the new start segment (new MIDI Region).

Rounded to Whole Bars

The *MIDI > Snap Region Start to Bar* function rounds the Region startpoint to the nearest whole bar.

The position of events within MIDI Regions is not affected by changes to the Region length.

If you wish to alter the position of the events:

- Hold down Option while altering the length of a MIDI Region to alter the timing of events. The events will be stretched or compressed, proportionately, by the amount that the MIDI Region was altered in length.

Note: You can make a rhythmic MIDI Region play in “half-time” by stretching it to twice the original length, or in “double-time” by shortening the length to half the original length.

... to Adjust It to Fit Its Contents

The *MIDI > Set Optimal Region Sizes* function reduces or increases the length of a Region, making it just large enough to contain the events (or Regions, if a Folder) within it. The Region borders are rounded to the nearest bar.

Holding down Option when using this function rounds the borders to the nearest beat.

... to Adjust It to Fit Other Regions

The *Region > Remove Overlaps* function searches all selected Regions in a track for overlaps. If an overlap is found, the earlier Region is reduced in length, thus removing the overlap.

... to Adjust It to Fit Song Position

You can move the start or end point of a selected Region to the Song Position Line, by use of the following key commands:

- Set Object Start to SPL Position
- Set Object End to SPL Position.

The use of *Set Object Start to SPL Position* is only possible when the Song Position Line (SPL) is placed before the start of the Region. Similarly *Set Object End to SPL Position* only makes sense if the SPL is placed after the end of the Region. If not, the length of the Region will be shortened to one format (Snap) value.

Using a Finer Grid

All of these operations (moving/copying, lengthening/shortening) snap to the bar or beat grid, depending on the current Snap menu setting. There are two ways to override the grid, allowing finer adjustments. All you need to do is hold these keys during the particular operation:

- *Display Format values as grid scale*: Press Control during operation.
- *No grid (ticks as grid scale)*: Press Control-Shift during operation.

Let's say you want to shorten a Region in a 4/4 bar so that the "4" is played but not the "4 and" of the last bar.

This can be done by following these steps:

- 1 Zoom the screen display until you can see quarter notes in the Bar Ruler.
- 2 Grab the bottom right corner of the Region, and move the mouse to the left, until the Region is shortened by one quarter note.
- 3 Press (and hold) Control, and move the mouse carefully to the right, until the Region has become one division longer. While you're doing this, the help tag shows the Region start position, track number, and the current length of the Region in bars, beats, divisions, and ticks. The three right-hand numbers should be "3 1 0".

Dividing MIDI Regions

Click on the Scissors (see "The Tools" on page 18) in the Toolbox. Now click-hold on the desired MIDI Region(s). The help tag shows the current mouse position. When you release the mouse button, all selected MIDI Regions are cut at the position shown in the help tag. The grid is based on the Snap menu setting.

If any notes overlap other notes by more than a 1/16 note, the following dialog will appear on-screen:

Overlapping Notes found! Do you want to keep, to shorten or to split those?

Keep (default) leaves all notes unaltered. The MIDI Region is cut as usual, but when you do this, you can end up with notes in the left-hand half that are much longer than the MIDI Region containing them. Such notes will play normally, unless "Clip Length" is set to *On*, which cuts off all sustaining notes at the end of a MIDI Region.

Shorten truncates all overlapping notes, so that they end at the point where the MIDI Region was divided.

Split divides overlapping notes across the two MIDI Regions created when a cut is made; two notes are created, with the same pitch and velocity as the original, and with the same total length as the original note.

Multiple Divisions with the Scissors

If you hold down Option while cutting a Region with the Scissors tool, the selected Region will be cut into multiple pieces of the same length as the first segment.

As an example: To divide a 16-bar Region into eight 2-bar Regions, cut the Region at the start of bar 3, while holding down Option.

At the Locator Positions

The *Region > Split/Demix > Split Regions by Locators* function cuts all selected Regions located wholly or partly between the locators, at the left and right locator positions. All Regions created between the locator positions as a result of the cut operation, are then automatically selected.

Graphically

You can achieve the same effect by defining a cycle area with the mouse in the Bar Ruler, while holding down Command.

Cut at the Song Position

The *Region > Split/Demix > Split Regions by Song Position* function splits all selected Regions exactly at the SPL.

To cut at the nearest bar, use the *Split Regions/Events by rounded Song Position* key command.

Merging MIDI Regions

You can merge two or more selected MIDI Regions into a single MIDI Region, by clicking on one of them with the Glue tool (see “The Tools” on page 18).

The function of the Glue tool is the same as *Region > Merge > Regions*. This merges all selected MIDI Regions—even those on different tracks—into a single MIDI Region. All events from each individual MIDI Region retain their original time positions. Be aware that the individual MIDI channels are replaced by the MIDI channel of the current track’s Instrument. The new (merged) MIDI Region adopts the name and track of the first (along the time line) of the merged MIDI Regions (see “Fixing/Neutralizing MIDI Region Parameters” on page 145).

The *Region > Merge > Regions per Tracks* function has the same effect as *Merge Regions*, but if the selected Regions are on several different tracks they are combined into one Region per track.

The *Region > Merge > Regions*, the *Region > Merge > Regions per Tracks* and the Glue tool functions handle the *Transpose*, *Velocity*, and *Dynamics* Region parameters intelligently. If these parameters are not identical in all selected Regions, the Regions are normalized before the merge. If one of the Region parameters (the Transpose value, for example) is set identically in all selected Regions, that value is preserved, and the events remain unchanged.

Demixing Regions

The *Region > Split/Demix > Demix by Event Channel* function searches the selected Region for events with different MIDI channels. A separate Region, containing all matching events, is created for every MIDI channel that is found. Each of these Regions is created on a track with an Instrument that matches the MIDI channel. If no such tracks exist, new tracks are created, using the original Instrument's track.

This function is useful for the import of Standard MIDI Files (Format 0), when all note events are placed in a single MIDI Region.

The *Region > Split/Demix > Demix by Note Pitch* function searches the selected MIDI Region for notes with different note numbers. A different MIDI Region of the same length is created for every note number found. The tracks created for these MIDI Regions is assigned to the same Instrument as the original MIDI Region. This feature is especially useful for separating drum parts that have been recorded into Logic from a drum machine.

Muting Regions

Often, when arranging, you'll want to test musical ideas by muting certain Regions. This is what the Mute tool (see "The Tools" on page 18) is designed for.

You can mute individual or selected Regions by clicking on them with the mute tool. Clicking a muted Region reverses this state (unmuting). Muted Regions are indicated by a dot that precedes the Region name, and are shaded (dependent on the *Preferences > Display > Arrange > Muted Regions are textured* setting).



Note: You can perform the same function with the *Mute Folders/Regions* key command.

Soloing Regions

You can solo any selected Regions by using the Solo button in the Transport window, or the key command of the same name.

Double-clicking on the Solo button or using the *Solo Lock* key command “locks” the soloed status, so that changing the selection doesn’t affect what is being soloed. This is especially useful when you want to make changes to the playback parameters of a Region, while listening to a specific solo group.

Another click (or reusing the key command) exits solo mode. For more on this, read the Solo and Solo Lock sections (see “Mode Buttons” on page 96).

When the Solo function is activated, the Bar Ruler will change from gray to yellow, making it easy to see that Solo is engaged.

The Solo tool (see “Selecting Tools” on page 17) enables you to solo individual or selected Regions, by click-holding on them. You can also scrub the Region by moving the mouse horizontally. If Logic is in play mode, solo playback starts as soon as you stop scrubbing. Release the mouse button to end solo auditioning.

Naming a Region

Click the Region with the Text tool (see “The Tools” on page 18), and a text input box will appear. Enter the desired name and press Enter, or click another Region or the Arrange area background to exit text input mode.

The same applies if entering a name in the Region Parameter box.

Multiple Naming

Select a group of Regions (with the rubber band, for example), and click one of them with the Text tool. A text input box will appear, allowing you to name the Region. All Regions are assigned same name.

With Incrementing Numbers

If you end the name of the Region with a number, all selected Regions are assigned the same name, but are incrementally numbered (region 1, region 2, region 3, and so on). They are numbered in accordance with their temporal (time) positions. If you want all Regions to end with the same number, just add a space after the number.

The above also applies if you enter the name in the top line of the Region Parameter box, rather than use the text tool.

Transferring Track Names to Regions

A quick reminder: the track name is normally used as the default name for any Regions recorded on it. If you have copied Regions from another track, however, and want to name them after the destination track, use the *Region > Track Names to Regions* function.

Special Functions

Inserting Events

MIDI events can be added directly to the selected track in the Arrange window, at the current song position, via the Clipboard. Events can be copied from one of the edit windows (even from another song).

This function allows you to insert MIDI events—from the Matrix Editor, for example—directly into the Arrange window. Logic checks for a selected MIDI Region (for use as a destination), and adds the data to it. If no MIDI Regions are selected, Logic will create a new MIDI Region on the selected track.

Deleting Events

Outside the MIDI Region borders

MIDI > Erase MIDI Events > Outside Region Borders allows you to erase all MIDI events that fall outside the start and endpoints of a Region.

Erase Duplicate Events

The *MIDI > Erase MIDI Events > Duplicates* function searches all selected MIDI Regions and all MIDI Regions in selected folders, for identical events with the same time position. Any events occurring twice or more at the same position are deleted (allowing one to remain).

- The search looks for notes, controllers, monophonic aftertouch and program change data.
- Events of the same type, but on different channels, are not viewed as being identical.
- The “same time position” includes two notes which are output simultaneously because of the current quantization setting.

There are further functions available for event deletion in the Arrange window (see “Copying Events Selectively” on page 168).

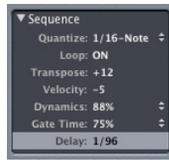
For more on the other event editing functions in the Arrange window (see “Arrange Window Techniques” on page 167).

Adding Prg, Vol, and Pan as Events

The *MIDI > Insert Instrument MIDI Settings as Events* command allows you to insert the program, volume, and pan (Prg, Vol, Pan from the Instrument’s Object Parameter box) settings as actual MIDI events into one, or more, selected MIDI Regions. The events are placed a quarter note before the beginning of the relevant MIDI Regions. Only the activated (checked) settings in the Instrument’s Object Parameter box(es) are added as events. If any events of the same kind already exist in the Region(s), they are overwritten.

MIDI Region Playback Parameters

The Region Parameter box is located to the left of the track list, above the Toolbox.



Displaying Region Parameters

When you select a Region, its parameters are automatically displayed in the Region Parameter box. If the Region Parameter box isn't visible, select *View > Parameters*.

None of these parameters alter the original data of the Region, they only affect playback.

Note: The Region parameters also apply to folders, affecting all Regions within them.

Opening and Closing

Clicking on the small triangle to the left of the name shows or hides the contents of the box, just as with folders in the Finder (if you are viewing the contents By Name). Closing the box provides room for the elements below.

Name

The top line in the Region Parameter box simply shows the name of the selected Region.

Quantize

Covered in the Quantization section (see “Quantization” on page 147).

Defaults and MIDI Thru

Default Region Parameters

If no Region is selected, the upper line of the Region Parameter box will display *MIDI Thru*. Any live MIDI input (in stop mode, as well as during recording or playback) will be played with the instrument and settings chosen here. When you record a new Region, the settings in the *MIDI Thru* Parameter box are carried across to the new MIDI Region's Parameter box. The MIDI Thru Parameter box can be viewed as an adjustable “default” Parameter box.

Realtime processing

An important concept to understand is that incoming MIDI data is always relayed “through” the instrument assigned to the currently selected track—as long as the record enable button is active, and the chosen MIDI channel is not excluded from MIDI Thru. This data is also processed through the MIDI Thru Parameter box, described above. The MIDI Thru parameters are always displayed, and are adjustable when no Regions are selected. Click on the window background to deselect all Regions.

Setting up MIDI Thru to match a Region's parameter

The *Set Track & MIDI Thru Parameters by Region/Folder* key command allows you to set the MIDI Thru parameters to match those of a selected Region. This action also selects the Region's track.

Editing Several Regions Simultaneously

If several Regions are selected, the number of selected Regions is displayed, in place of a Region name. If you alter any Region parameter, all selected Regions will be affected. If a given parameter (Transpose, for example) is set differently in the individual Regions, a "*" appears in the Parameter field. You can alter this parameter for all selected Regions, and the value differential will be retained (relative alteration). If you want to set all selected Regions to the same value, hold down Option while changing the value (absolute alteration).

Loop

Value range: On or Off. Normal value: Off

When switched On, the Region is repeated until it encounters another Region on the same track. A loop will also terminate at the end marker of a folder (if the looped Region is inside a folder), or the song end marker. These loop repeats are displayed as grey beams, named after the parent Region. The length of each loop is identical to that of the parent Region, so if you want to create polyrhythmic structures, try experimenting with the length of the original Region.

One way of ending a loop early is to create an empty Region (on the same track) with the Pencil. Perhaps a better method is to place the looped Region in a folder. You can then control the total number of loops by simply altering the length of the folder.

Looped Regions can be selected by clicking on the light-gray bar at the top of the loop-repetitions. A short click will select the looped Region. Click-holding behaves like a click on the background. All Regions are deselected and rubber-band selection becomes active, allowing multiple Regions to be selected.

The *Toggle Loop* key command may be used to switch the Loop parameter on and off for selected Regions.

Region > Parameters > Turn Loops to Real Copies transforms the loops into real copies of the original Region, and simultaneously switches the Loop parameter *Off* for the resulting Region(s).

Region > Parameters > Turn Loops to Aliases changes MIDI Region loops to aliases. This function is also available as a key command.

Transpose

Value range: ± 96 semitones. Normal value: 0

All note events contained in the MIDI Region are transposed up or down by the selected amount during playback. Even complete folders can be instantly transposed in this way. If several individual MIDI Regions within the folder have already been transposed, the relative differences between them are retained.

If you want to transpose by octaves, click on the arrows to the right of the Transpose parameter. This opens a pull-down menu that allows direct octave transpositions.

To guard against drum notes, and so on being transposed, the MIDI Instrument's Object Parameter box contains a *No Transpose* checkbox. If you place a check in this box, the transpose parameter is ignored in all MIDI Regions played by this Instrument.

Velocity, Dynamics, and Gate Time

Velocity

Value range: ± 99 . Normal value: 0

All notes in the relevant Region are offset by the selected value. Positive values add to the originally recorded velocity, and negative ones subtract from it, although naturally it is impossible to go outside the limits defined by the MIDI Standard (0—127). If you select a velocity offset that exceeds the maximum or minimum possible value for a particular note, that note will play at the extreme possible range. As an example, a setting of +20 will cause a note with a velocity of 120 to play at 127.

Dynamics

Value range: in percent. Normal value: 100%

This parameter also affects the velocity values of notes, but instead of adding or subtracting a fixed amount, the differences between “soft” and “loud” notes (the dynamics) are increased or decreased. This works in a similar way to a compressor or expander. Values above 100% expand the dynamics, thereby increasing the difference between “loud” and “soft,” while values below 100% compress the dynamics, reducing the differences between “loud” and “soft.”

The *Fix* setting causes all notes to be transmitted at a velocity value of 64. When used in conjunction with the *Velocity* parameter (see above), it is possible to set any fixed velocity value.

Gate Time

Value range: in percent. Normal value: 100%

The term “gate time” stems from the technology used in analog synthesizers, and refers to the time between pressing and releasing a key. This parameter affects the absolute note duration or length. This should not be confused with the musical note value, which normally refers to the amount of time until the next note. The practical effect is to make the notes in the Region more staccato or legato. The parameter range is related to the original note lengths. “Fix” produces extreme staccato. Values below 100% shorten the note lengths. Values above 100% lengthen the notes. The “leg.” setting produces a completely legato effect for all notes, no matter what their original lengths, eliminating all space between notes in the affected Region. If this is used on a folder, all notes in all MIDI Regions in the folder will be affected.

Delay

Value range: –999 to 9999 ticks. Normal value: 0

This parameter alters the time position of selected Regions. Positive values correspond to a delay (laid-back playing style or dragging), negative values cause a pre-delay (driving or rushing).

The units are ticks. A tick is the smallest time resolution in a sequencer, which is 1/3840th note in Logic. On the right side of the delay value field you can use the mouse as slider to input the value.

If you on the arrows to the right of the Delay value, the pop-up menu allows you to set the delay in note values (1/16, 1/8 and so on).



Select *View > Delay in ms* to switch the display to milliseconds.

This can also be used to calculate delay times for different note values at various tempos:

- 1 Set the desired note value by clicking on the Delay value.
- 2 Go to the View menu and switch on *Delay in ms*.
- 3 Set the desired tempo in the Transport panel.

4 The delay parameter will now show the delay time.

The delay parameter is mainly used for musical purposes. It is also a way of fixing timing problems that may occur for a variety of reasons. Some examples of these are:

- The attack phase of the sound is too slow. A good musician will automatically compensate for this by playing the notes slightly early. With very slow sounds, you may need a pre-delay of over 100 ms to even them out.
- The sound generator is reacting too slowly to the incoming note-on messages. Older multitimbral sound generators often take tens of milliseconds before outputting a voice. This effect may be better compensated for with the Instrument's Parameter box *Delay* parameter, as this will affect all Regions on all tracks that are transmitted to the slow-reacting device.
- The delay in outputting the voice is not constant as it is dependent on the order of notes arriving serially at the sound generator. You should therefore try pre-delaying rhythmically important tracks by as little as one tick—it can work wonders!

Fixing/Neutralizing MIDI Region Parameters

You can normalize the MIDI Region parameter settings of all selected MIDI Regions and Folders with the *MIDI > Region Parameters > Normalize Region Parameters* command.

This means that all settings are actually written as data, and playback parameters revert to normal values. The audible result remains the same. The Loop and extended MIDI Region parameters are not affected. Use of this function is effectively like saying “make these MIDI Region/instrument parameter values permanent”. In most circumstances, it is better not to do this, as leaving the original data untouched provides more flexibility. This includes unlimited opportunities to change your mind about MIDI Region edits.

Merge/Normalize and MIDI Channels

As per the Merge function or the Glue tool, the Normalize function is intelligent in the way it handles stored MIDI channel numbers. If all stored events have the same MIDI channel number, the channel will be changed to that of the Instrument assigned to the current track. If the events are on different channels, Logic will ask whether or not you would like to convert the event channels.

The following Normalize options are also available by selecting *MIDI > Region Parameters > ...*:

... *Normalize without Channel* leaves the stored channel number untouched.

... *Normalize without Channel & Delay* leaves the stored channel number and Delay parameters untouched.

If the playback Instrument has a channel setting of “All”, or you’re dealing with a completely different type of Environment Object (a Channel Splitter used as “A-Playback” for example), the stored MIDI channel numbers are unaffected by the Normalize function.

A quick tip: if you're editing MIDI Regions that appear as notation on a polyphonic score style, we recommend using *Normalize without Channel*, as the event channel is used to assign notes to individual polyphonic voices in the Score Editor.

Extended Region Parameter Box

The Extended Region Parameter box contains additional Region parameters. These include more comprehensive quantization (see “Quantization” on page 147) parameters.



Opening the Extended Region Parameter Box

To open the Extended Region Parameters float window, you can use either; the *Options* > *Extended Region Parameters* command, or double-click on the left half of the Region Parameter box (next to the parameter names).

Clip Length

Value range: On/Off. Neutral value: Off

When switched On, this parameter causes any notes that sustain beyond the end of a MIDI Region to stop playing at the MIDI Region endpoint. Remember, however, that Clip Length is purely a playback parameter. The data of these longer notes is not affected, and their display in the editor windows is unchanged.

The point of this function is to allow you to alter the length of a note directly from the Arrange window, by adjusting the length of the MIDI Region. Clip length has no effect on Folders.

Score

Value range: On/Off. Neutral value: On.

When switched *Off*, this parameter removes the selected MIDI Regions from the Score Edit window. This is useful if the MIDI Region doesn't contain any notes—the MIDI Region contains other data, such as controller information for fader automation.

Quantization

Quantization is the rhythmic correction of notes to a specific time grid. Any inaccurately played notes are moved to the nearest position on this grid.

As an example, if the smallest notes in a passage are 1/16th notes, you should use 1/16th quantization to move all recorded notes to their ideal rhythmic value. This will only work if no note was played more than 1/32nd from the ideal position, otherwise the note will be moved 1/16th later or earlier than the desired position.

How It Works

Quantization settings are made in either the Region Parameter box or the Extended Region Parameter box. They are non-destructive playback parameters, so they can be replaced by another setting at any time. This also means that you can always revert to the unquantized, original recording by setting the *Qua* parameter to *Off*. Unlike other playback parameters, quantization affects the way notes are displayed in the editor windows, thus allowing you to see what effect the quantization parameters are having by looking at the position of the notes. Region quantization only affects notes, not other types of events (controllers, for example).

For every note event, two positions are stored internally: the original recorded position, and the playback position (also shown in the editor windows). For unquantized MIDI Regions, both positions are the same. Each time you quantize, a new playback position is calculated in relation to the original position.

The *Apply Quantization Settings Destructively* (see “Applying the Quantization Settings” on page 150”) command overwrites the original position with the playback position. The same thing happens if you manually change a note in one of the editors.

Which Events Can Be Quantized?

Region parameter quantization only works on notes, not on other types of events like controllers. Apart from notes, all events have just one position parameter, which can be left alone or permanently changed by Event Quantize, or dragging with the mouse.

Essentially, quantization works on the whole MIDI Region. To quantize individual notes or other event types, use Event quantization (see “Event and Note Quantization” on page 43) in one of the Editor windows. You should note that this overwrites the original record position of the quantized note.

If you want to quantize various parts of a MIDI Region differently, you can divide the MIDI Region, and use different quantization settings on each part of the MIDI Region. You can then recombine the parts of the original MIDI Region without affecting the way the parts are played.

The quantization grid always begins at the start of a MIDI Region. If the MIDI Region does not start at the beginning of the bar, neither does the quantization grid.

Quantization

The quantization grid is accessed from a pull-down menu beside the *Quantization* parameter in the Region Parameter box.

You can also step through the available quantization resolutions in the pull-down menu, one at a time, with the *Quantize: next value* and *Quantize: previous value* key commands.

This function sets the quantization value for all selected MIDI Regions.

Quantization off

The *Off* setting plays the notes at the finest possible timing resolution: 1/3840 note, which is unquantized playback, in practical terms.

Normal quantization

The *1/1*, *1/2*, *1/4*, *1/8*, *1/16*, *1/32* and *1/64* note settings quantize the MIDI Region to the equivalent note value.

Triplet quantization

The *1/3*, *1/6*, *1/12*, *1/24*, *1/48* and *1/96* note settings quantize the MIDI Region to triplet note values. A *1/6* note is equivalent to a quarter triplet, *1/12* note to an eighth triplet, *1/24* note to a sixteenth triplet and *1/48* note to a thirty-second triplet.

Mixed quantization

The *8 & 12* setting corresponds to eighths and eighth triplets, *16 & 12* to sixteenths and eighth triplets and *16 & 24* to sixteenths and sixteenth triplets. Mixed quantization always applies to both note values, and requires greater playing precision when recording.

Odd quantization

The *9-Tuplet* setting means novetuplets (1 bar = 9 beats), *7-Tuplet* is septuplets (1 bar = 7 beats), *5-Tuplet/4* is quarter quintuplets (1 bar = 5 beats), and *5-Tuplet/8* is eighth quintuplets (1 bar = 10 beats).

Additional Quantization Parameters

The following quantization parameters are located in the Extended Region Parameters box, which can be opened by either; double-clicking on the left half of the Region Parameter box, or with *Options > Extended Region Parameters*.

Q-Swing

Value range: 1% to 99%. Normal value: 50%

This percentage value alters the position of every second point in the current quantization grid. Values over 50% delay the beats. Values under 50% pre-delay them. The most practical settings fall between 50% and 75%, imparting a “swing” feel to strictly quantized MIDI Regions.

Q-Strength

Value range: 0% to 100%. Normal value: 100%.

This percentage value determines how far a note is shifted towards the nearest grid position. 100% results in full quantization, 0% leaves the note at its recorded position.

Q-Range

Value range: 0 to 3840 ticks. Normal value: 0 ticks.

All notes further (in ticks) from the nearest grid position than the value specified here are not quantized. A value of 0 means that every note is quantized.

If you enter negative values for Q-Range, you are using *Far away only Quantize*. In this mode, only notes that fall outside the set range (in ticks) are moved to the ideal quantization grid positions; while notes closer to an “ideal” position remain unquantized. This moves the most poorly played notes (those outside the range) to perfect timing positions on the quantization grid, or at least towards these positions, depending on the Q-Strength setting.

Q-Flam

Value range: ± 3840 ticks. Normal value: 0 ticks.

Notes with the same time position (chords) are spread out by this parameter. Positive values produce an upwards arpeggio, negative values a downwards arpeggio. The first note of the arpeggio is unaltered.

Q-Veloc

Value range: -99% to +127%. Normal value: 0%.

This percentage value determines the amount that the velocity values of quantized notes are affected by the velocity values of the template MIDI Region (see “Groove” on page 151). At 0% the notes retain their original velocity, and at 100% they adopt the velocity values of the template. Negative values alter the velocity so that the deviation from the template becomes even greater.

Q-Length

Value range: -99% to +127%. Normal value: 0%.

This percentage value determines how strongly the note lengths of the quantized notes are affected by the equivalent note lengths of the template MIDI Region. 0% has no effect, while at 100%, the notes adopt the exact note lengths of the template. Negative values alter the note lengths so that the deviation from the template is increased.

Linear Quantize—“Q-Range”

The *Linear Quantize* algorithm is always used automatically whenever you set a positive value for the *Q Range* parameter.

The *Q Range* parameter is found in the Extended Region Parameter box, which you can open by selecting *Options > Extended Region Parameters*.

Operation

Linear Quantize is well-suited to “soft quantization” of recordings which already have the right groove, but are too hurried or “laid back” in places. Linear Quantize retains the original feel, but positions the rhythmic “center” precisely in the groove.

To obtain the best results, use a low, even quantize value, such as 1/4 note. Set the *Q Range* parameter to compensate for the maximum error in the recording; 96 ticks (= 1/40 note), for example.

Linear Quantize is a very musical quantization strategy that requires a certain amount of technical musical prowess.

Applying the Quantization Settings

In the same way that other Region parameters can be normalized, the quantization settings can also be applied permanently to stored data.

To do this, make use of the *MIDI > Region Parameters > Apply Quantization Settings Destructively* command.

Of course, once this is done, it is impossible to revert to the original recording, unless you use *Undo* immediately after performing the operation (or the Undo History).

Pre-quantization

The *Apply Quantization Settings Destructively* function is especially well suited to pre-quantization. As an example, if a recorded MIDI Region cannot be quantized to a 1/16 swing without producing a few incorrectly timed notes, quantize it to 1/16th notes and then use *Apply Quantization Settings Destructively*. You can now apply any swing quantization to this cleaned-up version of the MIDI Region.

If you are recording a hi-hat pattern consisting of 1/16 notes and one single 1/32 note, first play the rhythm (quantized to 1/16 notes) without the 1/32 note and choose *Apply Quantization Settings Destructively*. You can now raise the quantization to 1/32 notes, and add the extra note without incorrectly quantizing any badly-played 1/16 notes.

Groove

In the early days of sequencers, many people thought that electronic music sounded mechanical or sterile. This impression (which, at the time, might have been a fair observation) was based on the fact that sequencers could only output notes that were quantized. This is no longer the case. Logic's resolution is so high that at a tempo of 120 it can differentiate between two notes that are just 520 microseconds apart. This is equivalent to a single oscillation cycle of the highest note that you can play on a soprano saxophone.

It is, of course, still possible to generate sterile, mechanical timing, if that's what you actually want (although even straight quantization can be given a groove with the aid of the Q-Swing parameter), with the quantization functions (see "Quantization" on page 147).

Logic also allows you to use your own quantization grid (or Groove Template), making full use of the system's high timing resolution.

Creating Groove Templates

Rather than quantizing the notes to one of the preset grids, you can create new ones based on the rhythms of other MIDI Regions. These are referred to as "groove templates." Groove templates make it possible to capture the small timing deviations which give a MIDI Region its "feel," and apply them to other MIDI Regions.

Creating Your Own Quantization Template (Groove)

The *Options > Groove Templates > Make Groove Template* function transforms the exact timing of notes in the selected MIDI Region into a quantization template. It then appears in the pull-down menu of the *Qua* parameter (in the Region Parameter box), named after the MIDI Region on which it is based. It can be used on any other MIDI Region, in exactly the same way as the other items in the Quantize pull-down menu.

In general, two-bar MIDI Regions work particularly well as models for this function, but you can use MIDI Regions of any length. Make sure that the model MIDI Region actually contains a note at every desired quantization value.

Deleting a Quantization Template

Use *Options > Groove Templates > Remove Groove Template from List* to delete the selected model MIDI Region from the list of possible quantization templates. The next time you open the pull-down menu, this quantization template will no longer be available.

Importing Groove Templates

You can also import third-party quantization templates, such as those made by the Canadian firm WC Music Research (DNA Groove Templates). First, you must copy the templates into a folder called “Grooves”, which must be on the same level as the Logic program itself. If necessary, manually create a folder of this name.

You can then use the *Options > Groove Templates > Import DNA Groove Templates* function to import the templates. All DNA Groove Templates in the Grooves folder are displayed graphically, along with their names. Just click a groove template to apply it immediately to the selected MIDI Region(s). If you like the groove, you can transfer it into Logic’s list of quantization templates, by double-clicking on it.

Logic then creates a folder called “Grooves!” in the Arrange area (if not already present) for these imported groove templates. The groove templates are stored as MIDI Regions within the folder.

The conversion of the DNA grooves into stored MIDI Regions allows the quantization templates to be used, even when the song is played on another computer that doesn’t have a Grooves folder with the corresponding DNA Groove Templates on it’s hard disk.

Note: You can also use Audio Regions to create Groove Templates. For more information, please read the “Audio to MIDI Groove Template” section on page 412.

Folders Overview

A folder is a Region that can contain other Regions, much like a folder in the Finder that can contain other folders or files.

One way to imagine a folder is as a song within a song. A folder can have as many tracks, featuring Regions, as required. When opened, folders look just like the Arrange area and track list in a song.

Within a track of the song, a folder looks like a MIDI Region, but has a dotted surface.



This could contain tracks like trumpet, saxophone, and trombone arranged into a brass section, or 14 tracks of drum instruments, which you may want to treat as a single drum pattern Region.

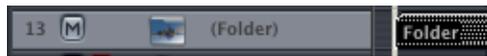
In the same way, your entire song, including all tracks and Regions, could itself be a folder, appearing as a grey beam in another song. In this way, you could arrange several songs for a concert.

This is not all that folders can do. You could use folders to represent the parts of a song (choruses and verses). As in the Finder, you can place as many folders as you like within other folders, and within yet more folders (for the instrument groups within the different parts of the song, as an example), with no limit to the number of levels you can create.

Another possible use might be to store different arrangements of a song in different folders, allowing you to switch between them rapidly... That's enough for you to be thinking about for the moment. We'll leave the rest up to your imagination...

The “Folder” as a Track Instrument

A folder is normally placed on a track assigned to a Folder in the Track List, rather than an Instrument.



All Regions in the folder are played by the instruments set in the folder's track list. All instruments within the folder will play back as they normally would on the top level of the Arrange window.

If you place a folder on a track that is set to a normal instrument, its entire contents are played by this instrument. This usually only makes sense if the folder contains tracks for just this instrument. This could be a quick way of listening to a string arrangement, if some of the intended sound sources are unavailable, for example.

Working with folders

Creating folders

The *Region > Folder > Pack Folder* function places all selected Regions into a folder. The folder is created on an existing folder track. If no track with a folder instrument is available, Logic creates one.

In a similar way, if no Region is selected, Logic creates a track with a folder on it. This contains no Regions—just tracks assigned to all instruments from the current level.

Changing Display Levels

Entering a Folder

To change to a lower level (go into a folder) of the Arrange window, double-click the folder itself.

The *Go Into Folder or Region* key command does the same, but make sure the folder is selected before choosing this option. If a MIDI Region is selected when this command is used, an Event List is opened, showing its contents.

Double-clicking on a track assigned as folder in the track list, opens the Track Mixer (see “Track Mixer” on page 307).

Exiting a Folder

To change to a higher display level of the Arrange window, double-click on the background. The *Go Out of Folder or Region* key command does the same.

Moving Regions into Folders

...is as easy as drag-and-drop. Drag the Region(s) from the original track onto the folder at the desired position and release the mouse. If the folder does not already contain a track with the same instrument as the original track, Logic creates one. When you look inside the folder, you will see the Region at the drop position.

Folder Editing: Just Like Regions

In principle, you can do anything with folders that you can do with Regions (see “MIDI Regions” on page 128).

Unpacking Folders

Unpacking Individual Regions

If you want to move individual Regions from a folder to a higher level, there are two ways of doing so:

- Go to the display level that you want to add the Region to. Now, open a second Arrange window by pressing Command-1 (default). Go into the folder that you want to remove the Region from, and drag it from one Arrange window into the other.
- Go to the display level that you want to remove the Region from. Select the Region and transfer it to the Clipboard by pressing Command-X. Change to the display level that you want to add the Region to. Select the desired track, and set the song position line to the desired position, then add the Region by pressing Command-V.

Unpacking Folders

Use the *Region > Folder > Unpack Folder* command to dismantle the selected folder. If you select *Unpack Folders (Create new tracks)* Logic will create new tracks on the same level that the folder was located on (below the former folder track). If you select *Unpack Folders (Use existing tracks)*, the Regions contained within it are placed on tracks set to the appropriate instruments.

Aliases

An alias in Logic is the same as an alias in the Finder. It looks like a Region, but contains no actual data. It is just a reference to the data of the original Region—a virtual “reflection” of the original. You can always recognize an alias, because its name is written in italics.

Note: Aliases can be created for MIDI Regions and Folders. Only cloned Audio Regions can be created for Audio Regions (see the “Making Multiple Copies of Regions” section on page 132). When the term Region is used in the following section about aliases, it only refers to MIDI Regions and Folders.



If the data in the original Region is altered, this immediately affects all aliases of the Region.

In fact, this is the whole point of aliases. As an example, if a riff or phrase keeps recurring throughout a song, it makes sense to use aliases, rather than have full copies of the original eat up your storage space.

Furthermore, when using aliases, if you feel something is not quite right, you only need to alter the original, and the correction will automatically take effect throughout the whole song. If you just want to alter a detail at one point in the song, you can turn that particular alias into an independent Region.

Creating an Alias

To create an alias, just hold down Shift when copying the Region as per usual (hold down Option-Shift and drag).

There is also the *Alias > Make* command in the *MIDI* menu. The alias appears on the selected track, beginning at the current song position.

If several Regions are selected, their relative time and track positions are retained. The selected track is the destination track for the first Region along the time line.

When you use the *Region > Repeat Regions* (see “Copying Regions” on page 132) function, you have the “as Alias” option.

You can use *MIDI > Alias > Make but Copy Folder* to create aliases of the current selection. If a folder is selected, a true copy of the folder is created, and aliases of all Regions in the original folder are placed inside it. The advantage is that within this folder, you can (for example) set up mutes, and alter program, instrument, or playback parameters, if desired.

Playback Parameters

Although an alias is a “slave” of the original, it has its own playback parameters. The exception is the original’s quantization parameters, which have a special status and always apply to aliases too.

Re-assigning an Alias

The *MIDI > Alias > Re-Assign* function assigns a new original Region to an existing alias. Both the alias and the intended new original Region must be selected before using this option.

Alias and Real Regions

Search Functions for an Original or Alias

Finding the Original of an Alias

If you have forgotten where the original is for a certain alias, select the alias, and choose the *MIDI > Alias > Select Original* function, which will find and select the original Region. Another method is described in the “Contents Visible in MIDI Regions” section on page 172.

Finding the Alias of an Original

Conversely, you can select the original of a particular Region, and find any aliases you’ve made from it. Select *MIDI > Alias > Select All Aliases of Region*. All existing aliases will then be found and selected.

“Orphan” Aliases

If you erase a Region that one or more aliases were created from, Logic will display the following warning message:

One or more Aliases are made from Regions to be cleared! Do you still want to clear these?

“Don’t Clear” cancels the erase procedure, while “Clear” deletes the Region. If you do this, it makes no sense to keep the aliases after you’ve deleted the original. As Logic doesn’t do this for you, you could end up with “orphan” aliases—aliases without an original. Although such Regions serve no useful purpose, Logic doesn’t automatically delete them, as you might decide to assign them to new originals at a later stage.

Selecting All Orphan Aliases

MIDI > Alias > Select All Orphan Aliases selects all aliases that reference original Regions that no longer exist.

Deleting Orphan Aliases

MIDI > Alias > Delete All Orphan Aliases deletes all aliases that no longer have originals. You can use this function to tidy up after deleting a number of Regions, as this may possibly leave several unnecessary aliases in your song file.

Turning the Alias into a Real Region

You can use *MIDI > Alias > Turn to Real Copy* to make a real Region from an alias; its contents will be identical to those of the original Region referenced by the alias.

Editing the Events in an Alias

It is not possible to edit aliases of MIDI Regions. If you double-click on an alias, Logic assumes that you either want to edit the original, or turn the alias into a real Region. A dialog box appears, asking whether you want to create and edit a real copy, or to edit the original instead.

Click on the desired button; Enter opens the editor window for the original MIDI Region.

Merging Two or More Regions

If you edit an original Region by merging it with others, any existing aliases are automatically updated to reflect the changes.

Markers

As their name implies, markers are mainly used to mark particular time positions or sections in a song. They usually appear as short text strings and (optionally) colored sections in the Bar Rulers of all Logic windows, or (optionally) as longer texts (of any length), in the Marker Text window. This makes markers suitable for use as notepads for storing text comments with a song file.



Only the names of the markers are shown in the Bar Ruler (if there is enough space). The complete text of a marker can be viewed and edited in the Marker Text window (see “Marker Text Window” on page 159).

The names of all markers, their bar position and length, are also listed in the Marker List window (see “Marker List Window” on page 161), which, as its name suggests, is a specialized event list window for markers. Markers have a specific duration or length, regardless of the extent of the actual text. A length of one tick means that the marker extends to the beginning of the next marker, or to the end of the song or folder, if no other marker follows it.

Apart from the text functions, markers can also be regarded as namable storage areas for locator positions.

Creating Markers...

... using the mouse

To create a marker with the mouse, position the mouse cursor in the lower third of the Bar Ruler at the desired bar position, hold down Command-Option and click. A Marker Text window will open.

If a marker already exists at that bar position (or up to a quarter note before or after it), no new marker will be created. The same applies for all other methods of creating markers (via menus or key commands, see below).

... using menu or key commands

To create a marker at the current song position (rounded to the nearest bar), select *Options > Marker > Create*, or use the *Create Marker* key command. This does not open a Marker Text window, thereby making it easier to quickly create several markers, one after another.

Options > Marker > Create Without Rounding (or the *Create Marker without rounding* key command) does almost the same, but the position of the marker is not rounded to the nearest bar.

... above Regions

Selecting *Options > Marker > Create by Regions* creates markers at the position(s) of all currently selected Regions. These markers take on the names, bar position and length of the Regions they are derived from.

The menu and key commands are also available directly in the Marker List window.

... matching a cycled section

To create a marker which corresponds exactly to the length and position of a cycled section, drag the cycle bar down into the lower third of the Bar Ruler. For more on this, check out the section on *Adjusting a Marker to Fit a Cycle* (see “Marker Position and Length” on page 163).

Deleting Markers

To delete a marker, grab it with the mouse in the Bar Ruler, and drag it down, out of the Bar Ruler. Let go when the mouse cursor turns into a downwards pointing hand.

To delete a marker at the current song position, you can also choose *Options > Marker > Delete* or the *Delete Marker* key command. A marker can be deleted by selecting it and pressing Backspace in the Marker List window.

Marker Names

Newly created markers are automatically named “Marker ##” (unless they were derived from Regions as described above). “##” stands for their order of appearance along the time line, which will be displayed in the Bar Ruler in place of the ## (resulting in “Marker 1,” “Marker 2” and so on). The number always depends on the actual order of all markers in the song, including markers that have had their name changed.

Markers created with the *Create by Regions* function are automatically assigned the name of the Regions they were derived from.

The marker names appear in the Bar Ruler of all Logic windows, the Marker List window, and the title bar of the Marker Text window. Automatically assigned names can be changed, either directly in the Bar Ruler, or in the Marker Text window:

Editing Marker Names and Text

...directly in the Bar Ruler

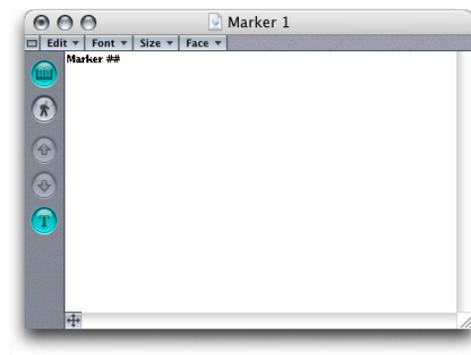
Double-click on the marker while holding down Command-Control. A text entry field will open, allowing you to edit the marker’s name. The same is achieved via *Options > Marker > Quick Edit Marker*.

...in the Marker Text window

The name of a marker can also be edited directly in the Marker Text window (see “Marker Text Window” on page 159): The first paragraph in the window (up to a length of 60 characters, including spaces) will be used as the marker name. The length of the name display in Bar Rulers and the Marker List window depends on available space.

Marker Text Window

To open the Marker Text window, either double-click on a marker in the Bar Ruler while holding Shift-Command, or select *Options > Markers > Open Text* or *... > Open Text As Float*.



Reminder: A floating window will always stay “on top” of regular windows. It is not possible to perform any text input or editing in floating marker windows.

Marker Text Input

You can enter as much text as desired in this window. The first paragraph (up to 60 characters) will be displayed as the marker name in the Bar Ruler. The remaining text will only be visible in the Marker Text window itself.

Marker text can be input and edited as per usual in any text editor. The local *Edit* menu contains the standard *Cut*, *Copy*, *Paste*, *Clear*, and *Select All* commands.

The Copy and Paste commands can also be used to import or export text to and from other software applications (such as word processors), or to print the text.

Text line breaks are always automatically formatted in accordance with the current size of the window.

If you click on the open book button (deactivating it), the window will become a Marker List window. Another click on this switch (highlighting it), will restore the Marker Text mode.

Text Appearance

It is possible to assign a different font, size, and style to any selected portion of the text, using the Font, Size, and Face menus. All fonts installed on your system can be used.

Different colors can be assigned to the text in its entirety, or selected parts, and to the Marker Text window background (see below for details).

Disabling Text Input in the Marker Text Window

If you deactivate the *T* button to the left of the window, the existing marker text is protected, and cannot be altered until the button is reactivated. This prevents any unwanted text edits, which can easily happen if you use key commands while the Marker Text window is open. Reactivate (lit) the switch to enter or edit any text.



Any “normal” computer keystroke (with or without Shift held) will be interpreted as text input if the window is the active window, even if a key command is defined for the key.

Automatic Text Selection

If a “*” is used as first character in the text, all marker text will automatically be selected when the Marker Text window is opened. This facility allows existing text to be overwritten immediately.

Colors...

The *Face > Colors* option opens a color palette, when in the Marker Text window.

...for marker text

You can assign colors to all currently selected characters in the Marker Text window by clicking on the desired color in the palette.

...for the Marker Text window and Bar Ruler background

A Command-click on one of the colors in the palette will assign the color to the background of the Marker Text window, and also to the marker background in the Bar Ruler. (If dark colors are used, the marker text will automatically be shown in an inverse color).

Markers without a Name

Press Enter, or Option–Space bar and Enter, rather than typing in text, to create a marker with no name.

Marker List Window

The Marker List window shows all existing markers in an event list. You can copy and delete markers, and/or edit their position and length in this window. You can also select any marker for text editing.

Opening the Marker List window

The *Options > Marker > Open List* and *...Open List as Float* functions (and key commands) open the Marker List window.



Reselecting this command closes the Marker List window.

The Edit menu contains the usual Clipboard and selection commands. The *Select all following*, *Select inside Locators*, and *Toggle selection* functions are available as key commands.

Tools in the Marker List Window

- The *Pointer* offers the usual selection and editing functions.
 - Selection: by clicking, clicking with Shift held down, and “rubber-banding” in the vicinity of the marker name.
 - Editing: use the mouse as slider, direct value input by double-clicking. Double-clicking on the name converts the Marker List into a Marker Text window, where the text of that particular marker is displayed.

- The *Pencil* duplicates a marker if you click on its name. You can then edit the position and length of the duplicated marker.
- The *Eraser* deletes a marker by clicking on it.
- The *Index Finger* sets the song position to the start of the marker, and sets the locator positions to match the marker's start and endpoints. This tool can also be used for regular editing functions (like the pointer). The index finger is the default tool in the Marker List window.

Playing Markers

If you click-hold on a marker in the Marker List window with the index finger, Logic will commence playback at the marker start position, and will continue playing until the mouse button is released.

Buttons in both Marker Windows

In Marker Text mode (see "Marker Text Window" on page 159), you will see five buttons along the left side of the Marker window. Only two buttons appear in List mode (see "Marker List Window" on page 161):

The *highlighted open book* (top) switch indicates that you are in the Marker Text window (see "Marker Text Window" on page 159). If this switch is not highlighted, you are looking at the Marker List window (see "Marker List Window" on page 161). This switch toggles between these two modes.

Clicking the *walking man* (*Catch*) ensures that you always see the text of the current marker displayed in the Marker Text window.

The *two arrows* (only available in Marker Text mode) enable you to jump to the previous or next marker, without leaving the window. These are equivalent to the *Goto previous Marker* and *Goto next Marker* key commands.

The *T* button enables/disables text input in Marker Text mode.



Marker Position and Length

There are two display options for marker position and length in the Marker List window:

- *Options > Position & Length in SMPTE units* toggles the Marker position and length display between bar positions and SMPTE time positions.
- *Options > Length as Absolute Position* toggles the marker length display between actual (relative) length and (absolute) display of the marker's end position (shown as a bar position).

Moving Markers in the Bar Ruler

To change a marker's position directly in the Bar Ruler, just grab the marker in the Bar Ruler with the mouse while holding Command, and drag it to the right or left. The smallest movements you can achieve this way are quarter-note steps. You can, however, change the size of the steps by holding down additional keys: Control to move in division steps (whatever is currently set in the Snap menu), and Shift-Control to move in ticks (dependent on the horizontal zoom). Watch the help tag for precise feedback on movements:

Moving Markers in the Marker List Window

The marker position can also be changed in the Marker List window, using the mouse as a slider on the bar position display, or by double-clicking on a position value and entering the new value on the computer keyboard. The same principle applies to marker length.

Adjusting a Marker to Fit a Cycle

This works as per creating a marker from a cycled section. If you drag a cycle onto an existing marker (with a right or left end—or both—that falls inside the cycled section), the marker length and bar position will match that of the cycle. Simply drag the cycle downwards, until the cursor takes on the shape of the index finger.

Locking Markers to SMPTE Positions

Options > Lock SMPTE Position will lock (fix) the SMPTE position of markers. To indicate this status, a lock symbol is displayed at the beginning of the marker name in the list (like locked events or Regions in the Event List window). These markers always retain their absolute time position: if the song tempo is changed, their bar positions will change to keep them at the same SMPTE positions.

Options > Unlock SMPTE Position will reverse this status.

Using Markers to Set Song Position and Locators

...in the Bar Ruler

If you click on a marker in the Bar Ruler while holding Command, the current song position will be set to the startpoint of the selected marker.

When you drag a marker up into the top third of the Bar Ruler, this will set a cycle of the same position and length as the marker (and thus the locator positions). If the sequencer is stopped when performing this action, the SPL will be set to the marker startpoint.

...with key commands

There are several key commands that set the SPL to the beginning of a particular marker, and adjust the locator positions to match the marker's start and endpoints. The first three commands in the following list will also activate Cycle mode:

- Set Locators by Marker and Enable Cycle
- Set Locators by previous Marker and Enable Cycle
- Set Locators by next Marker and Enable Cycle
- Goto previous Marker
- Goto next Marker
- Goto Marker Number #
- Goto Marker number 1—20 (20 different commands)

The “Marker Numbers” in these commands refer to the (serial) order of all markers in the song.

...in the Marker windows

Clicking on one of the arrow buttons in the Marker Text window, or clicking on a marker with the Pointer tool in the Marker List window will also set the current song position to the startpoint of the corresponding marker, and the locators to the beginning and end of the marker.

Summary of Marker Mouse Actions

Without Modifier keys:

- Grabbing a marker, and pulling it upwards, sets a Cycle zone that corresponds to the length of the marker.
- Grabbing a Cycle, and pulling it down into the marker area on the Bar Ruler creates a new marker that corresponds to the position and length of the Cycle. Should the startpoint of the cycled section fall inside the boundaries of an existing marker, the marker's position and length will be adjusted to match those of the Cycle.
- Grabbing the marker, dragging it below the Bar Ruler, and releasing the mouse button deletes the marker (Undo is possible).

All other mouse actions without modifier keys in the marker area of the Bar Ruler have no effect on markers. Such actions affect the current song position; SPL placement (clicking), scrubbing (dragging), and Start/Stop (double-clicking).

With Option-Command pressed

... creates a new marker and opens the Marker Text window.

With Command pressed

- A short click on an existing marker sets the SPL to the marker startpoint.
- Double-clicking on an existing marker starts Logic at the marker startpoint.
- Grabbing, and pulling left/right, moves markers (holding down Control or Shift-Control allows smaller movements).
- Grabbing, and pulling upwards/downwards, sets cycle lengths/erases markers.

Double-clicking on a marker while holding Command-Control

- Opens a small text edit box for the marker name. If the marker already contains more than a few words of text, the Marker Text window will open.

Double-clicking while holding Shift-Control-Command

- Creates a marker, and opens the small name input field.

Double-clicking on a marker while holding Shift-Command

- Opens the Marker Text window for the marker (without creating a new marker).

Time and Key Signature Editor

The Time and Key Signature Editor window allows you to copy, move, and delete time signature changes, key signature changes and global score symbols (repeat signs, special barlines and so on).

Choose *Signature/Key Change List Editor* from the *Options* menu to open this window. This editor is very similar in use to the Event List editor, except that new list entries can only be created by copying existing ones.



The following score symbols are displayed in this window as list entries, if they are present in the score of the song (note: the initial time and key signature of the song is always displayed here, without bar position indications at the top of the list):

- Time signature changes
- Key signatures/key changes, as displayed in the Score Edit window
- Repeat signs (repeat start, repeat end, repeat end and start, brackets for first and second endings)

- Special barlines: double barlines, final double barlines (“end of score”), half/short barlines, hidden barlines (displayed as dotted lines on the screen) and manually inserted regular barlines.

Note: None of these symbols affects Logic’s MIDI and audio playback. Time signatures do, however, affect both the score display and the bar position display in all windows. All functions reliant on the chosen time signature and bar positions (such as MIDI metronome click or Transform window functions) are affected, if bar positions are used to restrict a function to a certain part of the song.

Functions

Copying Time and Key Signatures

Time signatures, key changes, repeat signs, and special barlines can be copied in this window, exactly as in the Event List:

- Select all list entries that you want to copy by clicking on them (Shift-click for multiple selections) and use *Edit > Copy* (Command-C) to copy them to the Clipboard.
- Insert copied entries by choosing *Edit > Paste* (Command-V).
- Copied list entries are inserted into the list, and an entry box for the bar position of the first inserted list event will open. Type in the desired bar position and close the box by pressing Return. Subsequent list entries are inserted at bar positions that correspond to their original distance from the first copied list entry.

Moving and Deleting List Entries

All list entries in this window (except the initial time signature and key indication at the top of the list) can be moved or deleted. Again, this works like the Event Edit window:

- To delete a list entry, select it and press Backspace.
- To move an entry, you can either; click on its bar position with the mouse, keep the mouse button pressed and move the mouse up or down, or double-click on the bar position of the list entry, and type the desired bar position into the box that appears.

Changing Time and Key Signatures in the List Editor

Existing time signatures and key changes can be altered directly in this list:

- Their position can be changed as described in the previous section.
- Time signatures can be changed by click-holding on the nominator or denominator in the list, and dragging the mouse up or down to increase or decrease the value.
- To alter a key signature, either; click on the word major or minor to switch between parallel major and minor keys, or click and hold on the root of the key: This opens a pop-up menu of root notes for all available keys. Select the desired key by highlighting the corresponding note in the pop-up menu.

Arrange Window Techniques

If necessary, you should reread the “Using the Mouse” section on page 13, the “Selection Techniques” section on page 36, and the “Edit Operations” section on page 34.

These sections, and the techniques covered in the MIDI Regions section (see “MIDI Regions” on page 128), will teach you how to perform most Arrange window operations.

This section describes functions that

- only affect a particular part of the song, determined by the Locator positions, or
- cause an interaction between objects and Locator positions.

Adding or Removing Passages

The *Region > Cut/Insert Time* functions allow you to remove a passage from a complete arrangement. All bar changes, tempo changes and global score symbols are shifted accordingly. You can also insert a gap within your arrangement. As with cutting time, all tempo changes and so on are moved accordingly. You can also cut and paste a section of your song from one location to another.

You can change just a few selected objects as well. In this situation, you need to tell Logic whether any bar changes, tempo changes and global score symbols should also be shifted. A dialog box will ask whether or not you also want to move Tempo Changes and Global Score Symbols.

Press Enter if you *don't* want to move tempo changes and global score symbols.

The abovementioned global edit is then performed on all objects, if selected. These functions are otherwise restricted to tracks that contain selected objects (at least those that fall between the locator points).

Inserting a Gap across All Tracks

Region > Cut/Insert Time > Insert Time and Move by Locators—The selected objects are cut at the left locator. All objects to the right of the left locator are moved to the right by the cycle length. This creates a gap between the locators. Objects which began at the left locator now begin at the right locator.

Removing a Section

Region > Cut/Insert Time > Snip: Cut Time and Move by Locators—The selected objects are cut at the left and right locators. The objects created between the locators are deleted (in fact, they're copied to the Clipboard and erased from the song, as with Cut) and all objects to the right of the right locator are moved to the left by the length of the cycle zone. All objects which began at the right locator now begin at the left locator, and the section between the locators is removed from the arrangement.

Inserting a Section

Region > Cut/Insert Time > Splice: Insert Snipped Part at Song Position—This function combines the *Insert Time and Move by Locators* and *Paste* functions: All selected objects are cut at the left locator and a passage of one “cycle” length is inserted. Objects currently in the Clipboard are then pasted to the song position (which remains at the left locator position).

Practical Usages

“Snip”—removing an entire section of a song—such as a chorus.

“Splice”—inserting the part at another point in the song. To ensure all tracks are shifted, including tempo, time signature changes, and markers, please select everything beforehand (with Command-A).

Deleting Events Selectively

There are several ways of deleting events from selected Regions, directly in the Arrange window. One method is to select one of the *Erase MIDI Events* commands from the *MIDI* menu.

MIDI > Erase MIDI Events > Inside Locators deletes all MIDI events (that fall between the locators) from all selected Regions.

MIDI > Erase MIDI Events > Outside Locators deletes all MIDI events (that fall outside the locators) from all selected Regions.

Copying Events Selectively

MIDI > Copy MIDI Events is used to copy (or move) MIDI events within selected MIDI Regions. You define the area that you want to move or copy with the left and right locators. The current song position marks the destination for the data.

The *MIDI > Copy MIDI Events* option launches a dialog that offers the following parameters:

Left Locator and Right Locator

These define the area containing the source data (also called the source region).

Destination

This allows you to define the destination position independently of the song position.

Number of Copies

Defines the number of copies.

Create New Region

When set to on, a new MIDI Region is created at the destination position, containing the copied (or moved) events.

Mode

The Mode pop-up menu offers three different Copy functions, which copy the selected events to the destination position, leaving the selected data in its original position.

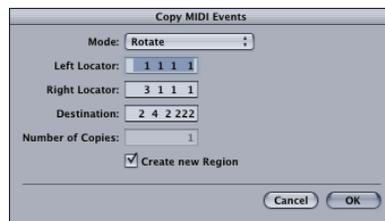
- *Copy Merge*: The copied data is mixed with the data already present at the destination position.
- *Copy Replace*: The data already present at the destination position is deleted, and replaced by the copied data.
- *Copy Insert*: All data already present at the destination position is moved to the right, by the length of the source region.

There are also three Move functions available (Move Merge, Move Replace, Move Insert), which work similarly to the Copy functions. These functions actually move the selected events, removing them from their original position.

If you choose *Rotate*, the source events are moved to the destination position. The data that was previously at the destination position, and the data that falls between the source and destination positions are all moved towards the source position. Thus the data is not altered or deleted, but rotated.

To use the Rotate function:

- 1 Select a MIDI Region.
- 2 Set the song position exactly at the start, and the right locator exactly at the endpoint of the desired MIDI Region. Position the left locator 1/4 note before the endpoint of the MIDI Region.
- 3 Select *MIDI > Copy MIDI Events* and set the Mode to *Rotate*. Now, every time you press Enter, all events are moved a 1/4 note backwards, and the events that fall within the last quarter note are moved to the front of the Region.



The *Direct Swap* option exchanges the source Region with a Region of the same length, starting at the target position.

The *Remove* option removes the MIDI data from the source Region, and leaves the Region at its original position.

Track Automation Data

Track Automation Data (see “Display” on page 315) can also be copied with this tool, provided that no Region containing MIDI data is also selected.

Altering the Display

For information on basic window functions, please refer to the section on Window Functions (see “Window Functions” on page 21).

If you want to maximize the room available for the Arrange area, please refer to the section on Relationships between Windows (see “Relationships between Windows” on page 29).

Display Options for the Track List

You can use the *View* menu to show or hide various parts of the track list:

Track Numbers/Level Meters

Allows you to show or hide the track numbers and level meters.

Mute Button

Every track has its own *Mute* button. If the Mute buttons are hidden, you can still mute any track by clicking to the left of the track number.

Track Solo Button

Every track has its own *Solo* button.

Record Enable Button

Allows you to show/hide the Record Enable buttons.

Track Protect Button

Shows/hides the Track Protect Buttons.

Track Freeze Button

Shows/hides the Track Freeze Buttons.

Track Node Button

Shows/hides the Network Node Buttons.

Track Instrument Channel

When on, this option displays an abbreviated Track Instrument label.

Instrument Icon

Selecting *Instrument Icon* shows/hides the track instrument icons.

Instrument Icon (Large)

Selecting *Instrument Icon (Large)* allows the display of large track instrument icons.

Track Instrument Color

Selecting this option uses the track instrument color for all newly-created Regions.

Instrument Name

Shows/hides the Instrument Name (see “Instrument Name and Track Name” on page 171).

Track Name

Shows/hides the Track Name (see “Instrument Name and Track Name” on page 171).

Instrument Name and Track Name

Hiding one of the names makes more horizontal space available. To distinguish between them, the instrument name is always shown in bold type.

Horizontal Layout

If both the instrument and track names are shown, the names are divided by a line. You can move this dividing line by dragging the mark at the top of the track list with the mouse.



Instrument and Track Name stacked on each other

If you zoom in far enough vertically, you will be shown both names, one above the other: the instrument name (in bold) on top, and the track name below. This even occurs if one of the names is hidden.



Sorting the Tracks

You can sort tracks by grabbing the desired track number and moving it vertically. You can use the right edge of the track list for sorting as well.

Here are the rest of the track list functions involving names:

Selecting a Track Instrument

You can assign an instrument to a track by click-holding the left half of the name or the icon.

Opening the Environment Window for an Instrument

You can open an Environment window (with the relevant instrument highlighted), by double-clicking the instrument name.

Editing Instrument Names

You can edit the Instrument/Audio Object name by Option–double-clicking directly in the track list. You can also use the Instrument Parameter box.

Editing Track Names

You can edit track names by Command–double-clicking directly into the track list—even if it’s only the instrument name that is shown.

Region Display

Contents Visible in MIDI Regions

If you vertically zoom the display, you will be able to see the actual events contained within MIDI Regions.



MIDI Regions show notes or controller events, folders show the Regions they contain, and aliases show the name and position of the original.

The *View > Region Content* option allows you to see a display of contents, at large enough zoom settings. If you uncheck this option, the contents will not be displayed, no matter what the zoom setting.

Region Colors

Newly recorded Regions initially adopt the color of the track instrument. You can change the color of a Region via the local *View > Colors* menu, which opens a color palette. A double-click on a color field opens the system color palette, allowing you to create custom colors. Color edits are stored in the Preferences file and are available for all songs.

After copying Regions between tracks, you could find the Arrange area will start to resemble a patchwork quilt. In this situation, the *Region > Instrument Colors To Regions* function replaces the colors of all selected Regions with the colors of the Instruments playing these Regions. Instrument colors can be set in the Environment.

Altering the Background of the Arrange

Use the *View > Grid* function to switch on/off a track/bar number grid in the arrange area’s background.

Plain Background toggles the background between a plain background and a high resolution pattern. You can choose both a background color for the plain background and a high resolution pattern via *Preferences > Display > Arrange*.

Show/Hide Channel Strip Only

A *View* menu option (and key command) allows you to hide all elements of the Parameters area — except the Arrange channel strip.

This is extremely handy in cases where a high number of active Inserts and Sends are used, and displayed, on small screens (such as that of a 12" PowerBook).

The same command can be reused to toggle back to the full view of the Parameters area.

Reset Functions

To switch off stuck notes, click on the MIDI monitor in the Transport window, or hit Stop twice in rapid succession. In both cases, reset messages are sent, as defined in *Preferences > MIDI > Reset Messages* (see “Interface Language” on page 650).

For Hanging Notes—Panic Function

If the notes continue to sound, then your sound sources may not be able to respond to “All Notes Off” messages. If this happens, try the following:

Double-click on the MIDI Monitor in the Transport window (or use the *Send discrete Note Offs* key command). Separate Note Off messages will then be sent for every note, on all channels of every MIDI port.

This should do the trick!

Unwanted Modulation—Controller Reset

Options > Send to MIDI > Reset Controllers transmits a control change message #121, with a value of 0 (reset all controllers), on all MIDI channels and outputs used by defined instruments. This neutralizes all MIDI controllers, such as modulation or pitch bends.

If Some Sounds Are Suddenly Too Quiet—Volume Reset

The *Options > Send to MIDI > Maximum Volume* function transmits a control change message #7 (main volume), with a value of 127, on all MIDI channels and outputs used by defined instruments. This sets all channels to their maximum volume, providing the optimum signal/noise ratio for your sound sources.

If You Suddenly Hear the Wrong Sounds—Send Instrument Settings

The *Options > Send to MIDI > Used Instrument MIDI Settings* function sends all Prg, Vol, and Pan settings from all Instrument’s Object Parameter boxes used in the current song. This could help to reset your sound sources for the current song, if your synths suddenly change patches mid-performance.

You can set this function to operate automatically after loading any song by activating the *After loading Song, send: Used Instrument MIDI Setting* option, in the *Song Settings > MIDI* page.

This chapter discusses the importing, creation, editing, and handling of Audio Regions in the Arrange window.

You will also learn a number of automated recording techniques, discover crossfading, looping, and tempo matching. Further to this, you'll find out about the Freeze facility, which allows you to create projects that are beyond the real time capabilities of your computer.

Regions

Creating Regions

MIDI Regions are containers for MIDI events in the Arrange window. Containers for audio data are referred to as Audio Regions, or simply Regions.



Audio Regions can be compared to MIDI Regions in the ways that they are used and edited. When you record audio in real time, Logic not only creates an audio file on the hard disk, but also automatically creates a Region, which represents the recorded audio file. Regions can be seen in both the Arrange window (on tracks), and in the Audio window (see "Audio Window—Introduction" on page 349), which lists all audio files and Regions used in the song.

Drag and Drop into the Arrange Window

You can import existing audio files into a song by dragging and dropping them directly into the Arrange window from either; the Audio window, or directly from any folder on your hard disks. A Region, encompassing the entire audio file, will automatically be created at the "drop" point.

Note: You can only drag Regions onto Audio tracks.

Multiple File Dragging

You can drag multiple audio files from the Audio window or a Finder window into the Arrange window. To do so, simply rubber band contiguous files, or command-click non-contiguous audio files in the Finder or Audio window, and drag them to the desired Arrange window position. The following dialog will be launched:



- *Create new tracks*—creates new tracks for each dragged file, using the next available Audio Object. As an example, if three audio files are dragged into the Arrange window onto Track/Audio Object 4, three new audio tracks (Track/Objects 5, 6, and 7) will be created, and the audio files will be placed onto these tracks (as Regions) at the selected song position.
- *Use existing tracks*—will sequentially place the dragged files (as Regions) onto existing tracks, starting with the currently selected track. As an example, if three audio files are dragged into the Arrange window (where track 4 is selected), the first file will be placed on track 4 and the following two files will be placed on tracks 5 and 6.
- *Place all files on selected track*—does just this, with all files being placed sequentially on the desired track.
- *Copy audio file names to track names*—uses the file names to rename tracks, and is only available for use with the *Create new tracks* and *Use existing tracks* functions.
- *Create new audio regions*—will add the desired files to the Arrange window, and will create a new audio Region for each. A numeric value will be appended to each audio Region in the Arrange window, and a new Region will be created for each file in the Audio window. As an example, a Region called “folk-04” will become a new Region called “folk-04.1”. The original Region will be retained in the Audio window (and Arrange, if used).

Inserting Audio Files Using the Pencil Tool

Audio files can be inserted on Audio tracks by Shift-clicking at the desired Arrange window position with the Pencil tool. A file selector appears, allowing you to select the file that you wish to insert. The length of new Regions inserted in this way defaults to the complete file length, which can be freely edited later.

Inserting Apple Loops

Apple Loops are special types of audio files. The insertion method for Apple Loops is different to that of other audio file types. Further information can be found in the Apple Loops section (see “Apple Loops” on page 72).

Editing Regions

Dividing Regions

When you divide a Region using the Scissors tool, you create two new Regions. The newly created segments of the Region are named after the original, with a sequential number appended to the end of the name.

Using the Marquee Tool



When applying the Marquee Tool (see “Editing Parts of a Region” on page 133) to a Region, the selected area will become a new Region once an operation is applied.

Region Display

The Arrange window displays the actual waveform of an audio file, all the way down to single sample resolution (at higher zoom levels). The *Waveform vertical zoom* key commands make this feature even more useful; for precise Arrange edit operations, and for operations on audio Regions with low signal levels.

Strip Silence

Audio > Strip Silence allows you to slice a recording into different Regions, according to their amplitude level.

Scrubbing

You can scrub playback of a Region to accurately select a division point, by using the Scissors tool and holding down the mouse button. This is only available on audio systems that support scrubbing. When using this feature, the Scissors tool works like a virtual playback head, which moves over the “virtual tape” (the Region). If you release the mouse button, the region will be divided at the current position of the Scissors tool.

Resolution

When selecting a cut point with the Scissors tool, you can move backwards and forwards in steps of one division. If you need a finer resolution, press Control after you have selected the Region with the Scissors. To obtain the maximum resolution (ticks) press Shift, as well.

On Zero Crossings

If *Edit > Search Zero Crossings* is switched on in the Audio window, the division-point is moved to the nearest position that the waveform crosses the zero amplitude axis. When enabled, this also applies to all other methods of altering the start or endpoint of a Region in the Arrange window.

Note: This can cause the precise startpoint and length of a Region to differ slightly from the selected value. In most cases, this will be inaudible.

Erasing Regions

Regions can be erased by either; selecting them and pressing Backspace, or by clicking on them with the Eraser tool.

Erasing Recordings

When you erase a Region that you have just recorded (since opening the song), Logic will ask if you also want to erase the corresponding audio file. This is a good way to avoid wasting hard drive space unnecessarily by retaining bad takes and unwanted recordings.

If the recording was made before the song was loaded for the current session, this dialog box will not appear. This prevents you from accidentally deleting valuable recordings. Pressing Backspace will only remove the Region from the Arrange area. If you want to delete the corresponding audio file from the hard disk, you can do so by selecting *Audio File > Delete File(s)* in the Audio window.

Copying Regions

Creating New Regions

Copies of Audio Regions are made in exactly the same way as MIDI Regions—by dragging them while holding down Option. This automatically creates a new Region in the Audio window. The new Region will retain the name of the original, with a sequential number added.

This allows you to alter the start and endpoints of the copied Region independently of the original. It is comparable to a genuine copy of a MIDI Region, which is created in the same way.

Using an Existing Region More than Once

You can also create another version of the same Region in the Arrange window—a cloned Region, if you will. To do this, hold down the Option and Shift keys as you are copying. This is comparable to an alias of a MIDI Region, which is created in the same way.

Whenever you adjust the start or endpoints of any of these Regions, all other cloned Regions will also be adjusted.

Making Cloned Regions Independent

To make several cloned Regions independent of each other, select *Audio > Convert Regions to New Regions* in the Arrange window. This converts all selected clones into individual Regions.

Converting Several Regions into Audio Files

You also have the option of saving all selected Regions in the Arrange window as independent audio files: *Audio > Convert Regions to New Audio Files*. The audio files are created in the same folder as your original file. The files are added to the Audio window as well, and the references of the Regions in the Arrange window are changed to match the newly created files. Logic creates the files in the file type of the original.

Making Multiple Copies of Regions

You can make multiple copies (see “Copying Regions” on page 132) of both Audio and MIDI Regions with *Region > Repeat Regions*. This function creates clones of the Region (the Regions are not independent).

Another way to make Regions repeat is through use of the *Loop* parameter in the Region Parameter box (see “Loop” on page 142).

The *MIDI > Region Parameters > Turn Loops to Real Copies* command will change loops of selected Regions into “real” copies. The Regions that are created, however, represent the same Region. As such, any alterations to the length of the Region or audio material affects all “real looped” Regions (as with cloned Regions).

Moving Audio Regions

You can grab Audio Regions in the Arrange window with the mouse, and move them around, just like MIDI Regions. Dragging will snap to increments defined by the Snap menu setting (see “Snap and Drag Menus” section on page 130).

If you hold down Control while moving Regions, you can move them in steps of one division (in sixteenths, for example).

If you hold down Control and Shift while moving Regions, you can move them by single ticks (maximum resolution).

You can also use the Delay parameter in the Region Parameter box to shift the playback position of Regions.

In practice, a resolution of one tick will usually be fine enough.

To move a Region by a finer resolution than ticks (such as a resolution of one sample word), please use the Anchor point in the Audio window or Sample Editor.

Note: All cloned Regions in the Arrange window are affected as well.

You can also move Regions by adjusting their positions in the Event List:

- 1 Select the Region that you wish to edit.
- 2 Choose *Windows > Event List*.
- 3 Click on the button (featuring the square graphic) in the Event List’s top left corner to move up one level in the hierarchy.
- 4 Move Regions as desired, by changing the value in the *Position* column.

To SMPTE Positions

The position of Regions can also be displayed in the Event List as SMPTE values, by selecting *View > Position & Length in SMPTE Units* from the Event List menu.

If you’re synchronizing music to picture, you can type in the required SMPTE positions for particular events. A simpler and more convenient method is the *Pickup Clock* key command in the Event List. This automatically places the Anchor of the selected Region at the current song position (the point in the film you’re currently locked to, when in Sync mode).

You can also display the endpoint of a Region as a SMPTE time. To do this, select *View > Length as Absolute Position* in the Event List.

Moving Regions Back to Record Position

You can move any selected Region in the Arrange window back to its original recorded position by selecting *Audio > Move Region to Original Record Position*.

This function only works if the corresponding audio file was recorded in the current song. Audio files imported via *Add Audio File* have no original record position.

This command is also available as a key command: *Set Region(s) to original Recording Position*.

Inserting at the Record Position

You can also copy (default: Command-C) or cut (Command-X) a Region to the Clipboard, and then use *Edit > Paste at Original Position* to insert it into the selected track, at the original record position.

Changing Start and End Points

You can shorten or lengthen any Region by grabbing its lower right hand corner with the mouse and dragging it—if track based automation is displayed, grab the corners above the automation layer. You cannot make a Region longer than its original audio file. This means that all other Regions derived from this Region will be lengthened by the same amount (cloned regions—see the “Copying Regions” section on page 179).

Of course, the same goes for any changes you make to the startpoint of a Region. Such changes can be made by grabbing, and dragging, the lower left edge of the Region.

You can edit a Region's start and endpoints far more accurately with the Sample Editor, which can be opened by double-clicking on the Region. Simply slide the “S” and “E” markers to change the Start and End points of the region. While moving the Start point, use the Option-key, to ensure that the Anchor (and therefore the timing of the audio, relative to the rest of the arrangement), remains unchanged. The Anchor must be positioned inside the Region.

If you wish to move the start point to the right, first move it to the approximate target position while in the Arrange window. Then open the Sample Editor, and use the Option-key to precisely move the start point to the desired location.

Setting Region Starts and Ends to fit Song Position

You can move the start or end point of a selected Region to the current location of the Song Position Line, by use of the following key commands:

- Set Object Start to SPL Position
- Set Object End to SPL Position.

The use of *Set Object Start to SPL Position* is only possible when the Song Position Line (SPL) is placed before the Region startpoint. Similarly, *Set Object End to SPL Position* only makes sense if the SPL is placed after the Region endpoint. If this is not the case, the length of the Region will be shortened to one format (denominator) value.

Note: Unlike the *Pickup Clock* command, audio data is not moved when using *Set Object Start to SPL Position* on an Audio Region.

Adjusting the Grid to Zero Crossings

If *Edit > Search Zero Crossings* is switched on in the Audio window, the adjustment will snap to the nearest zero crossing point of the waveform every time you alter the start or endpoint of a Region in the Arrange window. The Anchor is not affected.

The disadvantage of this option is that altered start or endpoints never land exactly on the selected musical grid, and will always be a few ticks out. Normally, this won't matter, because the Anchor reference point is unaffected. Should this ever cause a problem, you can simply switch off the *Search Zero Crossings* option. The primary reason for activation of the zero crossings option, is that it prevents clicks and pops at region start and endpoints.

Region Parameter Box

Name

As with MIDI Regions, the top line of the Region Parameter box displays, and allows you to edit, the name of the Audio Region. You can name several selected Audio Regions simultaneously; the Regions are assigned the same name, with sequential numbers added to the end of the name. Logic inserts these numbers automatically, unless you deliberately leave a space at the end of the name.

When you change the name of a Region in the Arrange, the corresponding Region is also renamed in the Audio window.

Loop

As with MIDI Regions, you can use the Loop parameter to make a Region repeat automatically. The loop repeats until it reaches the next Region on the track, the end of the song, or the end of the folder that contains the Region.

Don't forget that these loops are based on the Region's sample grid. This means that even if the Region is precisely matched to the song tempo, loop repeats may start to go out of sync after a while. You can avoid this problem by setting the endpoint of the Region to an exact measure boundary. In these cases, it may be better to use the *Region > Repeat Regions* function (see "Copying Regions" on page 132).

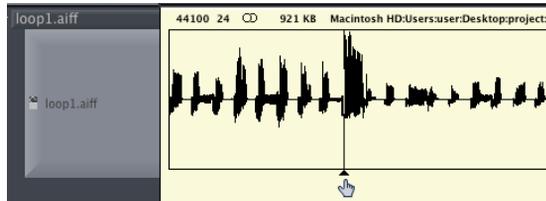
Delay

Just as with MIDI Regions, you can advance or delay the playback of Audio Regions, the smallest available units being ticks.

The Region Anchor

The Anchor is an Audio Region's temporal reference point. When you move an Audio Region, it's not the start point that is displayed in the help tag (as with MIDI Regions)—it's the Anchor point.

As an example, to guarantee perfect synchronization between a one-bar drum loop and your MIDI Regions, the Anchor must be assigned to a well-defined musical point. If the loop begins with a significant level peak (say a kick drum beat), set the Anchor to the point where the volume of that beat is at its precise peak.



Any changes made to the position of the Anchor in the Audio window will directly affect the corresponding Region in the Arrange window. The position of the audio will shift in relation to Logic's time axis, while the Anchor remains tied to the same bar value, and is marked by a dotted line.

MIDI and Audio Regions compared

The following overview sums up the main differences between Audio and MIDI Regions. There are some notes at the bottom of the table to clarify the most important points.

Feature	MIDI Regions	Audio Regions
Composed of discrete data	Yes	No, because Regions are just references to parts of audio files
Can be given names	Yes	Yes
<i>Loop</i> Region parameter available	Yes	Yes
<i>Quantize</i> Region parameter available	Yes	No, but the position of Regions themselves can be quantized, using the Event List display on the Arrange level. You can use the Quantize Engine to quantize audio files destructively.
<i>Transpose</i> Region parameter available	Yes	No, but you can use the Time Machine and Pitch Shifting functions. Apple Loops can be transposed.
<i>Velocity</i> Region parameter available	Yes	No
<i>Dynamics</i> Region parameter available	Yes	No
<i>Gate Time</i> Region parameter available	Yes	No
<i>Delay</i> Region parameter available	Yes	Yes

Feature	MIDI Regions	Audio Regions
Can be freely positioned	Yes	Yes
Left or right corner edit	Yes	Yes, and this affects the Audio Region, but not the position of the audio waveforms relative to the time axis of the sequencer
Can be cut with the <i>Scissors</i> tool	Yes	Yes, creates a new Audio Region.
Can have aliases made of them	Yes	Yes
Left corner may be dragged to conceal data at beginning	No	Yes
Have a variable musical reference point	No	Yes, a variable Anchor. This affects all Regions derived from a given Region, and can change the position of the audio, relative to the time axis of the sequencer
Can be turned off with the Mute function	Yes	Yes
Can be grouped into folders	Yes	Yes
Can be soloed	Yes	Yes

Naturally, some of the parameters that can be applied to MIDI events have no effect on audio signals. Equivalent operations for most of these are available as destructive edit operations in the Sample Edit window.

Only Audio Regions have the flexible reference point provided by the Anchor.

The fundamental functions (such as a freely determinable position and length, the ability to create complex arrangements with the aid of folders, and the ability to name, mute, and solo) are generally available to all types of Regions (MIDI Regions, Audio Regions, Folders, and Aliases).

Audio Recording

For details on preparations for audio recording, please refer to the relevant sections in the Audio Driver section (see “Audio Drivers” on page 377).

Creating Audio Tracks

To create an audio track, you must first assign an Audio Object as a track instrument. Click on a track name in the Arrange window, while holding down the mouse button. This opens the hierarchical Instrument list pull-down menu, where you may select an Audio Object via *Audio > Audio Track > Audio X*. To help things along, Audio Objects “Audio 1” to “Audio X” are preset for your hardware by the Logic Setup Assistant.

If you want to make adjustments to Audio Objects, you can do it directly from the Arrange window. The Object Parameter box is located below the Toolbox.

Arming Tracks

First Method:

- Click the button marked with an *R*, on the desired track in the track list. To show/hide these switches, select *View > Track Record Button*.



If you have checked *View > Track Record Button* but the switch is still not visible, you should switch on the driver for the relevant audio hardware in the *Audio > Audio Hardware & Drivers* window.

Second Method:

- Open the Environment Layer containing your Audio Objects (by selecting *Audio > Audio Mixer*).



- Click on the REC button of all Audio Objects that you wish to record to. Click the Audio Object REC button a second time to disarm the track. You can also arm the current track by clicking the Record Enable button on the Arrange channel strip.

Third Method:

- You can arm the currently selected track with the *Record Enable Track* key command. This command toggles between the armed/unarmed modes of the selected track in the Arrange window.

You can only make audio recordings on armed tracks, no matter what track is highlighted in the Arrange window.

- If you select a MIDI track, you'll record MIDI events.
- If you select an Audio Instrument track, you'll also record MIDI events.
- If you select an Audio track, you'll record on all tracks that have been armed (record enabled).
- Space is reserved on the hard disk for armed tracks, and will no longer be available for Undo files. For this reason, Logic will automatically disarm audio tracks when editing in the Sample Editor, or if the hard disk is nearly full.
- You can record simultaneously on multiple (see "MIDI Multi-Track Recording" on page 121) MIDI tracks and several audio tracks, by clicking the Record Enable button on the MIDI tracks and the audio tracks you want to record to. You can also record to multiple Audio Instrument tracks.

Note: Shift-clicking arms additional audio tracks, following the selection of a MIDI track for recording.

If several Arrange window tracks are assigned to the same Audio Object (“Audio 1,” for example), the new audio file (Region) will be recorded to the selected track.

“Disarming” all tracks

If several tracks are record-enabled, you can instantly disable them all by Option-clicking on *any* of the flashing REC buttons.

Standard Recording with Count-in

You can start recording at any point in a song by setting the Song Position Line to the desired location. If the target audio recording tracks are correctly set, and the necessary inputs (and audio signals) are connected and properly adjusted, just hit the Record switch on the Transport, or press “*”.

A “count-in” is heard. Signals will be recorded during this time. Depending on the number of tracks required, Logic will pause for a short interval between the time you press the Record button, and the start of recording.

During recording, the Recording float window opens. This displays the remaining recording time.

Logic will automatically create a Region in the Arrange window after recording (press Stop on the Transport to end recording), and will create an overview of the audio file. This is a graphic file that is used to display the waveform in the Arrange window. You can listen to the new recording in the Arrange window while the overview is created.

Record and Pause Mode

If Logic is in pause mode, you can start audio recording by clicking “Record Toggle,” “Pause” or “Play.” Recording begins at the current song position.

Punch-in Recording

You can actually engage recording while in playback mode—“on the fly.” To do this, start playback and press Shift-asterisk (the key command for *Record Toggle*) at the point where you want to start recording. Audio recording will start immediately. Recording can be stopped at any time, by pressing Stop in the usual way, or by pressing Shift-asterisk again. If you use this second option, recording ceases, but the sequencer will continue to play.

Punch on the Fly

If you click-hold the Record button in the Transport window, the Record menu opens, allowing you to switch on “Punch on the Fly.” This can also be switched on from the *Audio* menu.

Punch or drop recording is when you “punch in” to a previously recorded passage while the tape is running, in order to fix a mistake in an otherwise good recording. You then “punch out” of the recording, once the mistake is corrected (you’ve recorded over it).

This function is technically difficult to perform on hard disk recorders, due to the unavoidable delay in switching between read and write modes (creating a file and so on). In practice, recording takes place from the moment you start. Logic then adds this automatic background recording to the exact position that you wanted it to occur.

A free track is required for this purpose. A track is “free” if there are no Regions (or it contains muted regions) within the area that the punch-in recording is started and ended.

If you attempt a “Punch on the Fly” recording and Logic displays an error message, temporarily mute some non-critical audio tracks. Unmute them after recording.

Pre-programmed Drop-Record

Logic’s autodrop function can be used on audio tracks, just as it can with MIDI Regions. Autodrop is enabled by clicking on the autodrop switch on the Transport window. Here is a step by step breakdown of the procedure:



- The Autodrop button must be turned on.



- You can set the autodrop locators numerically in the Transport window.
- The autodrop recording zone is indicated by a thick bar in the middle third of the Bar Ruler.
- Recording only takes place within the autodrop zone, with the exception of a short “lead-in” just before recording is due to start.
- The autodrop zone start and end points can be set from either; the Bar Ruler, or by using the locators in the Transport bar. Please note that if the Cycle function is switched on, you can set the Autodrop Locators in the window to the right of the Cycle Locators (under tempo in the Transport bar).
- Start recording. Logic will begin recording about one bar before the drop-in locator. Press Stop to end recording, and a Region that corresponds exactly to the length of the autodrop zone will be created. This method allows the startpoint of the Region to be adjusted later, allowing the lead-in to become audible. This way, the beginning can be easily recovered if the performer anticipates the autodrop zone slightly. Adjustments to the lead-in portion of the Region does not change the position of the recording, relative to the time axis.

Tip: You can even define a small autodrop zone within a larger Cycle Zone (see below), if desired. This can be handy if a player needs to re-record a difficult passage in the middle of a song, and requires several attempts to get it right.

Audio Cycle Recording

You can make audio recordings even when “Cycle” is switched on. A new track is created for every cycle repeat. All newly-created tracks are played by the same Audio Object. This prevents the different “takes” from being played simultaneously.

If you stop recording just after a full cycle has ended, no new Region is created for the cycle that has just begun. The audio material is not lost, but is recorded after the last Region in the audio file.

The whole recording (all cycle repeats) is stored as a single audio file. This audio file is split into Regions, each as long as the Cycle length. The Region of the preceding cycle is automatically muted when playback of the ensuing cycle/Region begins.

Audio cycle recording also works when you’re simultaneously recording two channels (stereo tracks in split stereo mode, for example).

After recording, please note ...

After you’ve made your first audio recording in a song, you should not make any further adjustments to the tempo of the song. Decide on a tempo, and any changes in tempo, well before the first audio recording, and stick to it. Audio recordings have a fixed playback rate, and can only be matched to new tempos if you’re prepared to go through a great deal of hassle.

The time compression/expansion algorithms available in Logic only permit you to match audio to new tempos when the tempo differences involved are relatively small; if you try and use them to significantly change the tempo of your recordings, audio quality may be significantly compromised.

Note: You can, of course, change your audio recordings into Apple Loop format files. This file type makes transpositions and time stretching tasks much easier (see “Apple Loops” on page 72).

If you’ve made your audio recordings in real time, playing them over the top of an existing MIDI arrangement, it is not particularly recommended that you move the Anchor of any of your Regions. You can make slight adjustments to the timing of your Regions using the Delay parameter.

Auto Input Monitoring

Input monitoring allows you to determine what signal is heard on record-enabled tracks. If Auto Input Monitoring is switched on, you will only hear the input signal during the actual recording—before and afterwards, you’ll hear the previously recorded audio on the track, while the sequencer is running. This helps you judge drop-in and drop-out points for punch recording. If Auto Input Monitoring is switched off, you will always hear the input signal. Auto Input Monitoring, when switched on, also allows you to hear the input source when Logic is stopped, making it easy to set levels.

No monitoring of any kind will occur if the *Audio > Audio Hardware & Drivers > Software Monitoring* (see “Logic automatically recognizes any installed Core Audio hardware, and will use the default settings—defined in Mac OS X’s Audio MIDI Setup utility (Applications > Utilities > Audio MIDI Setup). It can, however, be advantageous to optimize the settings for your individual hardware setup, particularly if you use several sound cards or a multi I/O card. This can be done in Logic’s Core Audio pane, which offers the following options:” on page 378) parameter is disabled for the currently active audio hardware driver.

Input monitoring always involves a little latency. In certain configurations, you may be best served by not using Logic’s monitoring at all, to obtain the best possible monitor timing. Route the signal that you wish to record directly to the headphones or monitoring amplifier. You won’t unknowingly overdrive your A/D converters, as Logic’s input level meters will continue to work, and you’ll see a warning dialog as soon as an overload occurs. Latency is entirely dependent on the hardware, and driver settings.

Switching Auto Input Monitoring on/off

Click-holding the Record button (Transport window) opens the Record menu, where you can toggle Auto Input monitoring. You can also use the *Toggle Auto Input Monitoring* key command, or enable it from the *Audio* menu.

Possible Problems with Input Monitoring

Typical problems that can arise with record-enabled tracks:

- Singers cannot hear themselves while Logic is running. All they can hear is the old recording. Switch off Auto Input Monitoring.
- The track cannot be heard, even though Logic is not actually recording. Switch on Auto Input Monitoring.

Depending on the situation, both options can be useful. Normally, Auto Input Monitoring is switched on, and is only switched off in special situations.

Whenever you are doing punch recording (punch on the fly), you should switch Auto Input Monitoring on.

Stereo Recordings

For information on creating stereo recordings, please read the appropriate Mixers, Effects, and Audio Objects sections; Stereo Objects (see “Stereo Objects” on page 284) and Channel Strips (see “Logic’s Mixing Facilities” on page 265) and the section on Faders and Level Adjustment (see “Level” on page 281).

Stereo recordings will normally be saved as Interleaved Stereo files. A stereo symbol, consisting of two overlapping circles (see left image below), is shown beside the names of Interleaved Stereo files (that appear as Regions) in the Arrange window.



Split Stereo Regions are indicated by a stereo symbol consisting of two adjoining circles (see right image above).

You can freely mix both formats, even on the same track. We recommend that you use the Interleaved Stereo format if your audio hardware supports it.

Split Stereo files require around twice the hard disk I/O performance of Mono files. Interleaved Stereo files, by comparison, only require about one and a half times the throughput of Mono files.

You can check *Force record & convert interleaved into split stereo files* (force Logic to create Split Stereo files) in *Preferences > Audio > General*, for compatibility with ProTools (or other) systems.

Functions

Automatic Tempo Matching

Logic offers an automatic function that matches the length of a free-form musical passage with the length of an audio Region. The length of the Region remains constant, but the sequencer tempo is varied automatically, with the Region and musical passage ending up exactly the same length.

To illustrate the use of this function, we'll use a one-bar drum loop as an example:

Imagine you've recorded a drum loop live, or imported it from a sampling CD. You've used the Audio window and Sample Editor to adjust the start and endpoints of the audio Region, ensuring that the loop cycles perfectly, without any glitches.

Now, drag the drum loop into the Arrange window, where it appears as a Region. Make sure that you place the front (left) edge of the Region at the start of a bar.

Construct a Cycle in the Arrange window Bar Ruler. Set the length to match the intended musical length of the Region. The drum loop is one bar long, so you should set a Cycle length of one bar, to match.



Once the Cycle is set to the desired musical length in the Bar Ruler, you'll note that the current length of the Region will be different to that of the Cycle.

Select *Options > Tempo > Adjust Tempo using Region Length and Locators*. The default key command is "T".

The tempo is recalculated, making the Region exactly one bar long, and fitting the length of the Cycle perfectly. This does not change the playback tempo of the audio, but rather, makes the song tempo conform to the audio.



Time Stretching Regions

Logic allows you to change the length of audio Regions (without changing their pitch) directly in the Arrange window—using menu or key commands. Classic Transposition refers to the way the audio data is processed.

When applying these functions to a Region in the Arrange, a new file—consisting of the resulting material—will be created, leaving the original intact. Both new and old files are accessible in the Audio window.

Adjust Region Length to Locators (via classic Transposition)

Audio > Adjust Region Length to Locators stretches or compresses selected audio Regions to fit between the current positions of the left and right locators. The Region's startpoint is not changed by this function—so it doesn't matter if the locators are not precisely above the Region.

Adjust Region Length to Nearest Bar (via Classic Transposition)

Audio > Adjust Region Length to Nearest Bar adjusts the length of selected Regions to the closest whole bar. This function is ideal for fitting previously trimmed drum loops into songs where there is a small tempo discrepancy between loop and song.

Time Stretching Algorithms

Logic offers different Time Stretching and Compression algorithms in *Audio > Time Machine Algorithm*. The different algorithms (see “Time and Pitch Machine” on page 403) allow you to choose a computing method that is best suited for the musical material.

Audio and MIDI Scrubbing

You can scrub audio and MIDI in the Arrange window simultaneously.

If your song contains Regions on more than two neighboring tracks (tracks 1, 2, 3, and 4, for example), you need only select the Regions on tracks 2 and 4, for example, to scrub them.

Before scrubbing can occur, you need to enable *File > Song Settings > MIDI > Scrubbing with Audio in Arrange*.

This is how scrubbing works:

- 1 Hit the Pause button on the Transport bar (see “Transport Buttons” on page 94).
- 2 Grab the Song Position Line with the mouse, and move it back and forth through the parts of the song you want to hear. Note how audio and MIDI data are played back in perfect synchronicity, when scrubbing.
- 3 You can scrub at any zoom resolution—so set up a magnification level that you’re comfortable with, for the section of the song you’re scrubbing through.

Note: If your audio hardware permits it, scrubbing can also be activated when you’re dividing Regions (with the scissors) in the Arrange window.

Digital Mixdown

Logic allows you to digitally mix down audio data from within the Arrange window. This is done with the Glue tool. This function is non-destructive, as Logic always creates a new file for the mixed-down material. This new audio file is stored on your hard drive.

To carry out a mixdown, select the Glue tool from the Toolbox, and use it to select the required Regions for mixdown (if necessary, using Shift as well).

The mixdown process can be aborted by pressing Command-period. All audio files will remain unchanged.

No Mixdown Situation

- If there are several Regions (mono or stereo) in a row on the same track, which have been cut out of one Region using the scissors tool, no mixdown is carried out. In this situation, a single Region is simply created over the entire area. This delivers the desired result, without using any additional disk space.
- Logic can recognize associated Regions, even if there are gaps between them. The determining factor is that the relative position of the Regions in the Arrange window corresponds to the relative position of the Regions in the underlying audio file.
- No mixdown occurs when you try to mix two Regions on tracks that are panned to opposite sides.
- The two resulting mixdown files would be identical to the original audio files (in the areas used for the Regions). If you don’t need the unused areas of the audio files, select “Optimize Files”.

“Mixdown” of Regions in a Track

If several Regions that overlap each other are selected on a single track, no mixdown occurs. You are asked to create a new audio file, which is named after the first Region on the track. The selected Regions are then mixed together, with no changes to volume, and without clip scanning.

If there are empty sections between two Regions, these are added into the new audio file—as silent passages.

Genuine Mixdown with Clipsan

If you combine audio data from two or more tracks, the current pan and volume values for the individual tracks will define the pan and volume settings in the new audio file. If you want to combine both sides of a stereo audio file (a mono channel on each of two tracks), first set the pan controls of the component mono sides to hard left and hard right, respectively.

You can perform a mixdown while the sequencer is playing.

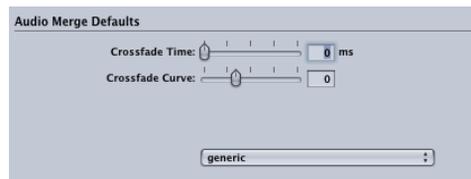
Following the digital clipping scan (Clipsan) and completion of the mixdown, Logic replaces the previously selected Regions with one Region that contains the new, mixed-down audio file in its entirety. You can use the undo function to restore the original audio Regions, if desired. If you do so, you'll be asked if you'd like to keep, or delete, the newly created mixed audio file. If you decide to keep it, it will remain in the Audio window, and can be further processed.

During a mixdown, the 32-Bit resolution Clipsan function ensures that the highest possible level is maintained, without clipping.

Audio Crossfades in Digital Mixdown

The Digital Mixdown function (Glue tool, menu, or key command) in the Arrange window supports audio crossfades of selected Regions.

The parameters are defined in the General Audio preferences pane, which can be opened either via the *Audio Crossfade options for Merge* key command or by selecting: *Preferences > Audio > General*.



There are two parameters:

Crossfade Time [ms]: This is the length of the entire crossfade. To switch off the crossfade, set this value to zero.

Crossfade Curve: To obtain a linear crossfade, set this value to zero. Other values (positive or negative), produce various exponential fades. The fade-outs and fade-ins are always symmetrical, to avoid deviations in level. The preset values are: *Time = 20 ms, Curve = 0* (linear).

The graph shows the actual shape of the crossfade; the original algorithms are also used to calculate the curve display. Values over about 250 ms are scaled in the graph, to ensure that the entire crossfade is visible.

Non-destructive Fades



Fade In, Fade Out and Crossfades can be performed with the Fade tool, or with the related parameters. The Fade In, Fade Out/X times and their curves can be found in the Region Parameter box. You can simultaneously adjust these parameters in all selected Regions.



These fade parameters are non-destructive (will not change the original audio file), as opposed to the fade functions in the Sample Editor, or with the Glue tool.

Technical Discussion

A background fade file exists for each song. It contains all fade areas. You will not normally need to access this file. This file is located in the same folder as the original Region, and is named after the song, with the "-f16m" extension for 16 bit recordings, or "-f24m" extension for 24 bit recordings".

This background file is created the moment you start playback, after setting the first crossfade for the song. If you are using numerous fades on multiple Regions, this could take several seconds. A progress panel is shown during the creation of the fade file.

This method of creating fades is non-destructive. You can change the fade parameters at any time, without changing the original audio files. The background file will be updated and optimized automatically, whenever you save the song.

The fade file will also be updated after destructive changes are applied to the original Regions/files in the Sample Editor.

Information about Regions and their Fade file

Use of the *Audio File > Delete Fade File(s)* option in the Audio window deletes the fade file. No information will be lost by doing this, because Logic automatically creates a new fade file the next time playback is started, based on the fade parameters of each Region. Information about the number and sizes of fade files can be seen via *Edit > Info*.

If the song uses audio files from a number of different folders or drives, Logic creates a corresponding number of fade files at these locations.

Enter Fades using Mouse and Fade Tool

As you'd perhaps expect, a fade in starts at the beginning, and a fade out occurs at the end of a Region. The length of fades can be adjusted in the Region Parameter box, but it's simpler to use the Fade tool inside the Region where the fade is to take place.

Fades are only visible if you are sufficiently zoomed in to see the waveform in the Region.

- You can edit existing fade times by using the Fade tool in conjunction with Shift. In this situation, the curve will not be affected.
- You can delete a fade by using the Fade tool, while holding down Option.

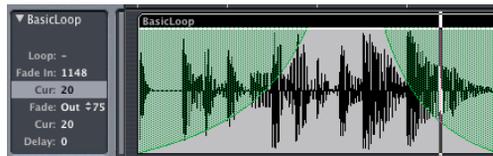
Fade curve shapes (Curve)

- You can adjust the curve shape by using the Fade tool in conjunction with Control.
- You can also use the *Curve* parameter in the Region Parameter box.

In the example below, *Curve* has a positive value for both fade in and fade out.



In the example below, *Curve* has a negative value for fade in, and a zero value for fade out.



Crossfades

If you select *Fade X* instead of *Fade Out*, the selected Region will be crossfaded with the following Region. The Fade In parameter and corresponding Curve are made redundant by use of this option.



Crossfading with the Fade tool

Use the Fade tool to mark the crossfade area of two adjacent Regions. This works, even if the two sections are not adjoining.

Freeze

The Freeze function saves almost 100% of the CPU power used for software instruments and effect plug-ins. You can apply it, individually, to audio or Audio Instrument tracks.

Concept

Internally, Freeze performs individual offline bounce processes for each “frozen” track. All plug-ins of a track (including software instrument plug-ins, if applicable, along with all related automation data) are rendered into a “Freeze file”.

As long as a track is frozen—following the freeze process—the freeze file will play back in place of the original track (and its CPU-hungry plug-ins). The original track and plug-ins are temporarily deactivated, and use no CPU resources.

Due to technical reasons, the Freeze function is not available for the tracks of DSP-based audio hardware systems (such as ProTools), tracks that use plug-ins calculated on DSP cards (Powercore, UAD-1, Pulsar, and so on) or tracks that use external signal processing devices via the I/O plug-in. You can, however, freeze tracks that use Sends to Busses—with DSP-based or I/O plug-ins used on the busses.

The Freeze function always bounces the complete channel signal. If you are using more than one track for the same audio or instrument channel in the Arrange, then all (sub)tracks of this channel will be frozen, and cannot be edited independently.

When to Freeze a Track

In real-life situations, Freeze allows you to:

- use additional plug-ins or software instruments in further audio or instrument tracks, which would normally not be possible as it would exceed the CPU processing limits of your computer.
- Play back songs created on computers with greater CPU power.

Freeze was made for very CPU-intensive processes, which are generally (from higher to lower demand) outlined as follows:

- Software synthesizers with a complex voice architecture
- Plug-ins with a complex structure (reverbs, filter banks or FFT-based effects)
- Software synthesizers with a simple voice architecture
- Software sampler with active filter
- Software sampler with deactivated filter
- Plug-ins with a simple structure

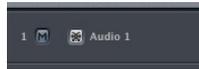
As long as your computer is able to calculate all active processes in real time, it's unnecessary to freeze tracks.

Freeze is recommended whenever your system's power runs short and one, or multiple, existing tracks with CPU-intensive instrument and/or effect plug-ins are in a finalized state, or at least seem to require no further changes for the meantime—in other words, a “close to final” mix.

As long as a track is frozen, its CPU usage is reduced to that of a high resolution audio track, without any effect plug-ins inserted—regardless of the number, or processing demands, of the plug-ins that were used originally.

How to Freeze a Track

It's extremely easy to freeze a track: simply activate the Freeze button—the button that features a small ice crystal icon (light gray when active). If the Freeze buttons are not visible, activate the *View > Track Freeze Buttons* menu option in the Arrange window.



If you hold Command while clicking on a Freeze button in the Track List, all tracks that contain data in the currently-selected display level (or folder) will be frozen. If the Freeze buttons were already enabled, they will be disabled.

You can also use track button slide activation to enable Freeze on multiple tracks.

Logic will create freeze files after receiving the next “Play” command. This allows you to activate the Freeze buttons of multiple tracks, and render their freeze files in one go.

During the Freeze process, the SPL will follow the currently rendered position. A floating progress bar window is also displayed.

Freeze files are always rendered between the song start and end marks—it is recommended that you check the song end mark in the Bar Ruler before starting a Freeze process. Please note that the end mark should be adjusted to include feedback-dependent delay repetitions or reverb tails. Empty areas (digital zero) at the end of freeze files will automatically be removed after the Freeze process.

You can abort freeze processes by pressing Command-Period—in this scenario, the portion of the frozen tracks that has already been rendered will remain in the freeze files, and will be used for playback. Frozen tracks will remain silent beyond this point.

The freeze process uses 100% of available CPU power. If, for example, a track uses 40% of the CPU for real time plug-in calculations, its freeze file will be created in two and a half times (faster than) the realtime speed. If the original track uses 100% of the CPU power, the freeze process will happen in (approximately) realtime—even if offline bouncing is used.

Working with Frozen Tracks

Once a track is frozen, you cannot edit any instrument or plug-in parameters (or related automation data). You can, however, still edit the:

- effect send levels and destinations,
- panorama and surround parameters,
- volume, mute, and solo

of frozen tracks—including their automation data.

Whenever you try to edit “forbidden” parameters of frozen tracks, (such as plug-in parameters that were rendered into the freeze file), Logic will display an error message:

“Current track is frozen. Do you want to unfreeze it?”

In this situation:

- *Unfreeze* will deactivate the Freeze button of the track.
- The freeze file will be deleted.

Please note that the track will now use the amount of CPU processing power that it originally required, if you enter “Play” mode.

Now,

- perform your edits,
- activate the *Freeze* button again, if required.

It is not possible to cut and re-arrange the freeze files in any way, nor is it possible to mix the freeze files with their originals on a single track—you can use one or the other, not both!

It is also not possible to record audio on frozen tracks. In fact, the Record button will be hidden when a track is frozen.

Freeze Files

The temporary freeze files are saved in a folder named “Freeze Files” which is created in the root directory of your project folder. Usually, you won’t need to access these freeze files directly.

Logic manages these freeze files automatically in the background: They are created during the Freeze process, will play back in place of the original tracks (as long as these tracks are frozen), and will be deleted as soon as the Freeze button of the corresponding track is deactivated.

In some cases, however, it might be handy to use freeze files directly: One example would be if you wanted to freeze all of your tracks, and use the freeze files for a remix in another studio (on DSP-based systems, for example). For such situations, it’s possible to adapt the bit depth of the freeze files to meet your needs: in *Preferences > Audio* you can change the Freeze File format from the default 32 Bit (float) to 24, or even 16 Bit.

Please note that only the 32 Bit float setting will ensure that the audio quality of frozen tracks is identical to that of the original tracks. In many cases, the 24 Bit setting will have no audible impact—but will reduce the disk traffic, further minimizing CPU usage, and allowing you to access the freeze files as audio files.

Refresh Freeze Files

The *Audio > Refresh Freeze Files* menu function (and key command of the same name) allow you to refresh the current freeze files. This may become necessary when global changes are made that also affect the playback of the frozen tracks (tempo changes, for example).

The Environment is Logic’s “brain.” It allows you to control all MIDI input and output.

Beyond basic input and output handling, the Environment can be used to process MIDI data in real time, and can even be used to create processing “machines”, such as virtual rhythm generators and step sequencers, or complex synthesizer editors.

Environment—Introduction

The Environment refers to Logic’s “virtual” environment inside your computer. It was developed to allow you complete control over your MIDI setup from within Logic.

Imagine that the Environment window provides a virtual view of your MIDI studio, including port objects which represent the MIDI inputs and outputs of your MIDI interface, instruments which are virtual representations of each device in your MIDI setup, and various objects for modifying the MIDI signal flow.

In order for this to work properly, you need to connect the different Objects in the Environment via virtual MIDI cables. This allows you to control the overall MIDI signal flow.

You can also create virtual faders that generate MIDI events when you move them. The movements of these Fader Objects can be remotely-controlled by other MIDI events, and recorded by Logic. In addition, there are specialized Objects which can split a MIDI signal into different channels, make pre-programmed alterations, or even re-route the signal path.

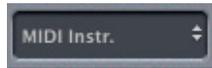
Layers

As you can probably imagine, the Environment can quickly fill up with a large number of Objects. To keep things organized, you can assign Objects to different display levels, referred to as “layers.” Think of these layers as being different, partial views of the overall Environment. Naturally, you can easily connect Objects between different layers.

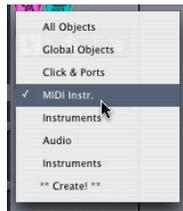
Opening the Environment Window

To open an Environment window, select *Windows > Environment* (default key command: Command-8). Double-clicking on an instrument in the track list of the Arrange window also opens an Environment window, to the layer containing the corresponding Instrument Object. When the Environment window opens, the Object that represents the track Instrument you double-clicked will be highlighted.

Basic Operation Layers



Layers are “display levels” of the Environment window. They allow you to configure the Environment’s display, allowing you to view and work with specific groups of related Objects (Audio Instruments, for example), rather than dealing with all Environment Objects at the same time. The name of the current layer is displayed in the Layer box.



The distribution of Objects on different layers has no effect on their function—it’s simply a system of organization. There are some exceptions: Objects in the Global Objects layer also appear on all other layers; and the All Objects layer shows all Environment Objects in a list.

Switching Between Layers

Click-holding the Layer box opens the layer pull-down menu, used to switch between layers.

Select *Options > Goto previous Layer* to switch back to the most recently active layer. This allows you to toggle between two layers.

Remember that you can assign key commands to this and many other Environment menu functions, for faster navigation and greater ease of use.

Creating Layers

Selecting **Create!** from the layer pull-down menu creates a new, empty layer called "(unnamed)"; at the end of the list. You can add a new layer above the current position in the list by selecting *Options > Layer > Insert*.

Naming Layers

Double-clicking on the layer box opens a text field, allowing you to enter a name for the current layer.

Deleting Layers

You can remove the current layer from the list by selecting *Options > Layer > Delete*. As all Objects contained in the layer are also deleted, an alert box appears, to warn against the unwitting deletion of Objects. You must click *Delete* to complete the operation. *Cancel* or Enter cancels the operation.

Special Layers

The position (and existence) of the first two layers is protected, and they cannot be deleted:

All Objects

The top layer in the pull-down menu always displays all Objects in the Environment. The Objects in this layer are normally shown as a list. (You can change this in the Environment's View menu, but doing so is not recommended.)

If you turn off the *Preferences > Display > Other > Allow 'All Objects' Layer option*, the All Objects layer will be removed from the layer pull-down menu.

The *Options > Goto Layer of Object* function switches to the selected Object's layer.

Global Objects

You can place Objects (output ports, for example) that you want to be visible in all layers in the second layer from the top. These will appear at the same position, in all layers. We recommend that you place as few Objects as possible on this layer, due to the on-screen clutter that global Objects can create.

Hiding/Showing Parameters

As in other windows, you can hide the column containing the buttons, Toolbox, layer menu, and Object Parameter box by selecting *View > Parameters*. This will create more room onscreen for the Environment workspace display.

Hiding/Showing the Cables

Choosing *View > Cables* toggles the display of cables. This also hides/shows the positioning bar to the right of the individual Objects (used for moving and sizing of several Environment Objects).

Protecting Cabling and Object Positions

You can prevent the accidental alteration of the position, size, and cable connections of all Objects by selecting *View > Protect Cabling/Positions*.

Background

If the cabling and Object positions are protected, and the cables are hidden, the background color changes. This usually looks better for virtual mixing desks and fader setups.

List Display

Selecting *View > by Text* switches the graphic display of the layers to a list display. The cables are not shown in the list display. This type of display is most useful in the *All Objects* layer.

Objects

Creating Objects

When you select an Object type from the *New* menu, an Object of this type is created in the current layer. Clicking on a layer background with the pencil tool creates a new "Standard Instrument" Object.

You can copy existing Objects by dragging an Object while holding down Option. Cabling is preserved; so groups of Objects copied in this way will be connected in the same way as the originals. (When you copy a single Object, only its output cables are preserved).

Deleting Objects

Click with the Eraser tool, or press Backspace, to delete all selected Objects.

Adjusting the Size of Objects

You can adjust the size of fader, keyboard, and monitor Objects by grabbing and dragging the bottom right corner (just as with windows). Changing sizes when multiple Objects are selected (by "rubber-banding" or Shift-clicking) will alter each Object's size, while preserving their sizes, relative to each other.

Selecting *Options > Clean up > Size by Default* sets the size of each selected Object to its default value.

The *Object Width -1 Pixel* or *...+1 Pixel* and *Object Height -1 Pixel* or *...+1 Pixel* key commands decrease or increase the width or height of all selected Objects by 1 pixel.

Moving Objects

You can move Objects by grabbing their icon or name, and dragging them to the desired position. The surface of Keyboard and Fader Objects is used for their operation. You must therefore either grab the name (if available), or the positioning bar to the right of the Object in order to move them.

If you hold down Shift, you can also grab Keyboard or Fader Objects by their surface. Remember to first deselect any other selected Objects by clicking on the layer background, to avoid moving them as well.

Snapping Objects to a Grid

Select *View > Snap Positions* to align the Objects to an invisible grid. It's a good idea to leave snap positions switched on. You only need to switch it off if you want to manually move an Object by a few pixels.

You can use the *Object move left/right/up/down* key commands to move all selected Objects one pixel in the relevant direction, even when the grid is switched on.

Aligning Objects ...

... in a row or column

To align several selected Objects horizontally or vertically, select the *Options > Clean up > Align Objects* function. The top left Object stays where it is. The position of the next Object determines whether the Objects are aligned in a column or a row. If it is to the right of the top left Object, all Objects are aligned horizontally (row). If it is below the top left Object, all Objects are aligned vertically (column).

...to grid positions

If you choose *Options > Clean up > Positions by Grid*, all selected Objects are aligned to the invisible grid.

Moving Objects between Layers

...with the layer selection box

To alter the layer assignment of a group of Environment Objects, first select the Objects, and then select the desired layer, while holding down Option. This moves the selected Objects to the chosen layer.

... with a second Environment window

Another way of moving Objects to a different layer is to open a second Environment window. Select the target layer and drag the relevant Objects from one window to the other. You can also use this method to copy Objects between layers (by holding Option).

... via the Clipboard

Another option is to move Objects via the Clipboard (*Edit* menu or the usual key commands):

- Select the Objects that you want to move and choose *Edit > Cut* (default key Command-X).
- Switch to the destination layer.
- Make sure that no Objects are selected (by clicking on the layer background).
- Select *Edit > Paste* (default key Command-V).

Replacing Objects

If any Objects are selected when attempting to add Objects to the current layer via *Edit > Paste*, a dialog box asks if you want to “Replace current selection? No/Replace”. If you press Enter or click Replace, the selected Objects will be replaced by the Objects in the Clipboard. The existing cabling remains intact.

Assigning an Object to the Selected Track

You can assign any Environment Object to the selected Arrange window track by clicking on the Object with the MIDI Thru tool.



Remember: Logic’s MIDI Thru function diverts all incoming MIDI events to the Environment Object assigned to the selected track.

Special Selection Commands

Selecting All Used Instruments

The *Edit > Select Used Instruments* function selects all Objects that are assigned to tracks in the Arrange window, or are connected to such Objects via cables.

Selecting All Unused Instruments

The *Edit > Select Unused Instruments* function selects all Objects that are neither; used in the Arrange window, nor connected to any such Objects via cables.

Selecting Cable Destination Objects

The *Edit > Select Cable Destination* option highlights the destination Object of a selected cable connection. This is particularly useful in two cases:

- The destination Object is in a different layer. You can use the function to select and display the destination Object in its layer;
- From the list display (*View > By Text*), you can locate the destination Object of a source Object, because selecting the source Object also selects its cable connections.

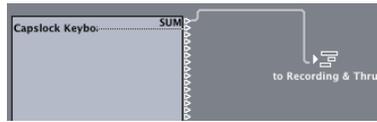
This function allows you to follow the cabling from one serially-cabled Object to the next. If several Objects are connected, or several cable connections are selected, the path of the top cable is followed.

Toggling your selection

Just as in the Arrange and editor windows, you can change the status of any selected Objects in the current layer by choosing *Edit > Toggle Selection*.

The MIDI Signal Path

Before any MIDI events received at your computer's MIDI inputs can be recorded by Logic, there must be a connection between two Environment Objects, namely: the physical input and the sequencer input.



In the sequencer, the events are always directed to the selected track, where they can be recorded. The events played by the track are mixed with any incoming events and sent to the Environment Object assigned to the track in the Arrange window's track list. From here, the events are directed to a MIDI output (see "Direct Output Assignment" on page 207).

You can insert Objects into the signal path between the physical input and the sequencer input, as well as between the instrument and the MIDI Out port, to accomplish other Environment processing. This is done by using cables (see "Cabling" on page 208).

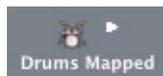
Direct Output Assignment

You can create a direct output connection from any Instrument Object to a physical MIDI output by setting the desired output in the *Port* parameter line, just above the *Channel* parameter.

If you click and hold in this line, a pull-down menu will list all individual ports, an *off* setting and one general setting (*All*) for each output connection. The *off* setting completely disables the connection to the MIDI interface port. The *All* option routes the Object's output to all available MIDI ports. This may be useful if the device is sending a pulse, for example.

Note: If you have a MIDI interface with more than one output port (or even several interfaces which can be stacked, like products belonging to the Unitor family), you can set up a direct connection to one of the individual ports (1 to 63) of that, or those, interface/s (for example "Port 1 (Unitor 8)" or "Port 14 (Motu)").

Any Object with a directly assigned output is indicated by a shaded triangle on its right-hand side. The triangle is hollow when there is no direct assignment.



Breaking the Direct Output Assignment

To break the direct output assignment, set the Port parameter to off, the top entry in the pull-down menu.

Cabling

The cabling between Environment Objects provides control over the entire MIDI signal path. A cable is normally shown as a gray line between a source and destination Object.

Objects always have an input on the left, and an output on the right-hand side. The output of an Object is shown as a small triangle, pointing to the right.

If you grab the triangle, the mouse pointer turns into a patch cord that represents a cable connection coming from the Object's output. Move the mouse over the destination Object to connect it to the source Object with a cable. Once you have selected the destination Object (this happens automatically when you touch it), release the mouse button.



If the source Object has already been directly assigned to an output, a dialog box will appear, asking whether or not you want to replace the direct assignment. You have three options:

- *Cancel*: the connection is not made, and the direct output assignment remains intact.
- *No*: your cabling is carried out, but the direct output assignment remains intact. This means that the Object is connected in two places—one via the visible cable and one via the direct output assignment.
- *Remove* (or Enter): your cabling is carried out, and the direct output assignment is removed. (This is the default selection, because you generally won't want an Object connected to two different destinations).

Cabling between Layers

If the destination Object of the cable is on a different layer, you can connect it by using the Instrument List. To do this, hold Option as you grab the output triangle and scroll to the desired destination Object when the Instrument List (see "Object Parameters" on page 211) appears.

You can also open a second Environment window showing the destination layer, and connect the Objects graphically between the windows.

A cable connection to another layer looks like this:



Deleting Cables

To remove a cable connection, click the cable with the eraser, or select the cable and press Backspace. You can also remove a cable by grabbing it and plugging it back into the input of its source Object.

You can use *Edit > Clear Cables only* to remove all selected cables, without also clearing any Objects that happen to be selected. This is handy if you want to clear all cables leading to (or from) one or more Objects, given that selecting Objects also selects all associated cable connections.

Cable Color

Cables are assigned the same color as the source Object. You can switch off cable coloring, and render them all in gray with the *View > Colored Cables* function.

Multiple Cabling

Multiple Inputs

There is no limit to the number of cables that you can “plug” into a target Object. All MIDI signals are then mixed at its input.

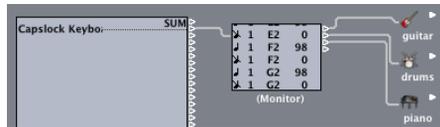
Multiple Outputs

Once an output from an Object is used (cabled to another Object), another output triangle automatically appears. You can thus cable outputs from the Object to as many other destination Objects as desired.

Note: Some Objects have special outputs, and are exceptions to this rule.

Special Outputs

Some Objects, such as the Channel Splitter (see “Channel Splitter Object” on page 224), feature several—functionally different—outputs. In these Objects, each output is only available once. Other special Objects include the cable switcher (see “Cable Switchers” on page 254) and physical input (see “Physical Input/Sequencer Input Objects” on page 236). If you want to route the signal to several destinations from these outputs, you must first create a monitor (see “Monitor Object” on page 223) (*New > Monitor*), plug the cable into it, then connect it to as many other destinations as you like. The monitor Object also allows you to view the MIDI events flowing through it.



To select a common destination for several existing cables, first select the cables. (If the cables are already leading to a common destination, the simplest way of doing this is to select the destination Object.) Next, grab one of the cables and plug it into the new destination Object. A dialog box will appear, asking “Do you want to connect all selected cables with new Destination? No/Connect.” Click *Connect*, or press Enter.

Cabling Serially

To cable a group of Objects serially, first select all Objects and then choose *Options > Cable serially*. The Objects will be cabled in series, starting with the top-left Object. This is handy for quickly connecting groups of faders in a mixing console, for example.

Cabling in Parallel

To cable a group of the same type of Object (transformers, faders, and so on) to the same destination, first cable one of the Objects to the destination. Next, select that Object and choose *Edit > Copy*. Now select the other Objects that you want to connect to the same destination, and choose *Options > Apply Buffer Template to > Cable(s)*. You can copy more complex cabling configurations this way, too. Just ensure that the type(s) of Objects in the group that you wish to copy matches the type(s) of Objects in the group that you apply the buffer template to.

Environment Objects

Object Parameters

Each Environment Object has several parameters that control its operation. These parameters can be viewed and changed in the Object Parameter box. The Parameter box also appears in the Arrange window when you select a track assigned to the Object. It also appears in the Environment window when you select the Object. These are the same parameters—changes in one location will be reflected in the other.

Opening/Closing the Object Parameter Box

By clicking the triangle at the top left, you can hide all parameters except the Object name and type. This reduces the box to its minimum vertical size.

Common Parameters

The following parameters are shared by all Object types:

Name

The name of the Object is shown next to the triangle, and can be selected for editing by clicking on it. You can also edit the name by clicking on the Object with the text tool.

Object Type

The Object type is shown in brackets, and cannot be edited.

Icon/Display Filter for the Instrument List

Click-holding on the icon in the Parameter box opens a pull-down menu, where you can choose an icon to represent the Object in the Environment and Arrange window track list.

Placing a check in the box next to the icon means that the Object will appear in the Instrument List, and can therefore be assigned to a track via this menu. Objects not on the track list can still be assigned to tracks by dragging them from the Environment window to the track list, or by using the Environment's MIDI Thru tool.

If the box is not checked, the Object will not appear in the Instrument List, and a diagonal line through the icon is shown. This will not hide the Object or its icon in the Environment.

You should only check the icon box if the Object will be used as a track instrument, or you need to connect cables to its outputs by using the instrument selection menu.

Color

You can change the color of an Object via the *View > Colors* local menu, which opens a palette of various colors. A double-click on a color field opens the system color palette, allowing you create customized colors. These color edits are stored in the Preferences file, and are available for all songs. The color of an Environment Object is used as the default color for any newly created Region in the Arrange window.

Standard Instrument

This is the simplest track playback Object. It provides a direct connection to a single MIDI port and channel, which can be set in its Parameter box.



You can also set a number of other playback parameters, including program bank and number, initial volume and pan, transpose, velocity scaling, and MIDI delay.

To create a new standard instrument, select *New > Instrument*, or click on the layer background with the pencil tool. Instruments serve as the interface between Logic's tracks and your MIDI sound sources.

The Standard Instrument Object Parameter box will be familiar to you from the Arrange window. Here are the details of the individual parameters.

Channel

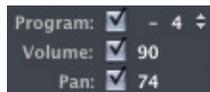
Use the Channel parameter to set the MIDI channel for the instrument's output. All events at the output of the standard instrument Object are sent via the channel set here. Exception: If you set this parameter to All, all events will be sent with their original channel settings—as they appear in the Event List window.

Port

Below the channel parameter, a direct connection to one of the MIDI output ports can be set. Remember that you can also directly cable the standard instrument Object to other Environment Objects for MIDI processing. If no MIDI output port is defined in the Object Parameter box for the instrument, the Port parameter will display "off".

Prg, Vol, and Pan

The *Prg*, *Vol*, and *Pan* parameters transmit program changes, volume controller (#7) and pan controller (#10) data.



You can edit the values of any of these parameters, but no data will be sent until you check the corresponding box (by clicking on it). If the box is already checked, any value alterations will be sent immediately, and the values will also be sent whenever the track is selected.

To the left of the program number, directly to the right of the checkbox, you'll see the bank select parameter. If your MIDI sound sources recognize Bank Select messages (check their manuals), you will be able to switch between sound banks. If your sound sources respond to the standard Bank Select message (Controller #32), you will be able to use this parameter directly. If not, you may define your own Bank Select commands (see "Defining Custom Bank Selects" on page 218).

Transpose

The *Transpose* parameter defines the number of semitones that all note events will be transposed by, on output. Negative values transpose downwards.

Velocity

The *Velocity* parameter allows you to increase or decrease the "note on" velocities of all note events, by an amount adjustable between -99 and 99.

Key Limit

The two note values of the *Lim* parameter define a pitch range. All notes outside this range will be ignored by the instrument when it plays a MIDI Region.

Vel Limit

The two values of the *VLim* parameter define a velocity range. All notes with a velocity that falls outside this range will not be played by the instrument.

Delay

The *Delay* parameter causes all MIDI events to be sent early or late. This "delay" ranges from -99 to 99 ticks. This allows you to adjust for any differences in reaction time between your various MIDI devices. Use the Region parameter of the same name to create delay effects, as this allows longer delay times.

No Transpose

If the box next to the *No Transpose* parameter is checked, all Regions on any tracks played by this instrument are protected from transposition. In other words, the "transpose" Region parameter is ignored. This is very useful for instruments assigned to drum or other multi-timbral samples, as transposition will cause the sounds (rather than the pitches) to change in these instruments.

No Reset

If the box next to the *No Reset* parameter is checked, no reset messages will be sent to the instrument. This can be useful if controllers are being used for non-musical purposes, such as when using an Instrument for mixer automation. The *Preferences > MIDI > Reset Messages* window controls what reset messages are normally sent. These messages are not sent to "No Reset" instruments.

Style

The *Style* parameter is located at the bottom of the Parameter Box. It displays *Auto* by default, but can be changed to any of the available score styles. Whenever a Region is created on one of the instrument's tracks, it will be assigned the score style displayed here. In the *Auto* style's case, Logic will pick an appropriate style based on the pitch range of the notes in the Region.

Don't forget: you can change a MIDI Region's Score Style at any time in the Display Parameter box of the Score window.

You can change the score styles of all MIDI Regions on an instrument's tracks by holding down Option when selecting the instrument's default score style.

Multi Instrument

A multi-instrument is like a collection of 16 standard instruments (see "Standard Instrument" on page 212) in one package. There is a "sub-channel" for each of the 16 MIDI channels—as indicated by the numbered squares on the multi-instrument icon. Clicking on any of these numbered squares selects the corresponding sub-instrument, and displays its parameters in the Parameter box.



All sub-channels of a multi-instrument use the same output port.

Multi-instruments have 15 name banks—each of which will hold 128 preset names. If the multi-instrument's program parameter is checked, selecting names in the name bank will send MIDI program change messages to the corresponding port and channel.

You will generally use multi-instruments to address multi-timbral synths or samplers in your studio. A multi-timbral synth is one that can receive on several MIDI channels at once—playing back a different sound on each channel. As most modern MIDI devices are multi-timbral, the multi instrument will probably be the most commonly used instrument Object in your Environment.

To create a new multi-instrument, choose *New > Multi Instrument*.

A multi-instrument is intended for use with multi-channel MIDI sound devices. It combines 16 separate sub-instruments (one for each MIDI channel) with 15 name banks, and a number of common bank select options.

A multi-instrument consists of 16 sub-channels, each of which has a complete set of instrument parameters. The name, MIDI channel and output of each sub-channel is determined by the multi-instrument. All sub-channels share the 15 banks of program names, and use the same format for their bank select message.

Multi-Instrument Parameter Box

Once you have created a multi-instrument, you will see the multi-instrument Parameter box.

You should already be familiar with the meaning and operation of the individual parameters (as they're identical to those of the standard instrument Object). The settings made here apply to all sub-channels and should be left at their neutral, default values, with the exception of the output port setting. Set the output port in the line below the "Cha" parameter line (Port parameter). For more information on this subject, please read the Direct Output Assignment section (see "Direct Output Assignment" on page 207). Direct output assignment can also be replaced by manual cabling to other Environment Objects—so keep it in mind.

Activating and Selecting Sub-channels

To select a sub-channel for a specific MIDI channel number, click the appropriately numbered button on the multi-instrument Object. The first time you click it, the sub-channel is activated, making it available from the Instrument List. To avoid menu clutter, you should only activate as many sub-channels as you actually need.



As with any other Environment Objects, you can remove sub-channels from the Instrument List, by unchecking the icon box. The button for that sub-channel will then be shown with a diagonal line through it. If you want to select the entire multi-instrument rather than a particular sub-channel, click on the top edge of the multi-instrument Object, or next to the icon.

In the above diagram, sub-channel 1 is selected, sub-channels 1 to 8 are activated, and 9 to 16 have been removed from the Instrument List.

The Sub-channel Parameter Box

The sub-channel parameters are the same as those of standard instrument Objects (see “Standard Instrument” on page 212). The only parameter you can not change is the MIDI channel. (If you change the output port, this will affect the entire multi-instrument and all other sub-channels.) If you try to change the channel from the Parameter box in the Environment window you’ll see the following warning: “Channel protected! Please select a sub-channel from the Instrument pull-down menu.” You can, however, change the channel in the Arrange window’s Parameter box to a sub-channel shown in the Instrument List (one without a slash through it on the multi-instrument), and the track’s instrument will change to the selected sub-channel.

Cabling

To connect the output of an Environment Object directly to the input of a sub-channel, hold down Option, and connect it the via the Instrument List (see “Cabling” on page 208).

Multi Instrument Window

Double-clicking on a multi-instrument opens the multi-instrument window:



Name and Short Name

At the top left, under *Device Name*, you can enter the full name of the multi-instrument. To the top right, under *Short Device Name*, you can also enter a short name. This short name is used in the Arrange window track list, when the program name is displayed. The short name is shown directly beside the icon, so leave a space in front of it, if you want uniform (name) spacing in the track list.

Depending on whether or not you have checked the sub-channel's Prg box, the following information will appear in the Arrange window track list:

- the name of the multi-instrument and channel number (if the box is not checked) or
- the short name, channel number and program name (if the box is checked).

Program Names

There are 128 program names in the multi-instrument window. A total of 15 banks of 128 program names are available. There are several ways of entering the program names:

- by double-clicking on the name (via the text input field),
- by copying (via the Clipboard) from a different multi-instrument, or from a word processing program. The Clipboard functions for a whole sound bank are available in the text import pull-down menu (downwards arrow at the top right). First, copy the program numbers or General MIDI names to the Clipboard, and add them to a word processor document. You can then edit the names and copy the whole section back again.
- if you want to use program numbers instead of names, select *Init Names as Numbers* from the text import menu.
- if you want to use General MIDI program names, select *Init General MIDI Names*.

If the *Use GM Drum Names for Channel 10* box at the very bottom is checked, the standard GM drum set names will be shown in the Prg pull-down menu of the Parameter box for sub-channel 10.

If the *Prg* box in the selected sub-channel's Parameter box is checked, you can send a program change message by selecting a program name in the multi-instrument window (either by clicking, or using your computer's arrow keys).

Banks

On the left, above the program names, you can choose one of 15 available sound banks (0 to 14) via a pull-down menu. The top item ("No Bank specified. Names of Bank 0 used.") can be used if that particular sound generator does not understand bank select messages, or only has 128 sound programs. Bank 0 is always initialized. The first time you choose one of the banks numbered 1 to 14, you will be asked whether or not you want to initialize this bank. Press Enter or Cancel if you don't want to initialize the bank. Non-initialized banks do not have their own program names, but use the names of the equivalent program numbers from bank 0. You should only initialize additional banks if you want to enter program names for those banks, because each initialized bank uses more memory.

In the pull-down menu to the right, labeled *Bank Message*, you can define the MIDI events that are sent when you switch between the banks of the multi-instrument. Different bank select formats are used by different MIDI instrument manufacturers—please consult your instrument’s manual to see whether it supports bank select messages and if so, what format it uses. With modern synths, there’s a good chance the format will be one of the top items in the pull-down menu: either controller# 32 or controller# 0. There are also presets to accommodate several of the more common types of synth. If your synth doesn’t use one of the formats listed, check out the section on defining your own bank select commands (see “Defining Custom Bank Selects” on page 218).

Defining Custom Bank Selects

Logic provides 63 bank numbers (0 to 62) for each single standard instrument, multi-instrument sub-channel, or mapped instrument. You can create custom lists, consisting of as many events (of any kind, even SysEx) as you wish—for each of these banks. Whenever you change the bank manually or send a standard bank change message from Logic, the entire list for that bank will be transmitted to your synth.

If you need more than 63 banks for a particular MIDI device, use several instrument Objects.

To set up custom bank select messages, first select the instrument, then choose *Options > Define Custom Bank Messages*. A window similar to the Event List will open, with a single, default, bank select message for banks 0 to 15. (The default used is a MIDI controller #0 message, with a value equal to the bank number).

You can create MIDI events here in exactly the same way as in the Event Editor, by cutting, copying, inserting, and editing. The only difference is that you enter the desired bank number, rather than a time position.

The letter in parentheses next to the bank number allows you to control the order of transmission, when a bank select requires more than one message.

As an example:



Here, the Bank Select command “Bank 1” was set up to send three events: first, (a) a controller #32 message with a value of 1, then (b) a controller #0 message with a value of 0 and finally, (c) a SysEx message.

If there are no events defined for a particular bank, a standard Bank Select message will be sent for that bank.

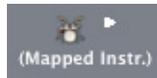
The custom bank select information becomes part of the instrument, and will be automatically copied with it, should you replicate the instrument Object.

For bank messages that need a channel (MIDI controller messages, for example), the channel of the instrument is used. This feature is especially useful for multi-instruments, as you only need to create one set of bank messages for all 16 sub-channels. If an instrument’s channel is set to *All*, channel 1 is used.

On multi-instruments, the bank select message (whether it’s a standard controller or a string of events you’ve configured) is also used by SoundDiver, if Autolink is switched on. This enables it to request the program names in the current bank.

Mapped Instrument

This instrument is particularly useful for drum instruments or any drum-mode MIDI device.



A drum-mode device is one which assigns different sounds to different MIDI notes on the same MIDI channel. Any input note may be routed to a different output note and assigned its own velocity setting, notation, name, and output cable. You can also protect mapped instruments from being accidentally transposed.

To create a new mapped instrument, select *New > Mapped Instrument*.

A mapped instrument is useful for drum programming. It is used just like a standard instrument, but has the following special features:

Each individual input note can be:

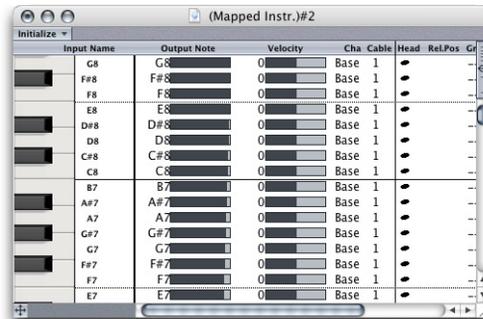
- named (snare, hi hat and so on);
- mapped to an output note (F# and G# for the same hi-hat sound, allowing you to play rapid repeats);
- given a velocity offset;
- assigned its own MIDI channel;
- sent to one of up to 16 output cables (this allows you to create a single instrument that addresses multiple sound sources);
- given its own notation parameters: note head shape, relative vertical position in the staff, and drum group assignment.

Object Parameter Box

The mapped instrument's parameters are a subset of the standard instrument (see "Standard Instrument" on page 212) parameters. The missing settings are available on a note-by-note basis in the mapped instrument window.

Mapped Instrument Window

To open the mapped instrument window, double-click on the mapped instrument icon in the Environment window. The rows correspond to input notes, and the columns contain the various parameters available for each note. The window is automatically opened when creating a new mapped instrument.



Monitor Keyboard (Selecting Notes)

The keyboard on the left represents the input notes. It can be played by clicking on it. You can also select individual notes or note ranges, by dragging the mouse over the notes you want to use. To select multiple notes, Shift-click on them. Any value alterations will apply to all selected notes.

Input Name

In the next column, you can click on the input note and give it a name of up to 12 characters. You can initialize the names of the selected notes to their pitch descriptions (C#3, for example) by selecting *Initialize > Names as Notes*, or to the names of the GM Standard drum sounds by selecting *Initialize > Names as General MIDI*.

Output Note

This column is used to set the output note. This is done by either; double-clicking on the note description and editing the text, or graphically dragging the beam. MIDI notes are sent out, allowing you to hear what you're doing while changing the value. The *Initialize > Output Notes* option matches the output notes of the selected pitches to the input note pitches.

Velocity

Used to set a velocity offset, which is added to or subtracted from the velocity of the incoming note. You can either grab the number and use the mouse as a slider, or click the desired point on the beam. *Initialize > Output Velocities* resets all velocity offsets to 0 (no offset).

Cha

Sets the MIDI channel of individual notes. This allows you to play individual sounds from different drum sets in the same sound generator. You will normally use the *Base* setting here. This means that the notes are sent on the channel set in the mapped instrument's Parameter box. If you choose *All*, the channel information of the incoming notes is used. This is useful if you want to insert the mapped instrument in the signal path after a multi-instrument or single instrument. To set all selected notes to *Base*, select *Initialize > Output Channels*.

Cable

You can send individual notes from the mapped instrument Object to (up to) 16 different output cables, enabling you to play sounds from different sound sources. If you select a cable that doesn't exist, the note will not be sent out. *Initialize > Output Cables* resets all cables to #1 (the top outlet of the mapped instrument).

Notation Parameters

The last three columns define the notation parameters of individual notes. Selecting *Initialize > Score Parameters* neutralizes the settings of the *Head*, *RelPos.* and *Group* parameters.

GM Mixer Object

The GM Mixer is a collection of 16 fader "modules", configured to emulate a virtual mixing desk for 16 MIDI channels. Each module has controls for volume, mute, preset, bank, and four assignable knobs (one of which is typically used for pan). There are optional controls for standard XG and GS effects.



The GM Mixer can be directly connected to an output port, via its Parameter box.

To create a new GM Mixer, select *New > GM Mixer*.

The GM Mixer is intended for controlling the 16 channels of a MIDI device which conforms to the GM, XG, or GS standard. This includes the GM set of 128 program names (with variation banks for XG or GS), MSB/LSB bank select messages, and standard controller names (#1 for mod wheel, #2 for breath, #7 for volume, #10 for pan, #11 for expression, and so on).

Most of the GM Mixer's set up is done in the mixer itself, but there are also a few parameters in its Parameter box.

Cha/Port

Like other instrument Objects, the GM Mixer can also have a direct MIDI output connection. This is set in the line below the channel in the Parameter box. The Channel parameter determines the channel number of the lowest GM Mixer module. You can use this, together with resizing the GM Mixer window, to create sub-mixers for any continuous string of channels (3 to 7, for example).

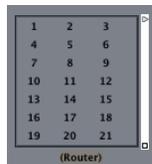
Legend

The Legend checkbox toggles the display of the legend along the left edge of the GM Mixer. The Legend not only indicates what the rows of controls do, it is used to set the function of the top four rows of knobs. After the GM Mixer is set up, you can hide the legend to save space.

Bank

The *Bank* checkbox toggles bank MSB/LSB display below the program name display, at the bottom of the GM Mixer. You can save space by hiding bank display, unless you need to select program banks numerically.

MMC Record Buttons



This Object allows you to control the record enable status of external, MMC (see "MIDI Machine Control" on page 616) compatible, recording devices. Resizing the Object allows you to determine the layout and number of track record buttons.

The Parameter box has the following settings:

MMC ID

Set it to "All" (= 127) to control all connected MMC devices, independent of the MMC ID that is set, or set it to a specific value to control a specific MMC device.

Extras

If enabled, the “V TC A1 A2” extra tracks are displayed:

- V for Video
- TC for Timecode
- A1 for Aux Track 1 (or A)
- A2 for Aux Track 2 (or B)

Keyboard Object

The keyboard Object is used for creating notes with the mouse. It will also display all notes passing through it. In this sense, you can think of it as a realtime, note-on monitor.

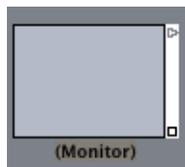
You can create a virtual keyboard by selecting *New > Keyboard*.

The keyboard Object generates MIDI note events when clicked with the mouse. It also displays note events passing through it—when a note is being held, the corresponding key is reversed in color. Although you can record the output of the keyboard in Logic, its main purpose is for testing and monitoring in the Environment.

Apart from the standard parameters, you can also set the MIDI channel, a fixed velocity for all notes and the octave of the lowest note on the keyboard (which is always a C). You can re-size the keyboard to control its range above the lowest note. Shift-click the keyboard to select, and move it.

Monitor Object

The monitor Object displays all MIDI events passing through it, and retains the last 32 such events. You will need to resize it to see more than 5 events at a time.



To create a monitor Object, select *New > Monitor*. The monitor shows all events (MIDI and meta) passing through it. It remembers the last 32 events, with the newest events shown at the bottom of the list. You can resize it to show from 1 to 32 events. (You can make it even bigger, if desired).

Monitors are very handy as both testing, and branching devices. When coupled with Objects that have functionally different outputs (the channel splitter and mapped instrument, for example), monitor Objects can be used to attach more than one output cable to the same function.

Click in the body of the monitor to clear it.

Channel Splitter Object



The channel splitter routes MIDI events by channel. It offers an output for each of the 16 MIDI channels, and an additional “SUM” output. If a particular channel output is not connected to anything, events for that channel will appear at the SUM output.

To create a new channel splitter Object, select *New > Channel Splitter*. You can use the channel splitter to reroute MIDI events to different cables, in accordance with their MIDI channels. Every MIDI event received at the channel splitter input is automatically routed to the output that corresponds to its MIDI channel. If no cable is connected to the corresponding output channel, the event is rerouted to the SUM output (at the top). The SUM output is used for the events of channels with no individual output connections.

Transformer Object

The transformer is used to select, and transform (change), MIDI events passing through it. Its select-conditions allow it to act as a MIDI filter.



Transform operations, combined with selection conditions, allow you to alter some MIDI events while letting others pass through unchanged. Use of “Meta Events” provides real time control of many transformer parameters.

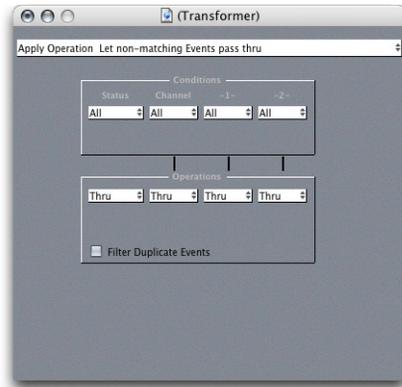
You can create a new transformer Object by selecting *New > Transformer*. The transformer allows you to both select and alter MIDI events in real time.

The transformer must be placed in the MIDI signal path in order to use it. If you wish to alter the output of an instrument, for example, cable the transformer between the instrument and a port Object (removing the instrument’s internal port assignment in the process).

Working Principle

The transformer first checks whether or not an event corresponds to certain *conditions*. If it does, then certain *operations* are carried out. Events which do not meet the conditions may pass unchanged to the output, or may be thrown away. The transformer can also make copies of matching events before altering them, and can split the selected events from the unselected ones, via its two top cables.

Transformer Dialog Box



Double-clicking on a transformer opens a dialog box, where you can set the conditions and operations. You can open this box as a floating window by Option-double-clicking on the transformer Object.

Mode of Operation

Use the pull-down menu at the top of the transformer window, to set the transformer's mode of operation. You can choose between the following options:

- Apply Operation Let non-matching Events pass thru (default setting)
MIDI events that match the condition are processed. MIDI events that don't conform to the condition are passed thru.
- Apply Operation Filter non-matching Events
MIDI events that conform to the condition are processed. MIDI events which do not conform to the condition are not passed through.
- Filter matching Events
All MIDI events which match the condition are filtered out. MIDI events that don't conform to the condition are passed through.
- Copy matching Events Apply Operation
All MIDI events which conform to the condition are copied, and the copy is processed. The original and transformed copy (plus any MIDI events that don't conform to the condition) are passed through. The unchanged original is parsed (processed) before the transformed copy.

- Copy matching Events Apply Operation (rev. order)
This is the same as above, except the original is parsed after the processed copy. You might want to use this when converting note events to pan controllers, for example. This causes the pan message to be sent before the note. (Many synths don't alter the pan position of notes that are currently playing).
- Condition Splitter (true → top cable)
Events that match the conditions are altered by the operations, and sent to the transformer's top output. Events that don't match the conditions are sent, unaltered, to the transformer's second output. Do not use the other outputs—as nothing ever appears there.
- Alternating Split
Events entering the transformer will be alternated between the top two outlets. No conditions or operations apply.
- SysEx Mapper ('1' → position, '2' → value)
This transformer mode is used to create and edit SysEx messages. You first need to enter the structure of the SysEx message in the transformer window—including its length, whether or not a checksum is required, and the values of bytes you don't want to change in real time. Next, you select the type of MIDI event that will affect the data bytes in the SysEx message. (Typically, you'll use MIDI controller events.) Incoming MIDI events will then change the SysEx message data bytes, according to the following rules:
 - The -1- value sets the position of the data byte.
 - The -2- value sets the value of the data byte.
 The channel controls the action to be taken:
 - Channel 1: The changed SysEx message is sent.
 - Channel 2: The changed SysEx message is not sent.
 - Channel 3: The unchanged SysEx message is sent.
 - Channels 4 to 16: No meaning (reserved for future use).
 The purpose of the channel controls is to allow multiple bytes of a SysEx message to be modified before it is sent.

 The *Filter non-matching* parameter in the SysEx mapper transformer window prevents incoming MIDI events (that don't control the SysEx message) from being passed through. Typically, you will want this feature turned on, to prevent interloping controller data from invading the SysEx data stream.
- Track Automation Splitter (true → to cable)
If the condition matches, incoming events will be sent to the Track Automation of the Object connected to the top cable of the transformer—after passing through the "Operation" field. With the appropriate "Operation" field settings, incoming MIDI data is transformed into Fader event data—allowing the automation of any possible parameter of the connected Mixer Object. Exception: Channel volume and channel pan uses Control events.

Conditions and Operations

The conditions and operations are the same as those found in the Transform window (see “Transform Window—Introduction” on page 587). The only differences arise from the fact that transformer Objects work in real time and therefore, position and note length have no useful meaning.

Pitch Bend editing

The transformer can process 14-bit pitch bend events: if byte 1 is changed (by addition or scaling), the change will also affect the second byte. Set the -2- operation to “THRU” to ensure that 14-bit pitch bend data is processed properly.

Remote Controlling the Condition and Operation Values

The values of any transformer conditions or operations can be externally controlled using meta events. Meta events are internal Logic messages—their form is similar to MIDI controller events, but they have no MIDI meaning, and never leave Logic. Like MIDI controller events, meta events have two data values: the first one indicates the type of meta event (49 to 127, but not all are used), and the second one is the event value (0 to 127).

Meta events 122 to 127 affect transformer parameters.

- Meta event #127 sets the first (top) operation value,
- Meta event #126 sets the second (bottom) operation value (if available).
- Meta event #125 sets the first (top) condition value.
- Meta event #124 sets the second (bottom) condition value (if available).

Note that all numerical condition and operation parameters that are used (conditions not set to All and operations not set to Thru) will be affected by the same meta event. (The status condition and operation are not affected by meta events). If you want to set numerical parameters individually, or leave some fixed, use separate transformers in series.

- Meta event #123 sets the transformer map position.
- Meta event #122 sets the transformer map value for the current map position. (Use meta event #123 to set the position first).

Note: You can use a transformer’s Map Set operation to create these two meta events simultaneously. When the operation status is set to Map Set, the -1- parameter specifies the map position, and the -2- parameter specifies the map value at that position (a meta event #122 is sent with the -1- value, followed by a meta event #123 with the -2- value).

You can create meta events with a fader; you can transform MIDI events into meta events with a transformer, and you can add meta events to a MIDI Region with the Event List editor. When you use a fader, set the Out definition to Switch, then set the -1- value to the meta event number. (Cable switcher type faders and meta events share the same Out definition. -1- values above 49 signify meta events).

You can remote-control any fader by using its In definition, allowing you to use faders (as well as other transformers) to convert MIDI events to meta events—for remote-control of transformers.

Condition: Map

Most transformer conditions are numerical relationships (=, unequal, inside, and so on), and the condition is met if the incoming MIDI event value satisfies the condition. The last condition, Map, works a little differently. Two numerical parameters are specified, and the incoming value is first converted by the map, then the mapped value is compared to the two parameters to see if it falls inside them.

Transforming Meta Events

Transformers can also process meta events, as long as they are not the meta events that affect transformers. These particular meta events change the transformer, rather than being processed by it.

Arpeggiator Object

The arpeggiator turns chords into arpeggios. It plays the currently held notes—individually—in a selectable pattern (up, down, random, and so on), and at a selectable speed that ranges between whole-notes and 768th-notes.



The arpeggiator features a number of useful parameters including; note-length, repeat on/off and octave doubling. All of its parameters can be changed in real time through the use of MIDI controller messages.

Important: Logic must be in play (or record) mode for the arpeggiator to work.

To create a new arpeggiator, select *New > Arpeggiator*.

The arpeggiator cycles through all held notes (arpeggiates chords) within its range. You can set the range to be as wide or narrow as you wish. There are parameters for direction, velocity, speed, note length, start quantize (snap), repeats, octaves, and velocity offset. All of the arpeggiator's parameters can be MIDI controlled in real time, which adds immensely to its versatility.

To use the arpeggiator, you must place it in the MIDI signal path, and Logic's Transport must be running. (For technical reasons, the arpeggiator resets on cycle jumps). Typically, you would assign the arpeggiator to an Arrange track, and cable its output to an instrument or port Object. You can, of course, insert it anywhere else in the MIDI signal path.

Once set up, you can use the arpeggiator with live MIDI input, or for MIDI Region playback. You can also record the output of the arpeggiator by cabling it into the sequencer input Object. If you do this, be sure you either record to a no output track, or break the arpeggiator's connection to the MIDI output.

Arpeggiator Parameters

The arpeggiator features the following parameters (the numbers in parentheses are Control Base offsets—see below):

Direction (+0)

The direction of the arpeggiated chord:

- *Up*: Lowest note to highest note
- *Down*: Highest note to lowest note
- *UpDn*: Up and down—highest and lowest notes repeat
- *Auto*: Up or down depending on whether the second chord note arrived before or after the first chord note
- *UpD2*: Up and down—highest and lowest notes don't repeat
- *Rand*: Notes play in random order
- *All*: All notes play at once (useful when repeat is on)

Vel (+1)

Velocity values of the arpeggiated notes.

- *1 to 127*: Fixed velocities,
- *Orig*: the velocities of the recorded notes are retained,
- *Rand*: random velocities between 1 and the original value.

Lim (Low: +2, High: +3)

This is where you can define the pitch range (between C-2 and G8) for the chord arpeggiation. Any chord notes outside this range are passed directly to the output. This is useful when you want to solo above, or play a bass line below an arpeggiated chord.

Res (+4)

This is where you set the rhythmic note value (the speed in note divisions) of the arpeggio via a pull-down menu. None = arpeggiator switched off.

Len (+5)

This is where you define the length of the arpeggiated notes. The Orig setting retains the lengths of recorded notes.

Snap to (+6)

Unless this value is set to None, the arpeggiator will wait for Logic's transport to reach the next indicated note division before starting the arpeggio. This is useful for rhythmically synchronizing the arpeggio with other MIDI data.

Repeat (+7)

On continues the arpeggio for as long as the chord is held down. Off finishes the arpeggio after one run.

Octaves (+8)

The arpeggio can be repeated over 1 to 10 octaves.

Crescendo (+9)

The velocity value set here (–99 to +99) is added every time the arpeggio is repeated (provided *Repeat* is set to On, of course).

Control Base

All 10 parameters of the arpeggiator can be remote-controlled by controller events. The *Control Base* parameter determines the controller number for the first parameter (Direction). The other parameters will be controlled by subsequent controller numbers. To figure out which controller number will be used for a certain parameter, add the number shown in brackets (behind the parameter names in this document) to the *Control Base* value. When *Control Base* is set to Off, MIDI control of the arpeggiator is disabled.

Delay Line Object

The delay line echoes MIDI events passing through it—at intervals ranging from one tick to 256 whole notes.



There are parameters for the number of echoes, (echo) transposition and velocity offset.

The echoes of each incoming event are cycled through each cabled output of the delay line.

Important: Logic's transport must be running for the delay line to work.

To create a new Delay Object, select *New > Delay Line*.

This Object repeats any MIDI events, much like a delay line effect. Pitch and velocity offsets can be added to note events. As with the arpeggiator, you will need to place the delay line in the MIDI signal path, and will need to start Logic's Transport for it to work.

The delay line can send up to 99 repeats, at intervals ranging from one tick to 256 whole notes. You can suppress the original note. Repeats leaving the delay line will cycle through all cabled outlets, allowing you to play each repeat with a different sound.

Delay Line Parameters

The Delay Object has the following parameters:

Thru Original

If this box is checked, the original signal is passed thru. If unchecked, the original signal is suppressed.

Repeats

Number of event repeats (1 to 99). Setting 0 = delay switched off.

Del

The delay time between the individual repeats. The left value is in divisions, and the right value in ticks.

Trp

The transposition of note events per repeat (± 99 semitones).

Vel

The change in the velocity values of note events per repeat (± 99).

Voice Limiter Object

The voice limiter restricts the number of MIDI notes (1 to 32) that can be held simultaneously.



It does this by “note stealing”—newly arriving notes will cause (some of the) currently held notes to be turned off, once the voice limit is reached (see the *Priority* parameter below).

To create a new voice limiter, select *New > Voice Limiter*.

Normally, you will assign the voice limiter to an Arrange track, and cable its output to the instrument Object that you want to voice limit. Alternately, you could cable it between an instrument Object (breaking its internal port connection) and a port Object.

Voice Limiter Parameters

Voices

This parameter defines the maximum number of voices that be simultaneously played. It ranges from 1 to 32.

Priority

This is where you define which notes are stolen (are turned off) when the number of held notes exceeds the limit.

Top = lowest (pitched) notes are turned off first.

Bot = the highest (pitched) notes are turned off first.

Last = the earliest notes (those played first) are turned off first.

Chord Memorizer Object

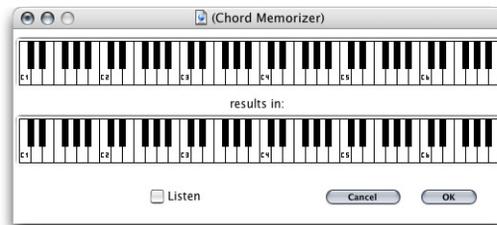
The chord memorizer maps individual notes to chords. You can assign one chord to each pitch class (to C, C#, D, and so on).



The octave of the incoming note determines the octave of the resulting chord. A chord can have zero to 12 notes in it. (Zero and one note chords can be useful for creating scale-filters and scale-correctors).

The easiest way to use the chord memorizer is to connect its output to the instrument that you want to play the chords, and assign it to an Arrange window track. You can, of course, place it anywhere else in the MIDI signal path.

To create a new chord memorizer, select *New > Chord Memorizer*.



Chord Memorizer Parameters

Cha

All chord notes will be output to the defined channel.

Lim

Notes within this range are mapped to chords. Notes outside the range are passed through unaltered.

Trp

The output chords are transposed by the amount set here (± 99 semitones).

Example: if you map C to a chord consisting of CEG, and set transpose to 1, then C will be mapped to C#FG#.

Key

The entire chord map is transposed by the amount set here (± 99 semitones).

Example: if you map C to CEG, and set key to 1, then C# will be mapped to C#FG#.

Example: if you want to map single notes to triads within a given key, first set the key, then define each of the triad chords (see below). When you want notes mapped to the triads in a different key, just change the key parameter.

Chord Memorizer Window

Double-clicking on the chord memorizer opens the chord memorizer window, where you can set up chord definitions.

The top keyboard is used for input/display of the incoming note, and the lower keyboard is for input/display of the assigned chords. Notes can be input using the mouse, or a MIDI keyboard.

Remember to only use notes that fall within the Lim range on the top keyboard. Also remember that you can only define one chord for each of the 12 pitch classes (C, C#, D, and so on). You can, of course, use more than one chord memorizer.

Entering Chords with the Mouse

- First, click the input note on the top keyboard. All notes in the associated chord will be inverted on the bottom keyboard.
- Next, click notes on the bottom keyboard until the inverted notes of the desired chord are shown. You can turn notes on or off on the bottom keyboard by clicking on them. You don't need to stay within the same octave as the input note.
- When you have entered the desired notes for your chord, select another input note (on the top keyboard), or close the chord memorizer window.

Entering Chords from Your MIDI Keyboard

- First play the "input note".
- Click the Listen checkbox. The lower keyboard is inverted, indicating it's readiness to record.
- Now play the notes of the desired chord. You can play them one at a time, or as a chord. If you make a mistake, uncheck the Listen checkbox, then check it again to start over.
- When you've entered the desired notes for your chord, uncheck the Listen checkbox and play a new input note, or close the chord memorizer window.

Touch Tracks Object

Touch Tracks turns Logic into an interactive live sequencer. A touch tracks Object allows you to trigger MIDI Regions or folders with single notes.



You can not use touch tracks to trigger audio. In the following section, any references to Regions mean folders and MIDI Regions, not Audio Regions.

To create a Touch Tracks Object:

- Drag a MIDI Region or Folder from the Arrange window into the Environment window or select *New > Touch Tracks*.

To use a Touch Tracks Object:

- Simply assign it to an Arrange window track, or place it anywhere in the MIDI signal path.

Here are some things to remember:

- Only the touch tracks input has meaning—trigger notes must appear here. Although the Object features an output triangle, it has no use, as events never appear here.
- Regions triggered by touch tracks play exactly as they would from the Arrange window—they play back through the instruments assigned to their tracks.
- Logic’s Transport must be running for touch tracks to work.

The Touch Tracks Window

You open the touch tracks window by double-clicking on the touch tracks Object. This window is set up similarly to the mapped instrument window (see “Mapped Instrument” on page 219)—the input note is selected via the keyboard on the left, and the output Region assignment and parameters are set in the columns of the corresponding row.

Region Note Assignment

Dragging a MIDI Region or Folder into the Environment creates a touch tracks Object. All notes (initially) trigger this Region. Middle C plays the Region/Folder at its original pitch, and all other notes transpose it—relative to middle C.

In the Input column, you can see the input notes, and to the right, in the Region/Folder column, the names of the assigned Regions or Folders. On the vertical keyboard to the left, you can select individual notes or whole pitch ranges, by grabbing and dragging. If you then drag a MIDI Region or Folder from the Arrange window, it will only be assigned to the selected notes.

Remember that all settings of the following parameters also apply to multiple selections.

A vertical gray line means that the setting is the same as the line above. If you change a vertical gray line that is above another vertical gray line, the lower one will change to display its previous value (it will no longer be the same as the line above.)

Group

To the left of the Region/Folder name is the group column. Groups behave as they do in the Hyper Editor—when you trigger a Region, any other (currently playing) Region in the same group will stop.

The off setting means that the Region is not assigned to any group.

Transposition

When you drag a Region to a key in the touch tracks window, that key triggers the Region at its original pitch (without transposition). If you want the Region transposed, you can set the amount in the *Trp* column (± 99 semitones).

If a key range is selected when you drag the Region to the touch tracks window, incremental transpositions will automatically be set for adjacent keys (within the key range).

When you create a touch tracks Object by dragging a Region into the Environment, C3 triggers the Region at its normal pitch, and all other keys trigger it—transposed relative to C3.

Velocity Sensitivity

In the *Velocity* column, you can set the sensitivity of Regions to the velocity value of the trigger note: by 100% (very sensitive), 50% (somewhat sensitive) or off (not velocity sensitive).

Trigger Modes

The *Trigger* column determines how Region playback is handled:

Multi

Playing the trigger note starts the Region. Playing it again restarts the Region, without stopping playback of the originally triggered version.

Single

Playing the trigger note once starts the Region. Playing it again stops playback, and restarts the Region.

Gate

The Region plays until the trigger note is released (or until the Region ends).

Gate Loop

The Region loops until the trigger note is released.

Toggle

Playing the trigger note starts the Region. Playing it again stops playback.

Toggle Loop

Playing the trigger note starts Region looping. Playing it again stops playback.

Start

This column allows you to quantize Region start and stop. Free means no quantization. The next 1/16, 1/4 or 1/1 settings start or stop the Region at the next 1/16 or 1/4 note or at the beginning of the next bar, when a trigger note is played.

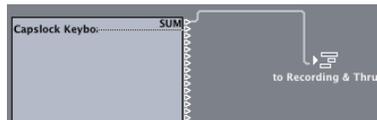
Delay

This column allows you to assign a delay to the Region startpoint. As in the Region Parameter box, the delay is set on the right side of the column in ticks, or on the left side in note values.

You can use both *Delay* and *Start* to make Regions start at any position in the measure. As an example: Set *Start* to 1/1 and *Delay* to 480 ticks to commence playback at the second 8th note in the measure.

Physical Input/Sequencer Input Objects

The physical input Object represents the physical inputs of your MIDI interface; the sequencer input represents Logic's MIDI input. You can only have one of each of these Objects in the Environment. The default sequencer input Object is named "to Recording & Thru."



To create either type of input Object, select *New > Physical Input* or *New > Sequencer Input*. To make use of an existing Object, drag it onto the relevant layer. This will not affect its cabling.

Physical Input Object

The physical input represents the MIDI inputs of your MIDI interface. Each song can have only one physical input Object. You only need to create a physical input Object if you have deleted the one that existed when the song was created. Do so by selecting *New > Physical Input*.

The physical input Object receives MIDI signals from the inputs of the MIDI interface(s) connected to your computer. This Object has a total of 65 outputs.

The outputs follow the input assignment of all connected MIDI interfaces.

The top output (SUM) carries the MIDI events for all individual outputs that are not cabled separately.

MIDI Remote Control

Remote control events are intercepted at the physical input Object, and are not passed through to its outputs. As such, remote control events will not reach the Environment, or be recorded on Arrange window tracks. If you want to trigger a MIDI remote control action from a fader or transformer, cable the Object's output back into the physical input Object.

Sequencer Input Object

MIDI events arrive at Arrange window tracks thru the sequencer input Object. If nothing is cabled into the sequencer input Object, nothing can be recorded in Logic. Typically, the physical input Object is cabled directly to the sequencer input Object but other Objects can be inserted between them. Typical candidates are; a monitor, keyboard, or cable switcher Object—feeding various processors such as an arpeggiator, a delay line, and so on (See the *Clicks & Ports* layer of the Logic default Song.) You can also cable the output of complex Environment processes into the sequencer input Object, in order to record the processed signal.

Each song can have only one sequencer input Object. You only need to create a sequencer input Object if you have deleted the one that existed when the song was created. If you do need to create one, select *New > Sequencer Input*.

MIDI Metronome Click

The MIDI metronome click Object is used to create note events at bar, beat, and division intervals. These can be sent to either; a MIDI port or the internal speaker.



There is a button on the Transport that turns the MIDI metronome click on and off.



A long click on this button will allow you to open the *File > Song Settings > Metronome* (see "Metronome Settings" on page 626). In this pane, you can also set the MIDI metronome click to play during recording and/or playback. This dialog mirrors the settings in the Parameter box of the MIDI metronome click Object: Checkboxes for *Bar*, *Beat*, and *Division* allow you to generate note events separately for bars, beats, and divisions. The *Cha*, *Note*, and *Vel* parameters define the MIDI channel, note number and velocity of generated notes. The MIDI port parameter allows you to set a direct output port for the metronome.

Each song can have only one MIDI metronome click Object. You only need to create a MIDI Metronome Click Object if the one that existed when the song was created has been deleted. If you do need to create one, select *New > MIDI Metronome Click*.

Internal Objects

“Internal” Objects include instruments located inside your Macintosh (such as a PCI card and/or software synthesizers). Although communication with sound sources inside the computer does not actually use MIDI, it still conforms to the MIDI communication protocol. Internal Objects have an input, but no output. They therefore act like extra output ports, which are hard-wired to the relevant sound generator.

Using Internal Objects

If you want to address internal sound sources, you must first create an equivalent internal Object (see below). Then create a standard instrument, multi-instrument or mapped instrument for the device. Next, connect the output of the instrument to the internal Object. Then use the instrument as you normally would.

Apple QuickTime

The QuickTime system extension offers a software-based GM sound generator. The “QuickTime Musical Instruments” file must be present on your System.

To create a virtual representation of the QuickTime synth, choose *New > Internal > Apple QuickTime*.

This software synth is 16-part multi-timbral. As usual, you can switch sounds via program changes; these are arranged according to the GM table. Channel 10 is always set to drum sounds, with GM key assignments. The QuickTime synthesizer reacts to notes and program change commands, as well as to pitch bend (± 2 semitones) and the main volume controller (#7).

The first note is used to initialize the relevant MIDI channel of the QuickTime synthesizer, and is not played.

Internal—ReWire

New > Internal > ReWire allows you to send MIDI data to ReWire2 compatible applications and their software instruments.

Starting/Stopping the ReWire connection

To connect to a ReWire compatible software instrument, first launch Logic and then the ReWire application. When shutting down, first quit the ReWire application, then Logic.

Settings

Apart from common parameters, the Rewire Object offers three settings:



Device: This setting refers to the ReWire application(s) that Logic can connect to. If one or more ReWire applications are running, it will display the names of these applications.

Bus: Lets you choose the ReWire Bus from all available ReWire busses. If a ReWire application provides bus names, they will be shown. If using Reason, the names of the instruments available in the Reason Rack will be shown from Bus 6 upwards, in place of numbers.

Cha: Sets the MIDI channel of the ReWire Object.

Reason Settings

When using Reason, the Bus numbers translate as follows:

- *Bus 1:* addresses the instrument chosen as the Live Track in Reason.
- *Busses 2 to 5:* address Busses A-D of Reason's MIDI In device.
- *Busses 6 and higher:* addresses the instruments of the Reason Rack.

ReWire Behavior

In *Preferences > Audio > Driver*, you can set the ReWire behavior for each ReWire compatible audio driver type. When sending MIDI data to a ReWire compatible software instrument, you can choose between these modes:

- *Playback mode:* use this mode when playing back MIDI tracks via ReWire. This setting requires less CPU power.
- *Live mode:* use this mode when playing a ReWire instrument live. This setting requires more CPU power.

MIDI Outs

Port Objects represent the MIDI output(s) of your MIDI interface(s). You can also use them to address the internal synth on your soundcard (if applicable).

To create a port Object choose *New > MIDI Out Port*.

The lowest line in the Parameter box sets the MIDI output driver for the port Object. The signals from all MIDI cables plugged into this Object will then be sent via the selected MIDI output.

Remember that you can also address any MIDI output port directly from instrument Objects (and the GM Mixer Object).

Alias

You can create an alias of any Environment Object, and it will behave exactly like the original. In the case of faders, the alias has its own value—which can be different than the value of the original Object. This is particularly useful if using text faders, as they consume a lot of memory—if you need several text faders of the same name, make several aliases of one original Object.

To create an alias of any Object, select the Object, then choose *New > Alias*.

Aliases can be reassigned with meta events. A special fader, known as the alias assigner (which works something like the cable switcher), is used to accomplish this. You can create one by selecting *New > Fader > Specials > Alias Assigner*. This will create a meta fader, with a -1- definition set to 46.

To use the alias assigner, cable its top outlet to the alias, and cable subsequent outlets to the various originals that you want to assign to the alias. If you set the alias assigner's maximum range to match the number of originals, minus 1 (we're counting from 0 here), you can then connect the next cable to a new alias, and subsequent cables to originals for the alias. In this way, the alias assigner can be used to assign multiple aliases simultaneously.

One situation where you might use an alias assigner is when switching a delay line alias between different originals (delay lines), set to different delay times. This method is one of several ways to provide MIDI control over delay time.

Alias Parameters

Aliases share the parameters of their “parent” original Objects, but they also have their own, special parameters:

Icon & Instrument List Checkbox

As usual, the checkbox next to the word *Icon* determines whether the alias appears on the Arrange window's Instrument List. You can assign any of the usual icons to it.

Ref

The *Ref* menu is used to select the original on which the alias is based. It is identical to the Arrange window's Instrument List.

Channel

The channel parameter causes all events leaving the alias to be channelized to the selected channel, for everything except faders. (If the setting is All, existing channelized events are left unchanged).

For faders, the channel parameter causes the alias to act as if the original fader's In and Out definitions are both set to the specified channel. (An All setting = no change).

Share Name/Share Size

These two parameters do just what they say—when checked, the alias shares the size and/or name of the original. If unchecked, it can be resized and given its own name.

Copying Aliases

If you copy an alias, you will create a new alias of the same original. If you select and copy both an alias and its original, you will create a copy of the original with its own, separate alias.

Ornament

You can create an ornament by selecting *New > Ornament*. Ornaments are simply solid backgrounds behind other Environment Objects. An ornament never “covers” the Objects behind it, allowing you to continue to select multiple Objects by rubber-banding them.

Macros

Macros are not actually Environment Objects. Rather, they are collections of other Environment Objects and their cabling. To create a new macro, first select all Environment Objects that you wish to include, then select *New > Macro*. Logic will enclose all selected Objects in a “frame” with a gray background. The macro will automatically be named after its input and output Objects, separated by a dash (see below).

You can create a “protected” macro by holding Control while creating the macro. Protected macros can not be unpacked, so ensure that you’ve made a copy of the Objects and cabling before creating a protected macro.

Macros have a lot in common with standard Environment Objects—you can connect cables to and from them, they can be resized, they have their own parameters and icon, they can be placed on the Arrange window’s Instrument List and they can be copied or dragged between Environment layers (including between songs).

Macro Input and Output

As a macro is a collection of Objects, individual Objects need to be specified as the macro’s input and output. This can be done in two ways: by name or by default. If you name one Object “Macro-In,” and another “Macro-Out,” these will automatically become the macro’s input and output. If there is no Object named “Macro-In,” the upper-leftmost Object will become the macro’s input. If there is no Object named “Macro-Out” then the lower-rightmost Object will become the macro’s output. Cables leading into the macro deliver events to the macro’s input Object, and cables leading from the macro’s outlets carry events leaving the macro’s output Object.

Macro parameters

Macros have four parameters:

Icon & Instrument List Checkbox

As usual, the checkbox next to the word **Icon** determines whether the macro appears on the Arrange window's Instrument List. If you use a macro as a (selected) track instrument, events played on the track, or incoming MIDI events will be sent to the macro's input Object (see above).

If you place a macro on the Instrument List, you can choose any of the available icons for it, via the usual pop-up menu.

Auto Fader

If you select a group of faders, and create a macro from them, checking this box will make them behave as if they were cabled serially.

Show All

This checkbox determines which Objects remain visible when combined into a macro. When checked, all Objects will be visible (assuming the macro is not resized to hide some of them). When unchecked, only faders, monitors, ornaments, and keyboard Objects will be visible. (You can toggle this checkbox at any time).

Special Macro Features

Unpacking

You can revert any macro back into its component Objects and cables, by double-clicking in any empty (blank) section of the macro Object.

Size Limitations

Macros are limited in size—the limit is dependent on the memory usage of the individual Objects within the macro. This limit is typically between 100 and 200 Objects.

Nesting Macros

You can nest macros—a macro can contain other macros as Objects.

Cables Leading Outside the Macro

If some of the Objects selected when creating a macro have cables leading to unselected Objects, these cables will be deleted when the macro is created. A warning dialog will notify you of this. In this situation, the macro is made from a copy of the original selection of Objects, and the original collection of Objects remains unchanged. If no cables lead to unselected Objects, the macro uses the original Objects.

Faders

Faders (see “Faders—Overview” on page 243) are used to send MIDI events by clicking or click-dragging on them. Faders come in different forms (knobs, sliders, numerical, and buttons). Fader Objects respond to incoming MIDI events.

Audio Objects

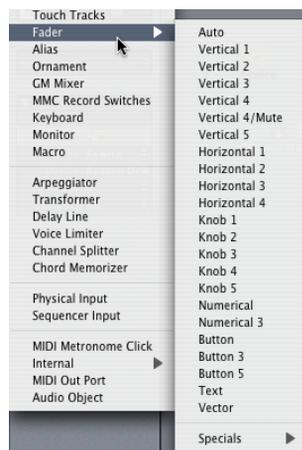
The Environment’s audio Object (see “Audio Objects in the Audio and Track Mixer” on page 269) is the “building block” of the Environment Audio Mixer. They are also used to create audio tracks in the Arrange window—audio tracks are simply tracks with Audio Objects assigned to them.

Although audio Objects are not part of the MIDI signal flow, they still allow MIDI controller messages to control aspects of Logic’s audio playback. Any MIDI Object can be cabled into an audio Object, thereby feeding control data into the audio Object.

Faders

Faders—Overview

To create a new fader, select *New > Fader > ...* A sub-menu appears, where you may select the style of fader you want. There’s also a sub-menu at the bottom named *Special*, used to select various special fader types (cable switcher, meta-fader and so on).



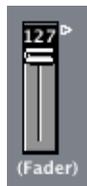
The style of a fader determines its onscreen appearance (slider, knob, menu, numerical) and how it responds to the mouse (click and drag, double-click and type a number, click, and select from a menu). The *Auto* style fader—the default style if you create a fader with a key command—changes styles as you alter its shape and size.

The type of fader determines what events the fader sends out and responds to. In two cases: the cable switcher and the alias assigner, the fader doesn’t send out events at all. The cable switcher routes events to its different outlets, and the alias assigner changes the references of fader aliases.

In general, a fader's style is completely independent of its type. A cable switcher can look like a button, a knob can send out MIDI or meta or SysEx events, and so on. The one exception is the Vector style fader—these behave in a special way, by sending out two (or in special cases, four) messages at a time, depending on the mouse location within their 2-dimensional, vector window.

Don't worry about selecting the wrong fader style or type from the New menu—you have complete control of a fader's style and type from its Parameter box.

Some of the styles have numerical displays. When there is a numerical display, you can double-click it, and type in the desired values. When you drag on any of the sliders or knobs, the series of values that are sent out depends on the fader size and scrolling speed—not every consecutive value is sent out at smaller sizes. If you drag slowly on the numerical field, however, you will send all consecutive values.



The text-style fader behaves like a pop-up menu. If double-clicked, a window will open, allowing you to enter text for each of the menu positions. A checkbox enables the names to be scrolled, rather than chosen from a menu.

The vector-style fader allows you to scroll in two directions, and sends out two values—one corresponding to the vertical position and the other to the horizontal position.

The cable switcher and vector fader Objects, route all incoming events to the selected output. As with most Objects, cabling one outlet automatically produces another (output). Clicking on the cable switcher Object makes it step sequentially through the outputs.

Fader Operation

Normally, you'll grab the surface of a fader, and drag it vertically or horizontally, depending on its style.

Knobs can be dragged either vertically or horizontally.

When the fader features a numerical display, you can grab this number and use the mouse as a slider. The advantage is that if you drag slowly, the fader output will move in increments of 1 value unit, regardless of the size of the Object. When using the fader itself as a slider, values may jump in larger increments, depending on the size of the fader and dragging speed. You can also change values in single steps by dragging on the slider or knob while holding down Control.

Buttons only send two values, the lowest and highest of their range set in the Parameter box. You change a button's state by clicking on it.

Working with Object Groups

When building a virtual mixing desk or synthesizer control panel in the Environment, you often need to deal with large groups of Fader Objects which have the same size, regular spacing and/or a similar definition. To save time on the definition and alignment of these groups, you can define (one or more) Objects as prototypes (templates) by copying them into the Clipboard (*Edit > Copy* or Command-C). You may then apply certain characteristics of the template to selected Objects.

Size and Alignment

The *Options > Apply Buffer Template to > Size* function allows you to transfer the size of the prototypes to the selected Objects.

To align a group of Objects, choose two Objects in a row, or two Objects in a column, or four Objects in two rows and two columns, as required. The horizontal and vertical alignment of these Objects can be copied into the Clipboard. You can then transfer this alignment template by selecting the *Options > Apply Buffer Template to > Position* function. The selected target Objects will be positioned at the top left corner of the Environment layer, in accordance with the layout of the template.

Options > Apply Buffer Template to > Position and Size combines both of the above functions.

Definition

The *Options > Apply Buffer Template to > Definition* function transfers the parameters of a copied template to all selected Objects. If several templates of the same type are available, the one that is closest in size is used.

... *> Definition, channel increment* increases the channel number from Object to Object, beginning with the top left Object. It is not necessary for the selected Objects to have the same In or Out definition as the template.

... > *Definition, number increment* increases the first data byte of the definition (controller number, for example).

Cabling serially

The *Options > Cable serially* function connects all selected Objects in series, beginning with the Object at the top left.

Names with Numbers

If you name one Object in a selected group of Objects with a name that ends in a numeral, the remaining Objects will be renamed with this name, but with sequentially increasing numerals. As an example: Selecting several Objects and naming one of them "Object 1" will result in the ensuing Objects being renamed as "Object 1", "Object 2", "Object 3" and so on.

Special Functions

Grouping Faders

If you select several faders and move one of them, all selected faders will move proportionately. As long as all faders remain selected, their relative positions will be retained (even after one or more of the faders has reached its minimum or maximum position).

Moving the fader group with Option pressed changes all values in a linear fashion (the absolute value differences are maintained).

Moving the fader group with Shift-Option pressed changes all faders to the same value.

Sending Fader Values

You can use the *Options > Send All Fader Values* and ... > *Send Selected Fader Values* functions to make all fader Objects or all selected fader Objects send their current values. Use of this function in conjunction with Logic's Record/Pause mode allows you to record a "snapshot" of all current fader positions. This is especially useful for virtual mixing desks, or synthesizer panels. (*Send All Fader Values* only sends values for faders that are cabled to other Objects.) The *Song Settings > MIDI Options > Send All Fader Values after loading* option automatically sends all fader values after a song is loaded.

Resetting Fader Values

Options > Reset Selected Faders sets all selected faders to zero, and transmits this data.

Recording and Playback of Fader Movements

Recording Fader Movements

You don't need any special cabling to record the data generated by a fader. All data generated by faders is recorded on the selected track when Logic is in record or record/pause mode. The recorded events correspond to the out definitions of the faders.

Playing Back Fader Movements

Any fader will react to incoming events that match its In definition. The fader must, of course, be in the MIDI signal path. Typically, you accomplish this by cabling the track instrument into the fader. For automated mixing tasks, it is useful to create a new (standard) instrument for the sole purpose of fader automation. Ensure that the instrument (which might be named "playback") has no direct MIDI output, that its channel setting is All, and that it is connected to the first fader in any chain of serially-cabled faders.

Fader Styles

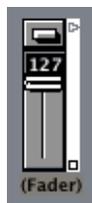
The fader's style is shown in the line under the icon. It can be changed by clicking on the current style name, and selecting the new style from the pop-up menu.

Remember that a fader's style does not usually affect its function—you can select the most convenient style for the desired use of the Object.

The following section provides notes on some of the fader styles:

Vertical/Mute

This is exactly like the Vertical 4 fader style, with an added mute switch. When you press the mute switch, the fader sends an event matching its Out definition with a value of 0. The fader's movements are not sent while the mute switch is on (down). The current fader value is sent when you turn the mute switch off (up).



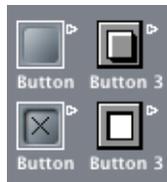
Numerical

You can double-click the numerical field of a numerical fader, and type in a new value. If you click and drag slowly on the numerical field, fader values will change in single step increments.



Buttons

Button style faders send only two possible values, corresponding to the minimum and maximum values of their range. When on (hollow or Xed in the illustration), the maximum value is sent. When off (filled or not Xed in the illustration) the minimum value is sent. If the minimum and maximum range parameters are set to the same value, the button sends this value each time it is clicked.



Text

Text faders function like Numerical faders, but can display text for each of the 128 possible MIDI values (0 to 127). Double-clicking on the surface of a text fader opens the text fader window.

Clicking on a position in this window will cause the corresponding fader value to be sent. (This is similar to selecting programs by name in the multi-instrument window). Double-click on a position in this window to type in the desired text. By default (when you create a text style fader), the text positions contain numerical values. You can use this feature to create numerical style faders with colored backgrounds.

Clipboard Functions

The pull-down menu located at the top right of the text fader window provides cut, copy, and paste Clipboard functions. You can use these facilities to transfer the entire list of names to a text editor (such as a marker text window in Logic), for more convenient editing. Note that empty lines (and lines that only contain spaces) are ignored. If you want to insert blank positions in the list, use Option-Space bar.

Behave as Menu

Check the *Behave as menu* box to make the text fader act like a pull-down menu. When this box is unchecked, the text fader acts like a scrolling menu.

Text Fader Range

A text fader only allows the entry of as many names defined by its range. To clarify, if you set a text style fader's range to 0, 1 you can only enter two values. You should always set the minimum necessary range for a text fader, as this saves memory. In any case, remember that the first name corresponds to the lowest value in the range (not necessarily 0) and the last name corresponds to the highest value (not necessarily 127).

If you force a text fader to a value outside its range (with MIDI input) it will display "---" for values below its range and "+++" for values above. The one exception is when the fader's range is 0, 1 in which case all values above 1 will display the name for value 1.

Fader Functions: MIDI Events

Each fader has an *In* and an *Out* definition. The *In* definition determines the types of MIDI events that can remote control the fader (the event types it reacts to). The *Out* definition determines the types of MIDI events the fader sends out. (A fader can, therefore, convert one type of MIDI event to another).



Most MIDI events consist of three bytes. The first byte indicates the type and channel of the MIDI event (a note on channel 3, for example). The second byte indicates the first data value (the pitch of a note event, for example) and the third byte indicates the second data value (the velocity of a note event, for example). A few MIDI events only use two bytes (program change and aftertouch). Some, such as faders (and transformers) always provide for 3 bytes, with the second byte being discarded for these special, 2-byte messages.

Fader parameters are provided for setting the message type, MIDI channel and the first data value. Note that the message type and MIDI channel are actually combined in the resulting MIDI event. The second data value is determined by the fader setting, or in the case of remote control, by the incoming MIDI event.

Here are the *In* and *Out* definition parameters:

Out (or *In*): defines the event type (use the pull-down menu shown in the diagram).

Channel (1 to 16): defines the MIDI channel of the event.

-1- (0 to 127): defines the first data byte of the event. In some cases, such as pitch bend, this is an actual data value. In other cases (MIDI controllers), this indicates the controller type (volume, pan, and so on, as examples). In other cases, such as aftertouch, this byte is unused.

Here is the meaning of the -1- parameter and fader position for each of the *In* and *Out* definition choices:

Note On

The -1- parameter sets the pitch, and the fader position sets the velocity. This is most useful as an *In* definition—for trapping specific notes and converting them to other MIDI events, or simply monitoring their velocity. If you move a fader with an *Out* definition set to Note On, a note-off MIDI event will immediately follow the note-on. This might be useful for creating onscreen drum pads from button style faders, for example.

P-Press

The -1- parameter sets the pitch, and the fader position sets the amount of Poly Pressure (key pressure or polyphonic aftertouch).

Control

The -1- parameter sets the MIDI controller number (the controller type), and the fader position sets the controller value. The controller type can actually be selected by name, via the pull-down menu that appears when you click-hold on the -1- parameter.

Program Change

The -1- parameter is ignored. (In earlier versions of Logic, this sets the program bank.) The fader position determines the program number.

C-Press

The -1- parameter is ignored. The fader position sets the channel pressure (monophonic aftertouch) amount.

PitchBd

The -1- parameter sets the pitch bend LSB, and the fader position sets the MSB. Typically, you would set the -1- parameter to 0, and use the fader to control the “coarse” pitch bend amount. A -1- setting of 0, and a fader position of 64 results in no pitch bend.

SysEx (see “Overview” on page 256) and Switcher/Meta are special functions of the faders.

Fader Functions: Range, Val as

Range

The range parameter contains two numbers—the left one sets the lowest possible fader value, and the right one sets the highest. Note that these limits can be exceeded by MIDI remote control. When the fader style is a button, the range determines the in and out position values of the button.

For text style faders, the first name always corresponds to the low end of the range, and subsequent names correspond to incremental range values, up to the top range. The number of names that can be entered into the window is limited by the range.

Val as

This parameter determines the way that numerical values are displayed by the fader:

Num

The fader value is displayed directly as a number (0 to 127).

Pan

Fader value 64 is displayed as “0”; smaller values appear as negative numbers and larger values as positive numbers (–64 to 63).

Hz, Oct, dB, ms

These display formats are tailored to various DSP functions.

bpm

An offset of 50 is added to the fader value. This displays the correct tempo settings for the special tempo control fader.

If none of the above formats is suitable, consider using a text style fader, and entering the desired display values as text. Examples include percentages, note names and program names.

Fader Functions: Filter

This parameter provides various filter options for MIDI events:

off

All incoming MIDI events are allowed to pass through. All events that match the input definition are converted, in accordance with the output definition.

Other

All MIDI events that do not correspond to the input definition are filtered. All events that match the input definition are converted in accordance with the output definition, and allowed to pass through.

Match

All MIDI events that match the input definition are filtered, all others are allowed to pass.

All

All incoming MIDI events are filtered.

Thru

All MIDI events coming from the physical input Object are filtered. This is the same as turning off all events coming from Logic (from Regions or the Environment).

Use this filter mode to prevent MIDI feedback, by blocking incoming MIDI events from being sent back out.

Shot

When the fader is moved with the mouse, only the final value (the value when the mouse button is released) is sent.

14 Bit

Used in conjunction with pitch bend, this allows 2-byte (fine tuning) pitch bend events. Used with controller messages, this causes the fader to send two MIDI controller messages—one for the MSB and one for the LSB.

For the 14 Bit setting to work, the fader's In and Out definitions must be the same. For controllers, the MSB uses the In definition controller number, and the LSB uses the controller number 32 higher. This conforms to the MIDI standard for sending 14-bit controller data.

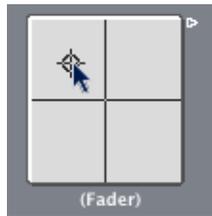
Note that with this filter setting, the fader's range maximum can be set to 16,383, and a fader value of 8192 represents no pitch bend.

Feedback

When the Feedback parameter is unchecked, the fader will automatically prevent feedback loops resulting from circular cabling (the fader remembers when a specific MIDI event has passed through it and will not allow it to pass through again). In some instances, you may want to allow this feedback—to allow a MIDI event to change a cable switcher's position after it has passed through the switch, for example. Checking the *Feedback* checkbox will allow this.

Vector Fader

Vector faders function like joysticks—they can be moved in two dimensions: up/down and right/left. Each dimension generates its own MIDI events, so each time you change the position of the crosshair with the mouse, two MIDI events are sent.



Most faders have *In* and *Out* definitions (see “Fader Functions: Range, Val as” on page 251) which determine the MIDI events sent by the fader (*Out*), and those it reacts to (*In*). The vector style fader replaces these with *Vert* and *Horz* definitions, which determine the MIDI events that correspond to vertical and horizontal motion. If you cable corresponding MIDI events into the vector fader, its crosshair display will update accordingly.

4-Channel vector mode

If you set a vector fader’s *Vert* and *Horz* definitions to the same MIDI event (the same MIDI controller and channel), the vector fader will send out four MIDI events each time the crosshair is moved. These will be the same MIDI event (a controller, for example), sent on four consecutive MIDI channels, starting with the channel set in the *Vert* definition.

The values of these MIDI events corresponds to the proximity of the crosshair to the vector fader’s four corners—upper-left for the lowest channel then upper-right, lower-left and lower-right respectively for the ensuing three channels. In the center, all channels receive a value of 32. At the corners, the corresponding channel receives a value of 127 and all remaining channels receive a value of 0. This is with the default range of 0 to 127. If you alter the range, the center and corners will behave differently but mysteriously, the four values will always add up to 125.

Special Faders Overview

Switchers, Alias Assigners and Meta Faders

These are two types of faders that do not generate MIDI events. They share the same Out definition type—namely, the one at the top of the definition menu. This selection will display either: “Switch” (see “Cable Switchers” on page 254) or “Meta,” depending on the current -1- value setting:

- If the -1- value is 48, the fader will be a cable switcher
- If the -1- value is 46, the fader will be an alias assigner (see “Meta Event Faders” on page 255).
- If the -1- value is any other value, the fader will send out meta messages (see “Meta Event Faders” on page 255) of a type that corresponds to the -1- value.

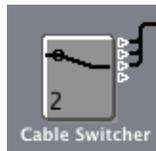
To create a cable switcher, either select *New > Fader > Specials > Cable Switcher* or change an existing fader’s Out definition to Switch/Meta, and set its -1- value to 48.

To create an alias assigner, either select *New > Fader > Specials > Alias Assigner* or change an existing fader’s Out definition to Switch/Meta, and set its -1- value to 46.

To create a Meta type fader, either select it from the *New > Fader > Specials* menu, or change an existing fader’s Out definition to Switch/Meta, and set its -1- value to the desired meta event number.

Cable Switchers

Cable switchers route events, rather than generating them. Any kind of MIDI or meta event can be routed by a cable switcher. The only exception are events that match the cable switcher’s In definition. These events will change the switch position (the routing), rather than passing through the cable switcher.



A cable switcher can be assigned to any fader style. It is practical to use the text fader style, as it allows you to label the switcher’s various routes. Use the Auto-style to actually display the switch routing, as shown here.

A cable switcher can have up to 128 separate outlets—a new outlet is generated each time an existing output is cabled to another Object. You can click on an auto-style cable switcher to step through the outlets (including the last, uncabled one). Incoming events that match the cable switcher’s In definition will change the switch position to that of the incoming data value. (If the data value is greater than the number of switch positions, the last, uncabled outlet will be selected).

Data values of 126 and 127 have a special effect:

- An event with a value of 127 increases the output number. If you're on the switcher's last output when this event is received, you'll jump back to the first output. This is just like clicking on the fader.
- An event with a value of 126 decreases the output number. If you're on the switcher's first output when this event is received, you'll jump forward to the last output.

Meta Event Faders

Meta faders generate special events called meta events, which are used to control certain Logic functions, but have no MIDI meaning, and are never sent to the MIDI output.

In some cases (such as *Goto Screenset*, *Goto Song* and so on), you do not need to cable meta faders into another Object for them to work. Even in these cases, you can use cabling to process meta events in the Environment, and therefore alter their effect. In the majority of cases (*Set fader range minimum*, *Bang!*, *Set Transformer Operation Minimum* and so on) the meta fader must be cabled to the Object being affected.

Here's a quick summary of the currently implemented meta events that can be generated by faders:

Meta Event	Controlled Logic function
46	Assign Alias
49	Goto Screenset
50	Goto Song
51	Goto marker
52	Stop playback
96	Set fader range minimum
97	Set fader range maximum
98	Set the fader value without sending.
99	Bang! Causes the fader to re-send its current value. The bang data value can be used to make the fader to increment-without-rollover (127), decrement-without-rollover (125), increment-with-rollover (123) or decrement-with-rollover (121). Use values one less than those shown, to have the bang passed through to all connected faders.
100	Tempo Control (see "Real Time Tempo Fader" on page 603)
122	Set transformer map value for the currently selected map position.
123	Select transformer map position.
124	Set transformer condition maximum (bottom) parameter, if any. (This applies to all conditions not set to All).
125	Set transformer condition minimum (top) parameter, if any. (This applies to all conditions not set to All).

Meta Event	Controlled Logic function
126	Set transformer operation maximum (bottom) parameter, if any. (This applies to all operations not set to Thru).
127	Set transformer operation minimum (top) parameter, if any. (This applies to all operations not set to Thru).

For more on Meta events 124 to 127, read the section on Remote Controlling the Condition and Operation Values (see “Transformer Object” on page 224).

Goto Marker /Screen Set/Song

Selecting *New > Fader > Special > Goto Marker* creates a fader which allows you to enter a marker number (Meta event 51); the SPL then moves instantly to the marker of that number. Markers are numbered sequentially, throughout the song, even if you have renamed them (from the default numbers assigned when each marker was created).

Selecting *New > Fader > Special > Goto Screenset* creates a Screenset fader (Meta event 49), allowing you to switch to the Screenset number chosen with the fader.

Meta event 50 has no effect within Logic, but you can use it to switch between songs on an external hardware sequencer.

Meta event 52 allows you to interrupt playback at any position.

To make the most efficient use of these faders, we recommend that you limit the value range to suit your particular circumstances. As an example, to limit the faders to the number of Screensets, songs, or markers you’re actually using.

SysEx Faders

Overview

The SysEx fader type (the last selection on the fader definition menu) is slightly different than the other fader types. It allows you to create a list of MIDI events that will be sent whenever the fader is moved or remote controlled. You can enter the messages to be sent in a window that resembles Logic’s Event editor, except that time positions serve only to control the order in which the events in the list are sent—they are not sent at specific times, or with any delay between them.

The SysEx fader type was originally intended for sending MIDI System Exclusive (SysEx) messages—messages that are exclusive to individual manufacturers’ MIDI devices. There are a number of built in features in the SysEx fader’s window (see below) that facilitate the creation of SysEx messages. SysEx faders can be used for any kind of MIDI event, and are therefore very handy for sending ordered batches of messages, such as mixer or control panel snapshots—with one click of the mouse.

You can also specify SysEx as an In definition, but this has limited usefulness because the incoming message (presumably SysEx) must be very short, in order to be recognized. This is a side-effect of the fact that SysEx messages can be of any length, and Logic must break them into small packets to avoid interrupting other MIDI activities.

Opening the Fader Event Editor window

When you set a fader's *Out* or *In* definition to SysEx, its event list window opens up. You can also open this window at any time by double-clicking on the word *SysEx* in the fader's Parameter box.

An important thing to remember about the SysEx fader is that only events that are selected when the event list window is closed will have their value altered by the fader value. Events that are not selected will be sent exactly as they appear in the window.

Selected events will have the value shown in the Val column of the list altered, if they are normal MIDI events (controllers, program change, aftertouch, and so on). For SysEx messages, you can set both; which byte(s) are altered, and the format (MSB/LSB, BCD, nibbles, and so on) that the value will take. You can also specify a checksum format, if necessary.

Creating a SysEx Message

There are two ways of entering SysEx messages in the SysEx fader's event list. One way is to have the fader "learn" the sysex string. To do this, you manually send the corresponding SysEx message from your synthesizer, using its onboard controls.

- If you haven't already done so, connect the MIDI output of the synthesizer to the MIDI input of your computer.
- Click the MIDI In button at the top left of the SysEx event list. If the button is red, this means it is ready to receive incoming MIDI data.



- Alter the parameter on your device. The corresponding SysEx message will be displayed and the MIDI In button will switch off automatically.

Another way is to type the sysex string into the event list. (Consult your MIDI device manual for SysEx documentation). Use of this method qualifies you as a confirmed MIDI freak. Here's how you go about it:

- Command-click the SysEx button. A generic SysEx message appears.



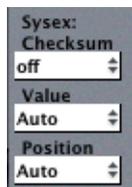
- The first data byte in the top line (directly after the word SysEx in the “NUM” column) is the manufacturer’s ID. This may be several data bytes long (as there are more than 128 manufacturers of MIDI devices).
- The manufacturer’s ID is usually followed by a device type ID, an individual device ID, a data type ID (which could be several bytes) and, if necessary, the number of the multi-timbral sub channel, the identification number(s) of the sound parameters plus the value of the sound parameter. There are no uniform “standards” that apply here.
- Data bytes are normally input as decimal numbers. To enter them in hex, place a “\$” in front of values when you type them in. *View > SysEx in Hex Format* allows you to see all values in hexadecimal.
- The last data byte (the “EOX” indicating the end of the SysEx message) is entered automatically by Logic. The number of data bytes in the SysEx message can be decreased or increased by clicking one of the two arrows before and after the word “<EOX>”.

Although you can have any number of messages (of any kind) in the SysEx fader’s event list there is only one fader value, and all selected messages will adopt this value.

You can use a similar method to create any kind of MIDI or meta event in the SysEx fader window. Command-clicking any of the eight event type buttons (note, program number, pitch bend, controller, channel pressure, poly pressure, SysEx, and meta event) creates a new event of that type. Meta events can be created by using the expanded view button—featuring the 0’s and 1’s on it’s face.

Setting the SysEx Data format

The terms “SUM” for the checksum and “VAL” for the fader value being sent are displayed within the SysEx string. The position and format of these bytes are set from the “Checksum,” “Value” and “Position” pull-down menus. These settings may be found in the lower left-hand corner of the fader event list.



Only selected SysEx events are affected by the above parameters, because only these events are affected by the fader value.

Checksum format

A checksum can be created in any of the following formats:

- Roland
- Yamaha
- Regular Checksum

- 2's complement
- 1's complement

If you don't know which one works with your MIDI device, try "off" (= no checksum) first or "2's complement".

Value byte position

Position allows you to determine the position of the value byte. This position is specified in bytes, counted from the end of the message: "last" refers to the position directly before the EOX byte, "Last-1" indicates the byte before that, and so on.

Auto ensures that the value byte is inserted at the last position in the SysEx string if no checksum was selected, or—if a checksum value was entered—that the value is inserted as the second to last byte.

Value byte format

header 1: value option	Result
Auto	The value is sent as one byte if the value range maximum is 127 or less. If the maximum is higher than 127, the value is sent as two bytes, the MSB (most significant byte) first.
One Byte	The value is sent as one byte.
MSB/LSB	The value is sent in two bytes, with the MSB (most significant byte) first.
LSB/MSB	The value is sent in two bytes, with the LSB (least significant byte) first.
BCD 4 LSB	The value is sent as "Binary Coded Decimal" in four bytes, in the order 1, 10, 100, 1000.
BCD 4 MSB	The value is sent as "Binary Coded Decimal" in four bytes, in the order 1000, 100, 10, 1.
2 Nibbles L	The value is sent in two nibbles, with the "least significant nibble" first.
3 Nibbles L	The value is sent in three nibbles, with the "least significant nibble" first.
4 Nibbles L	The value is sent in four nibbles, with the "least significant nibble" first.
2 Nibbles M	The value is sent in two nibbles, with the "most significant nibble" first.
3 Nibbles M	The value is sent in three nibbles, with the "most significant nibble" first.
4 Nibbles M	The value is sent in four nibbles, with the "most significant nibble" first.
2 ASCII M	The value is sent in two nibbles, the "most significant nibble" first; the nibbles are sent in ASCII format for the hex value. As an example, the value \$7F (=127 in decimal) will be transmitted as a "7" and "F".
3 ASCII M	same as 2 ASCII M, but in 3 nibbles.
4 ASCII M	same as 2 ASCII M, but in 4 nibbles.

The unused bits of the transfer in nibbles (X in OXXXNXXX) are sent with the information at the relevant positions of the SysEx strings. If you want to transfer these deleted bits, you will need to enter zeros in the SysEx string.

Environment Exchange

Overview

One of the main reasons for the Environment is to customize Logic to your MIDI studio. This can present a problem when sharing songs with other musicians, or using different studio setups. It also presents a problem when you return to older songs after you've changed your studio. Logic offers several functions to make these transitions as easy as possible.

Whenever you want to exchange Environments between songs, there is a source song containing the desired Environment, and a destination song with an Environment that you want to change. The destination Environment must be in memory, and must be the active song (one of its windows must be active). The source song can also be in memory or it can be a file on your hard drive (or any other media such as CD, Zip, and so on).

If there are two songs in memory, Logic will assume the active song is the destination, and the other song is the source. If there are more than two songs in memory, Logic will assume the active song is the destination and the most recently active of the other songs is the source. If there is only one song in memory, Logic will present an Open dialog, allowing you to select the source song when importing an Environment.

Importing, Replacing, Swapping Environments

Importing Single-purpose Environments

A single-purpose Environment patch might be an editor for a specific piece of MIDI equipment, an Environment for a single MIDI processing task such as a MIDI LFO, or a complex arpeggiator/delay line configuration. If the Environment patch is contained on a single layer, the simplest solution is to select *Options > Import Environment > Layer*, and then select the desired layer in the dialog that appears. This layer and all of its Objects will be inserted in the destination song, at the same layer position (the same place in the Layer pop-up menu) as it occupied in the source song. Note that this inserts a new layer into the destination song—its original layers will be shifted as needed.

You can also move selections of Environment Objects (inclusive of cabling) between songs by dragging or copy and pasting. This is made even simpler by first combining the Objects into a macro.

If the Environment patch you wish to import is complex and spread across several Environment layers, you should use the merge feature (*Options > Import Environment > Merge*). In this scenario, all Environment Objects from the source song will be added to the Environment of the destination song. One thing to watch out for here is that merged Objects will be placed on the same layer as their source, which can create a mess if Objects already occupy that layer in the destination song. To avoid this issue, create blank layers (in the destination song) at the same layer positions of the source song, before importing.

Something to be careful of in both cases, is the treatment of unique Objects in the Environment, including the physical input and sequencer input Objects. If you import these Objects, they will replace their counterparts in the destination Environment *and any cables leading into them will be lost*. It is best to temporarily delete these from the source Environment, before importing.

Another thing to be aware of is that when you import an Object, all Objects cabled from the imported Object are also imported.

Replacing an Older Environment with a Current One

If you have only added things to the Environment, but not deleted anything, you can update older songs by choosing *Options > Import Environment > Update*. Only the new Objects will be imported—the older Objects (along with their cabling and track assignments) will remain in place.

Swapping Environments

In the complex situation where you want to swap the Environment of one MIDI setup with the Environment of another, Logic offers three options: *Replace by Port MIDI/Channel*, *Replace by Name* and *Total Replace*. Be aware that this complex task involves a lot of guess work on Logic's part, and the results almost always require some manual fine tuning on your part.

Replace by Port/MIDI Channel

This option replaces all Objects in the destination song with Objects that address the same port and MIDI channel in the source song.

Replace by Name

This option replaces all Objects in the destination song with Objects of the same name in the source song. This affords you some degree of control, by renaming Objects in the source song accordingly.

Total Replace

This completely replaces the destination song's Environment with the source song's Environment. If you use this option, you'll have plenty of work to do, including reassigning Objects to Arrange window tracks, but sometimes it's the only way!

Replacement by Assignment

The most flexible (and most time consuming) method of exchanging Environments is to indicate whether each Environment Object is kept, deleted, or replaced. If you choose to replace an Object, you must also define the replacement Object. This method is accessed via *Options > Import Environment > Custom*.

When you select custom import, an Environment window listing all Objects in the destination Environment is shown in a column on the left, and the chosen action for each Object is shown in a column on the right.

You can assign the replacements one at a time, by clicking on items in the right hand list and selecting the desired replacement Object from a pop-up menu. This menu includes all Objects in the Instrument List of the source song.

Alternately, you can select one or more rows in the list, and make a choice from the Import menu. In addition to *keep* and *delete*, this menu offers several automated selection techniques, as described below.

The first Import menu option is *Import Environment using current Assignment*. No importing can take place until you make this selection. The other choices (including the pop-menus in the right column) determine how things will be imported.

Import Options

The last two items on the Import menu provide additional options for the import process:

Import > Copy Layer Names: the layer names of the second Environment are transferred to the current one.

Import > Copy selected Objects from 2nd Environment: all Objects selected in the source Environment are copied into the destination Environment, even if they don't appear on the assignment list.

Automatic Assignment Functions

The assignment functions described below are immediately applied to all selected rows in the import list. The assignments appear in the right column, and all rows are then deselected.

Import > Assign as 'Keep' these Objects are unaltered.

Import > Assign as 'Delete': these Objects are deleted.

Import > Assign by Identical: these Objects are assigned to Objects from the source song that match the type, icon, name, port, and MIDI channel. Objects with the same Unique ID have priority.

Logic maintains an internal list of all Environment Objects. When Objects are deleted, their position in this list becomes available for a new Object. Whenever an Object is added to the Environment, it is placed in the first available position on the list. (If there are no empty positions, it is added to the end of the list). An Object's position in the list is its Unique ID—as long as the Object is not deleted, its Unique ID never changes.

Import > Assign by Unique ID: Objects are assigned to Objects from the source song with the same Unique ID. (This option is useful for updating an Environment when Objects have only been added).

Import > Assign by Port/MIDI Channel: Objects are replaced by Objects with the same port/MIDI channel. If a match can't be found for an Object, an Object set to port 0 and the same MIDI channel is assigned. If a match still can't be found, an Object with the same MIDI channel is assigned.

Import > Assign by Name: Objects are replaced by Objects with the most similar name. (At least 80% of the name must be the same).

Import > Assign by Icon/Name: same as above except the Objects' icons must also be the same.

Logic provides you with different Mixer windows, designed to make mixing a painless and intuitive process.

Logic's two major Mixer windows—the Audio Mixer and the Track Mixer—are the topic of this chapter. We will first have a close look at the specific characteristics of the Audio Mixer. Before we move on to the Track Mixer, we will provide you with detailed information on Audio Objects, which are the building blocks of the Audio and Track Mixers. Finally, you'll get in touch with all of the Track Mixer's special features. We'll also have a look at MIDI channel strips, which are displayed right alongside audio tracks in the Track Mixer.

If you compare both Mixer windows, you can see that they look quite similar. There are, however, some differences in the Parameters area: The Audio Mixer is a layer of the Environment and therefore offers not only the Layers menu, but also the appropriate Object Parameter box. In the Parameters area of the Track Mixer, you can see several Filter buttons, labeled *Global*, *MIDI*, *Input*, *Track*, *Inst*, *Aux*, *Bus*, and *Output*. These Filter buttons make the Track Mixer a very convenient tool for mixing, as they allow you to limit the display to the tracks you're interested in.

Another obvious difference between the two Mixer windows is that the Audio Mixer consists solely of Audio Objects; you will not find any MIDI channel strips in it. The Track Mixer displays MIDI tracks beside audio tracks, allowing you to mix all song tracks in one window.

Audio Mixer

The Audio Mixer is one of the Environment layers in the default song (the template loaded by Logic after launching). To open it, select *Audio > Audio Mixer*, or go to the Environment (*Windows > Environment* or Command-8), and choose *Audio* from the Layer menu.

Note: If you press Option while opening a Mixer window, the Mixers will appear as float windows.

The specification and size of the Audio Mixer depends on the hardware used; it configures itself when you start Logic, or create a new song. The Environment's Audio Object is the "building block" of the Audio Mixer. All Audio Objects used in your current song are shown in the Audio Mixer. If plug-ins and auxiliary sends are included, the size of the Mixer increases automatically.

Setting up your Audio Mixer

The Audio Mixer provides you with various functions that allow you to build your virtual Audio Mixer with all required components. The following Audio Object types can be used for this purpose:

- *Track*—Recording and Playback
- *Input*—Controls the Input Signal
- *Instrument*—Virtual Software Instruments
- *Output*—Controls the Output Signal
- *Bus*—Routing and Effects
- *Master*—Overall Control of the Mixer's output signals
- *Aux*—Auxiliary Object

To create an Audio Object:

- 1 Select *New > Audio Object* in the Environment's local menu.
- 2 Double-click the newly-created Audio Object icon, to make the channel strip appear.
- 3 Now go to the Audio Object's Parameter box, and set its Channel parameter to the desired Audio Object type.



Note: If you're running more than one HDR (Hard Disk Recording) system, you may select which system the Object will control in the *Device* parameter of the Object Parameter box. Its exact appearance and functionality will vary, according to the hard disk recording hardware that the Audio Object represents.

To delete an Audio Object:

- 1 Select the Audio Object by clicking on its upper edge, or on its name.
- 2 Press Backspace. This sets the level of the track controlled by this Object to zero. If a duplicate of the Object being erased exists, it will remain in place, and its level will not be set to zero.

Connections

The signal within the various Audio Objects requires no cabling, or any kind of manual connection. The signal is routed via the corresponding slots in the Audio Object. As an example: the Send slots connect a Track or Instrument Object to the Bus Object; the Output slot connects the various Objects to an Output Object. Logic's virtual audio mixer resembles the routing and connection options of traditional mixing consoles.

Object Parameter Box

If the Parameter column is visible (select *View > Parameters* if it's not), a box will display the parameters of the selected Audio Object. Clicking on the triangle at the top of this box (next to the name) conceals/reveals its contents.



The name in the uppermost line of this box can be changed by clicking on it. This will also change the name displayed below the Object itself, and in the Arrange window (if no Track Name is specified). The check box to the left of the icon indicates whether or not the Audio Object will appear in the instrument selection menu of the Arrange window track list. You can change the icon via a pull-down menu if you wish, although the default icon is usually suitable.

Device

The *Device parameter* selects the hard disk recording system that the Audio Object is connected to. The default setting will be for one of the hard disk recording hardware units installed on your system; entries referring to hardware not connected to your system are “grayed out” (see “Audio Drivers” on page 377).

Channel

The *Channel parameter* determines the type and channel of the signal controlled by an Audio Object.

The various options are:

- Track (see “Track Object” on page 295)
- Input (see “Input Object” on page 297)
- Instrument (see “Audio Instrument Object” on page 298)
- Bus (see “Bus Objects” on page 302)
- Output (see “Output Objects” on page 301)
- Master (see “Master Object” on page 304)
- Aux (see “Auxiliary Object” on page 303)

Note: Stereo Inputs and Outputs are available as separate menu items.

When you select Audio Object types, you'll notice the following text styles are used:

- *Outline*: This indicates that the Object is not available. This happens when a song was produced on a system with more tracks than yours (track 9 on an 8-track system, for example).
- *Normal*: This is used for Objects that haven't been defined in the Environment, and are therefore not in use.
- *Bold*: Objects in bold have been defined in the Environment, and are in use.
- ****: The Object is unavailable as it already exists in its stereo form.

MIDI Channel

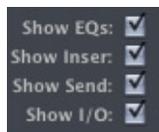
The *MIDI Channel* parameter determines the MIDI channel that the Audio Object will respond to. You can control the Audio Object remotely, using MIDI controller information.

This also works the other way around. Once a MIDI channel number is set, you can generate controller information on this MIDI channel, by moving the sliders and knobs of the Audio Object itself.

When the Channel parameter is set, the MIDI channel is automatically set to the same number, as this usually makes things easier to remember. For channels above 16, 16 is subtracted from the track number, so that a Channel setting of 17 will default to MIDI channel 1, Channel 18 to MIDI channel 2, and so forth.

Changing the Audio Object Display

If you want to reduce the length of a channel strip, you can hide individual components, such as the inserts, or the I/O routing. You are not actually switching the functions off, but rather changing the way the Audio Object is displayed.



To change the Audio Object display:

- 1 Select (by Shift-clicking, or rubber banding) all Audio Objects that you want to change.
- 2 Switch off/on any of the following options in the Parameter box to the left:
 - Show EQs
 - Show Inserts
 - Show Sends
 - Show I/O

Keep in mind that some types of Objects (such as Outputs or Busses) do not have all of these components. Their size is adapted to fit the Track Objects.

Note: You can construct your own audio mixing desks, on different layers, each with different display options. Thus, you can adapt the mixing desks to fit within your Screensets. You might create a layer where all Objects only show the level and pan controls as part of a Screenset that also displays an Arrange window, used for basic tracking. On another layer, you might create a mixer that shows all controls, for use during mixdown.

Audio Objects in the Audio and Track Mixer

Audio Objects are the building blocks of the Audio Mixer, and an important part of the Track Mixer. In the following section, you will learn about the differences between Audio Object types and how you can use them.

Multiple Selection of Audio Objects

Logic allows multiple Audio Object faders to be selected (by Shift-clicking) in the Track Mixer and Audio Mixer. The class (Instrument, Audio, Bus, Aux, and so on) of the channel doesn't matter.

To deselect multiple channels, click on any *unselected* channel. You can also select a previously unselected track in the Arrange window.

Once selected, all channels behave as a temporary “group”, allowing you to quickly adjust a number of settings on all selected faders by performing an operation on one of the grouped faders. To adjust the listed parameters on all selected channels, follow these instructions:

- *Volume:* Simply drag the Volume slider on any selected channel. All volume changes are relative and logarithmic.
- *Pan:* Drag the Pan knob on any selected channel. All pan changes are relative.
- *Mute:* Click the Mute button on any selected channel. The Mute buttons of all selected channels will switch to the new mode.
- *Solo:* Click the Solo button on any selected channel. The Solo buttons of all selected channels will switch to the new mode.
- *Record Enable:* Click the Record enable button on any selected channel. The Record Enable buttons of all selected channels will switch to the new mode (note that only channels with different input sources can be record enabled simultaneously).
- *Send Level:* Drag the Send level knob on any selected channel. All Send level knobs of the corresponding Send slots change accordingly (relative changes).
- *Send Destination:* Click-hold on any of the selected channel's Send slot(s), and make your selection from the list. The corresponding Send slots of all selected channels will be routed to the chosen destination.
- *Inserts:* Click-hold on any of the selected channel's Insert slot(s), and make your selection from the list. The selected effect will be inserted into the corresponding Insert slot on all selected channels.

- *Input:* Click-hold on any selected channel's Input slot, and make your selection from the list. All selected channels will receive their signal from the chosen input(s).
- *Output:* Click-hold on any selected channel's Output slot, and make your selection from the list. All selected channels will be routed to the chosen output (pair).
- *Automation Mode:* Click-hold any selected channel's Automation mode pop-up menu, and make your selection from the list. All selected channels will be switched to the chosen Automation mode.
- *Group Assignment:* Click-hold any selected channel's Group display, and make your selection from the list. All selected channels will be assigned to the chosen Group.

Important: You can only perform the multi-channel *Send* and *Insert* options if no active *Send* or *Insert* is in the slot on *any* selected channel. In other words, ensure that all selected channels have an unused *Send 3*, or *Insert slot 4*, for example, before using this facility.

Note: Clicking a fader or knob while holding *Option* resets the value to a neutral value: *Option*-clicking a volume fader sets it to 0 dB (90, if the *Value As* menu in the Object Parameter box is set to the *Num* option), *Option*-clicking a pan pot sets it to the center position, *Option*-clicking a send pot sets it to 0 dB (90).

Elements of the Audio Object

Here is an overview of all Audio Object elements. The list shows what elements are available in the different types of Audio Objects.



Element	Audio Object
Channel EQ	Track, Instrument, Input, Bus, Aux, Output
Inserts	Track, Input, Instrument, Output, Bus, Aux
Sends	Track, Input, Instrument, Aux
Input	Track, Instrument, Aux
Output	Track, Input, Instrument, Bus, Aux
Group	Track, Input, Instrument, Bus, Aux, Output, Master
Automation	Track, Input, Instrument, Output, Bus, Aux, Master
Pan/Balance Control	Track, Input, Instrument, Output, Bus, Aux
Levelmeter	Track, Input, Instrument, Output, Bus, Aux
Headroom/Clip Indicator	Track, Input, Instrument, Output, Bus, Aux
Volume Control	Track, Input, Instrument, Output, Bus, Master, Aux
Mute	Track, Input, Instrument, Output, Bus, Aux, Master
Solo	Track, Input, Instrument, Aux, Bus
Mono-Stereo	Track, Input, Output, Aux, Bus
Track Arm	Track
Bounce	Output

Channel EQ

The Channel EQ is inserted into the first available Insert slot by double-clicking the EQ area on the upper portion of mixer channel strips. This area will change to a thumbnail view of the Channel EQ display. The thumbnails provide an overview of the EQ settings used in each individual channel.

Option-double-clicking will insert the EQ as the first plug-in, and move all existing plug-ins of this channel one slot down (and redirecting their automation data accordingly, if necessary).



Alternately, you can insert the Channel EQ in any desired slot as per other plug-ins. You'll find it in the EQ section of the plug-in list. This is the only way to insert multiple Channel EQs. It should be noted that only the first (topmost) Channel EQ can be displayed as a thumbnail.

More information about the parameters of the Channel EQ can be found in the *Logic Pro 7 Plug-In Reference*.

Inserts

If you have enough processing capacity, you can use up to 15 Inserts per Audio Object. An extra blank Insert is created, as soon as all of the currently displayed insert slots are used, up to the maximum allowed.



The Insert pull-down menu displays all available Logic plug-ins, as well as all correctly installed Audio Units plug-ins.

Note: Shift-double-clicking on a used (active) Insert slot will open the Plug-in window as a non-float window. Clicking on the minimize button at the top left of the window will place the Plug-in window on the Dock. It can be restored by clicking on the Dock icon.

Channel Strip Settings Menu

If you click on the word Insert on any channel strip, the Channel Strip Settings menu opens. This menu allows you to load and save the entire routing configuration of a single channel strip, including all loaded plug-ins and settings.

The ability to save an entire routing configuration can be used in a number of ways, such as:

- Setting up and storing complex multi-effect configurations—on any type of channel.
- Similarly, the configuration of a particular routing configuration for use with multi-output software instruments.
- Copying a routing or effect configuration between Projects.
- The rapid creation of new Templates.

The Channel Strip menu offers the following items:

- Next/Previous Channel Strip Setting: Loads the next or previous Channel Strip Setting in the list.
- Copy/Paste Channel Strip Setting: Allows to you to copy and paste Channel Strip Settings between channels or Projects.
- Save Channel Strip Setting as: Saves the Channel Strip Setting, and allows you to name it.
- Once you have created one or more Channel Strip Settings, a list of settings will be shown below the menu functions. The active Channel Strip Setting is denoted by a bullet.

As there are obviously different classes of Audio Objects, a number of sub-folders (Audio, Instrument, Aux, and so on) are automatically created in the /Applications/Logic/Channel Strip Settings folder when you first save a Channel Strip Setting. Channel Strip Settings are identified by the “cst” file extension.

Important: Please do not attempt to change the Channel Strip Settings folder structure.

Note: Further information about Inserts and the use of plug-ins can be found in the first part of the Plug-In Reference.

Sends

The Sends allow you to send a portion of the Audio Object signal into an internal Bus or Auxiliary Object. The Sends connect the Track Object with a Bus Object or Auxiliary Object. No cabling is required for this or any other connection within the Audio Mixer.



Note: The Send routing options available vary, depending on the hardware you are using.

To create a Send:

- 1 Click on an empty Send slot and select one of the possible send destinations, using the pull-down menu that appears.
- 2 When you have selected the Send destination, you can regulate the amount of signal supplied by using the Send Amount control *knob*. As you are adjusting the level, the relevant value appears in the Send slot. You may assign up to 64 sends per track.

To remove a Send:

- Open the pull-down menu of an active Send slot, and select *No Send*.

To normalize the Send level:

- You can reset a Send to 0 dB (90) by Option-clicking on its Send Amount knob.

To bypass a Send:

- You can switch a Send to Bypass mode by Option-clicking on its Send slot. If a Send is active, its name will be blue. If a Send is switched off, its name is gray (bypass mode).

Post and Pre Fader Aux Sends

Sends in analog mixers are positioned either before (“pre”) or after (“post”) the fader. To select one of these options in Logic, click-hold the Send slot. The Bus menu opens, and you may select either Post or Pre at the top of the list.

A post fader signal level, routed to the Send, changes along with volume fader movements. If you are using the Send to route a signal from the channel to a reverb, this means that the relationship between the original signal and the effect signal remains constant. When you pull the channel’s volume fader all the way down, the reverb disappears as well. This setting is generally the most useful, and is the default in Logic.

If a Send is set to be pre fader, the level of the signal routed to the Send remains constant, regardless of any volume fader movements on the source channel. The signal is still fed to the selected bus—even if the channel’s volume fader is completely pulled down. Pre fader sends are mainly used for monitoring tasks; headphone monitoring in the studio, or foldback monitoring on stage. Pre fader sends are also useful when you want to hear the effect signal in isolation (without the original signal). The equalizer still affects the sends in “pre fader” mode (pre fader, post EQ).

Stereo Sends

Logic allows you to assign the sends of mono tracks to stereo busses (or stereo outputs). It’s unnecessary to assign two sends to address a true stereo reverb plug-in.

Post Pan

Only applicable to TDM hardware: you can use the “Post Pan” option when using stereo sends on mono Objects. This divides the signal sent to the stereo send destination into left and right channels, in accordance with the pan knob setting. This might be useful if a reverb plug-in includes processing of the pan position. To avoid confusion with the Pre/Post fader modes, this option only appears when using stereo sends in mono Objects.

Double-click on Send

Double-clicking on a Send slot of any audio channel will “jump” to the allocated Bus channel fader, making navigation easier in the Mixer windows.

In/Output

Input Selection

The Input field allows you to select the desired audio input of your audio hardware. This input (or input pair) supplies an audio signal to the track when recording. If Monitoring is switched on, the signal of this audio input will be routed to the output (or bus) selected in the Output field, when the track is record enabled. The number of available inputs is determined by the audio hardware in use.



Note: The Input slot is used for the insertion of software instruments on Audio Instrument Objects, and is known as the “Instrument Slot” on these channels. Further information can be found in the first section of the Plug-In Reference manual.

Output Routing and Sub Groups (Busses)

The slot directly below the Input slot determines where the signal of the Audio Object (mixer channel) will be sent. The number of outputs that are available is determined by the audio hardware in use.

You can select between Output Objects and Bus Objects, which can function as mixer subgroups. If the Audio Object is stereo, the bus will also be stereo. If the bus is a stereo Object as well, the entire (Mixer) signal flow will be stereo—in each of the busses available in Logic, if this is desired.

Hold Option while selecting the inputs or outputs of a single channel to change all selected Audio Objects simultaneously. (See also “Multiple Selection of Audio Objects” on page 269.) Please note that inputs are only changed on (selected) Audio Objects of the same status: mono or stereo. This facility allows you to easily select a single input for all audio tracks.

Double-click on Output slot

Double-clicking on the Output slot on any audio channel will “jump” to the allocated Output channel fader, accelerating navigation in the Mixers.

Pan/Balance

Mono Objects feature a Pan control, which determines the position of a signal in the stereo image.

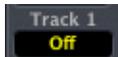


Stereo Objects, on the other hand, possess Balance controls. The Balance control differs from the Pan control in that the former controls the relative levels of two signals (L/R) at their outputs. The latter merely apportions one signal between two outputs.

Note: You can reset the Pan control to its centered (0) position with an Option-click.

Groups

The Group slot allows you to assign a channel strip to a Group.



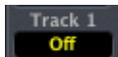
A Group combines multiple channel strips, linking some of their properties—their volume faders and Mute buttons, for example. If multiple audio tracks (with individual choir voices) are assigned to one Group, changing the volume of one choir track changes the volumes of all choir tracks. Individual level relationships—at the time the channels were assigned to the Group—are retained.

Groups can also link the selection of Objects in the Arrange window, thereby linking all edit operations you perform on grouped tracks.

Up to 32 Groups can be created. Each channel can be a member of multiple Groups.

Assigning a Channel to a Group

Clicking on the yellow Group display opens the Group pull-down menu, where one of the 32 Groups can be chosen, turned “off”, or the “Group Settings” dialog window can be launched.



Overlapping Groups

One channel can belong to more than one group. To assign an additional group to a channel, press Shift while choosing a Group via the Group pull-down menu.

Fast Assignment

Groups can be quickly set and cleared by holding Option-Control when clicking on the Group display. The last Group setting—including overlapping groups—will be applied to the current channel, without opening the pull-down menu.

Group Settings

The Group pull-down menu (of the Group display) also allows you to open the “Group Settings”. The following options can be set for each individual group, in the Group Setting dialog:

Enable

A group can be completely en/disabled with this option.

Name

You can name each group.

Arrange Selection (Edit)

Selecting a Region on one member track of a group selects the same horizontal range of all member tracks.

Arrange Track Zoom

Zooming an individual track of a group will zoom all members.

Arrange Track Hide

Hiding an individual track of a group will hide all members.

Arrange Track Record

Record enable/disable of an individual track in a group will record enable/disable all members.

Automation Mode

Changing the automation mode of an individual track in a group will change the automation mode for all members.

Instrument Color

Changing the color of one group member’s channel will assign this color to all group member channels.

Volume

Changing the volume fader of one group member’s channel will change the volume of all member channels—while maintaining the level relationships between them. Use a volume fader with a high initial setting, if possible.

Mute

The Mute status of all member channels is synchronized.

Pan

The panorama setting of all member channels is linked. As per volume, their initial relationships are maintained.

Send 1—8

You can link the Send levels individually for Sends 1—8. Different initial levels will be maintained.

Group Automation

Any Group member can act as a “master” for mix automation of an automated parameter such as volume. When an automation parameter value is written, the corresponding value of all other Group members is also written, depending on their Automation mode (*Touch* or *Latch*, for example). The data is written individually for each channel. As a result, you can disable the Group later, without affecting the automation of any Group member—and can obviously edit or change channels individually.

Temporarily Disable a Group (Clutch)

It is possible to temporarily disable all Group parameter links—in order to change the volume of an individual channel, for example, even if it’s a member of a Group with linked volumes. To do so, simply use the *Toggle Group Clutch* key command (default *g*). As long as the Clutch is active, all Group displays will change color—from yellow (normal) to blue (Clutch active, all Groups temporarily disabled).

Group Handling on the Logic Control

Click-holding the *GROUP* button allows you to use the *SELECT* buttons to assign the selected channels to the next free (new) group. You can use the *BANK* switches during this operation.

While in the Group mode (click and release the *GROUP* button), you can switch between Groups with *Arrow up* and *Arrow down*. The Group number (G1—G9, 10—32) is displayed in the 7-segment *ASSIGNMENT* display; the first characters of the Group name are displayed in the *SMPTE/BAR* display.

The Logic Control display shows track names in the top line. The bottom line will indicate the Group properties of the selected Group. *Arrow left* and *Arrow right* switch to further Group property pages. The *SELECT* keys display/edit the assignment of channels in the currently selected Group.

TRACK+GROUP activates Track Multi Channel View mode, which allows you to assign each channel to any Group (or turn it “off”) via each channel’s V-Pot. Alternately, you can enter this mode by pressing *TRACK* and then *Arrow left* or *Arrow right* until you reach the “Group” page.

Surround

Logic allows for mixdowns in surround format, with up to eight output channels. Surround formats supported include all common formats, including the most demanding, like the 7.1 format. To use surround, the audio hardware and driver must have and support more than two outputs.

Encoding or decoding does not take place. The use of surround does not imply any manipulation of frequency response characteristics or delay treatment. The processing only affects the relative volume settings for the output pattern selected for a given channel. It's up to you to insert plug-ins into the Output Objects serving as the surround channels—such as delay or EQs, high, or low pass filters.

All channels and busses can be set to different surround formats independently. Click-hold the Output slot of the desired Audio Object, and set the output to *Surround* in the pull-down menu.



The Pan control is replaced by a two-dimensional surround control. The loudspeakers are represented by colored dots, and the pan position is indicated by a white dot that can be grabbed and moved.

Changing the Surround Status of Multiple Channels Simultaneously

You can change the surround status of all selected channels simultaneously. Select all Objects that you want to set to the same assignment, and hold Option while clicking on the Output slot. Choose Surround from the menu.

The Surround Pan Window

Double-click the Surround control that replaced the Pan control. The Surround window launches, giving you a closer look at the Surround control. Grab the parameter field in the top of the window, and select the desired surround format (7.1, for example), which was designed for big cinema theaters. The seven loudspeaker symbols appear around the surround control. The routing of the signal to the speaker outputs is intuitively controlled by the position of the blue dot in the surround field, which can be dragged as desired.



The movement of the surround position on a given axis and radius is made easier with these functions:

- Hold Command to lock the angle.
- Hold Control to lock the radius.
- Hold Option to reset angle and radius to the center.

LFE Control

The abbreviation stands for “Low Frequency Enhancement” or “Low Frequency Effects,” as the LFE output is most commonly sent to a subwoofer channel. The use of a subwoofer speaker is not a must. Technically speaking, the LFE output is nothing more than an additional post fader auxiliary send, with the LFE control used as a volume fader. If you only want low frequency signals to reach the output, insert a low pass filter plug-in into the Output Object defined as the LFE “subwoofer” output. A cutoff frequency of 120 Hz is standard for surround applications. The LFE fader determines the amount of audio signal (from the actual Audio Object) that is routed to the LFE output. The *Preferences > Audio > Surround* pane defines which audio hardware output will serve as the LFE output.

Assigning Surround Channels to Audio Outputs

The assignment of surround channels to audio hardware outputs is accomplished in *Preferences > Audio > Surround*. The standard settings for Pro Logic, 5.1, 7.1, and EX formats (each available with or without center speaker) and LCR (Left-Central-Right) plus several other formats are pre-set, but can be edited.

Bouncing Surround Audio Files

The surround settings display the file name extensions that will be appended to the file names resulting from a surround bounce. Bouncing a surround mix will create more audio channels than your usual stereophonic bounce/mixdown, and these extensions are used to identify the files. Click on the various fields to edit the extensions.

Select *Surround Bounce* in the normal bounce dialog (after clicking the bounce button at the bottom right of an Output Object or via *File > Bounce*). All outputs selected in the surround settings will be bounced simultaneously, no matter which Output Object bounce button is pressed.

Level

Audio Objects feature level meters that display the playback or input monitor level.

When you arm a track, in preparation for recording, the meter displays the input level.



The playback level is also displayed to the left of the track number in the Arrange window, if *View > Track Numbers/Level Meters* is selected.



Peak Hold

As with conventional mixing desk meters, peak values are “held” on the display for a few seconds, making them easier to read. The most recent maximum level is always reliably displayed, even if your CPU power is insufficient for a smooth real time display of levels.

Clip Detector

The clip detector above the level meter shows you the headroom of a track in dB.



When a signal clips, the clip detector will turn red; the value indicates the amount that the signal needs to be reduced, in order to prevent clipping.



Up to +6 dB will be shown. If a track clips now and then, it doesn't really matter—as long as the master doesn't clip. Clicking on any clip detector will reset all clip detectors. The *Clear Overload Flag in Audio Channel Display* key command has the same effect.

Pre Fader Metering

Activation of *Audio > Pre-Fader Metering* ensures that the level displayed by the level meters is measured pre fader (pre pan/balance), but post Equalizer and inserts. This guarantees the display of track levels, even if the fader is dragged all the way down.

Adjusting the Level

The fader on each Track Object sets its playback level. The recording level is not set in Logic. It is set at the source (the device supplying the input signal). You cannot adjust the level on the digital input. Logic's fader is only used to control the monitoring level.

The level meter of the Audio Objects and aux sends can be shown in decibels (dB) (default), or MIDI controller values. To change the scale, select the appropriate Object, and alter the "Val as" parameter. A MIDI volume of 90 is equivalent to 0 dB.

The maximum boost is +6 dB. You can reset the volume fader to 0 dB (90) by Option-clicking on it.

When multiple Audio Objects are selected, changing their level by moving one fader is dB-proportional. The mixing ratio of the selected channels remains constant.

An independent monitoring level is available when a Track Object is record enabled. After arming the track, set the fader to the desired level. The original level will be restored when the Object is disarmed. This feature is not available when using TDM hardware, due to technical reasons.

The global *Toggle (Mute) Audio Tracks* key command switches the levels of all Audio Objects between two different values. Each Object may be set to any value for both toggle positions, allowing you to quickly switch between two basic mixes.

You can switch other Object types in the same way, using the global *Toggle (Mute) Audio Inputs*, *Toggle (Mute) Audio Aux*, *Toggle (Mute) Audio Bus* and *Toggle (Mute) Audio Outputs* key commands.

Solo/Mute

Solo

All Audio Objects have a Solo button. This mutes all other Audio Objects of the same hardware type.



Muted Objects are indicated by a flashing *M* in the Mute button. Please note that this does not mute MIDI tracks.

You can also solo several Objects at once.

Option-clicking a previously unsoloed Object releases other active Solo buttons, allowing the selected channel to be heard in isolation (“Interlocking Solo” or “Solo Toggle”).

Option-clicking any activated Solo button disables the solo status of all Audio Objects.

Solo Safe

If you want to hear the signal of a soloed channel with any bussed effects, the effect return channels obviously shouldn’t be muted. Unlike conventional mixing desks, Logic can scan the entire signal path, and leave the effect return channels open.

The same applies when you solo an effect return signal. The channels fed into the effect are muted, but their effect sends remain open, ensuring that the effect continues to receive a signal.

This automatic mute-suppression only applies to the internal effect returns. If you are using external effect units via Bus Objects, the scan will keep the effect master sends open. Logic cannot, however, know which of the Input Objects you are using as effect returns for external effect units. You need to manually switch these Input Objects to “solo safe”—just like on a conventional mixing desk.

Control-clicking an inactive solo switch makes an Audio Object “solo safe.” This prevents it from being muted when you solo another channel. “Solo safe” status is indicated by an X on the solo button. A second Control-click defeats the solo safe status.

Mute Button

You can mute any Audio Object by pressing the button marked with an *M*. Pressing the button a second time restores the previous level.



Stereo Objects

All Audio Object types (Track, Input, and Output) may be configured as stereo. Logic uses true stereo tracks, provided that *Preferences > Audio > Drivers > Universal Track Mode (UTM)* is activated. This means that Track 2 is unaffected when you configure Track 1 as stereo. DAE Hardware Users: Please note that setting a track to stereo will “grab” the adjacent track.

Audio Regions on the tracks of stereo Objects are always dealt with together, no matter what type of operation being performed. If you open the Sample Editor, both sides of the stereo pair are shown, and are processed together.

Creating Stereo Objects

To do this, select the desired Object (we’ll use the one named “Audio 1” as an example—click on its name, at the bottom). Click on the Mono symbol, at the bottom left of the Object, next to the REC button.



The button will now show two interlinked circles, indicating that it’s a stereo Object.



If you click-hold on this button, you will see a pop-up menu that offers four choices:

Mono: Sets the track to play mono files.

Stereo: Sets the track to play stereo files. These may be either “interleaved” or “split” stereo files.

Left: If a stereo region is assigned to the track, only the left side will be played. If a mono file is assigned to the track, it will play normally. In either case, the output of the track will be mono.

Right: If a stereo region is assigned to the track, only the right side will be played. If a mono file is assigned to the track, it will play normally. In either case, the output of the track will be mono.

Any combination of stereo and mono recordings is permitted. As an example, you can set both tracks 1 and 2 to stereo, and use tracks 3 and 4 for mono recordings, if you wish.

Whatever parameters you adjust for stereo Objects, the changes affect both sides equally. The pan control becomes a balance control.

Track Arming

The Record Enable button (see below) “arms” a track, making it ready for recording. Once armed, the Record Enable button flashes red. It remains constantly lit during the actual recording.



If the control flashes between gray-red, this indicates that no audio track is selected in the Arrange window, and no recording can take place. Please select the corresponding Audio track in the Arrange.

Rec controls only exist for Track Objects. Please note that the number of Track Objects that can be simultaneously armed is limited to the number of tracks that your audio hardware can record to concurrently. This would typically be the number of inputs offered by the audio hardware.

You can select the input that the Track Object will record from, via the input selector slot, found in the I/O section of the Track Object. Click-holding on the slot will reveal a pull-down menu, showing all available inputs for your hardware. If the record track is stereo, the inputs will be displayed in pairs (Input 1–2, Input 3–4, and so on). They will be displayed individually for mono tracks. Arming a track set to a specific input will automatically disarm any other track that is currently using the same input.

You can record on all hardware simultaneously, if using different audio hardware systems.

Bounce

Output Objects feature *Bounce* buttons. Bounces for Output Objects 1 and 2 can also be initiated by choosing *File > Bounce* from any Logic window (although the Arrange would be the most appropriate).



The Bounce process allows you to create an audio file (or multiple audio files) based on all audio Objects routed to the selected Output Object. All parameters, including volume, pan, and effects are recorded as part of the “bounced” file. Bouncing takes place in either realtime or faster than real time (“offline” bounce).

To create a bounce file:

- 1 Press the *Bounce* button on the Output Object or choose the *File > Bounce* menu option.
- 2 Set the parameters in the Bounce dialog window (see below).
- 3 Press the *Bounce* (or *Bounce & Burn*) button in the Bounce dialog window.

- 4 The ensuing file selector allows you to enter a destination folder and name for the bounced file.

Note: Mono bouncing is possible when the Output Object is set to mono. In this situation, a mono audio file is generated.

Global Options in the Bounce Dialog Window

Several global options are available in the Bounce Dialog window, regardless of the file type(s) being bounced.

Destination

You can select between a *PCM* file (in SDII, AIFF, or Wave format) or *MP3*, *AAC*, and *Burn* (to a Red Book compliant Audio CD) options by simply clicking in the desired checkboxHyper Dw.

You can select multiple checkboxes, if you wish. If you do so, multiple files will be written, with the appropriate file type appendix: *filename.aif*, *filename.mp3*, *filename.m4a*.

PCM, MP3, and AAC files can be individually bounced and added to the iTunes library if the *Add to iTunes library* checkbox is enabled in each sub-pane.

PCM files in SDII, AIFF, or Wave format—can be added to the Audio window if the *Add to Audio window* checkbox is enabled in the PCM sub-pane.

Note: All bounced wave file recordings are in Broadcast Wave format. Broadcast Wave files can be recognized by a clock symbol, shown alongside the Audio Region name in the Audio window. Broadcast Wave files include a high-resolution timestamp (timecode). The timestamp information is for the entire file—BWF files contain no Region information. Broadcast Wave files can be searched for in the Project Manager. The file extension of broadcast wave files is *.wav*, allowing them to be read by any application that supports the standard wave file format. In such programs, the additional Broadcast Wave file information is ignored.

Note: If Burn is selected, you may see a dialog informing you about changes to stereo interleaved or surround files. This is dependent on other settings made in the dialogs for each file type. Also note that the *Bounce* button will be renamed to *Bounce & Burn* when Burn is selected.

Start and End Position

These fields define the boundaries of the song segment that you want to write to the bounced file. The defaults for these fields is the whole song, from the beginning of the first Audio Region to the end of the last. Note that the defaults will be the locator positions, if the Cycle function is engaged. In any case, you can adjust the start and end positions manually. As an example, should you want to take into account a MIDI sound module (mixed via an Input Object) that falls outside the preset region.

It's often a good idea to set the End position of the bounce a little bit past the end of the last Region, ensuring that reverb tails and echoes from delay plug-ins are not chopped off. The amount of extra time needed will, of course, depend on the effect settings used.

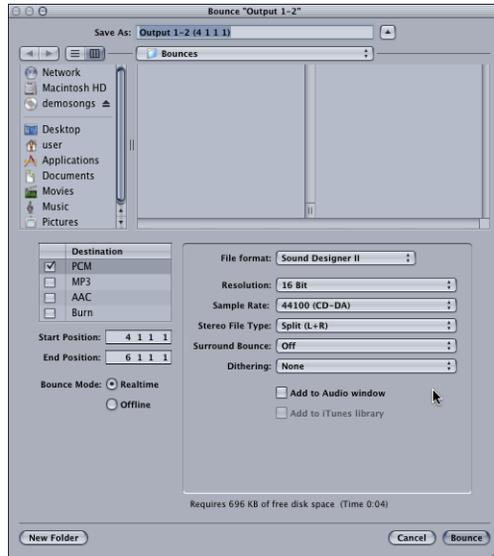
As you adjust the Start and End position parameters, you are shown the hard disk space requirements for the bounced file above the *Cancel* and *Bounce (Bounce & Burn)* buttons.

Bounce Mode

- *Realtime*: Creates the bounce file in real time. Use it whenever you wish to bounce audio and Audio Instrument tracks, plus external MIDI sound sources that are routed into the Logic Mixer via (Live) Input Objects.
- *Offline*: Accelerates the bounce process—depending on the complexity of your arrangement and available CPU processing power. It also allows the bouncing of complex arrangements that would normally exceed the power of your CPU, if trying to play them in real time. Offline bouncing, however, is limited to internal sources (audio or Audio Instrument tracks). The MIDI tracks and Input Objects of Logic's mixer are deactivated during offline bouncing.

Please note that the Offline Bounce Mode is only available to the Output Objects of mixers that belong to native audio driver systems. DSP-based audio hardware can not make use of offline bouncing due to the nature of its stream-oriented technology. Other software applications that are fed into your Logic Mixer via ReWire technology are available for offline bounce processes.

PCM Options in the Bounce Dialog Window



File Format

You can select between a PCM file (in SDII, AIFF, or Broadcast Wave format) or MP3, AAC, and burn to an Audio CD in one go.

PCM, MP3, and AAC files can be individually bounced and added to the iTunes library.

PCM files in SDII, AIFF, or Wave format can be added to the Audio window.

Resolution

This is where you define the resolution of the bounced file. The options are 16 Bit, 8 Bit (for multimedia productions) or 24 Bit (for mastering to DVD).

Sample Rate

This pull-down menu allows you to define the desired sample rate for your bounced audio file(s). Options range from 11,025 to 19,200 Hz, and include the three most commonly used sample rates: 44,100 (CD-DA), 48,000 (DAT) and 96,000 (DVD).

Stereo File Type

You can select between split stereo (for use in ProTools), or interleaved stereo (for further use in Logic or for CD writing software) here.

Setting *Stereo File Type* to *Split Stereo* disables *Burn* (following a warning message).

Surround Bounce

Bounces all Surround (see “Surround” on page 279) channels as separate files.

Enabling *Surround Bounce* disables *MP3*, *AAC*, and *Burn* (following a warning message).

Dithering

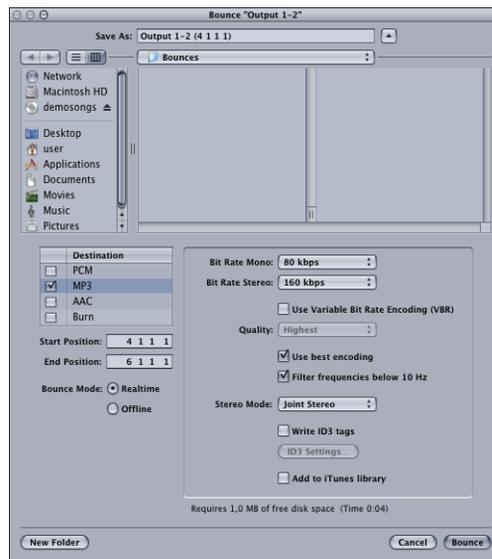
Dithering (see “Bouncing and POW-r Dithering” on page 84) is recommended when bouncing 24 bit recordings into 16 bit files.

“Add to” Options

The *Add to Audio window* option adds the bounced PCM file(s) to the Audio window

The *Add to iTunes library* option adds the bounced PCM file to the iTunes library. Note that iTunes does not support SDII. Should the file be in SDII format, this switch will be disabled.

MP3 Options in the Bounce Dialog Window



Logic allows the bouncing of MP3 (MPEG-2-Layer-3) format files. This well-known data reduction format for digital audio signals was developed by the Fraunhofer Institute, and allows high compression rates while maintaining quite good audio quality (depending on the compression rate). MP3 is the current standard for audio file exchange via the Internet.

Due to the fact that encoding an MP3 file equates to a loss of audio quality, you should not use MP3 files during production if you have access to the same audio data in linear formats such as: AIFF, WAV, or SDII.

Bounced PCM file(s) is/are also used for encoding to MP3/AAC or burning a CD. It should be noted that this occurs before dithering takes place.

Note: Should the selected sample rate be higher than 48 kHz, a temporary copy of the bounced PCM file is created—with an automatic sample rate conversion to 48 kHz before encoding. This conversion takes place because the MP3 format does not support sampling rates higher than 48 kHz.

If the *PCM* option is disabled in the *Destination* menu, a temporary PCM file is bounced as a source for encoding to MP3/AAC and/or burning to a CD—in accordance with the options selected in the *PCM* page.

Enabling the MP3 option in the Destination dialog automatically disables the *PCM > Surround* option (following a warning message). This is because the MP3 format does not support surround. Split Stereo format is, however, possible—even if the encoded MP3 file is set to *Joint Stereo* mode.

Bit Rate (Mono/Stereo)

MP3 bit rates are selectable between 8 kbps and 320 kbps, but default to 80 kbps mono, and 160 kbps stereo. These rates offer acceptable quality and good file compression. If you can afford the extra file size, we recommend selecting 96 kbps for mono and 192 kbps for stereo streams, as this provides better audio quality. You can, of course, choose even higher rates, but the quality improvement afforded by bit rates above 96/192 kbps is nominal.

Use Variable Bit Rate Encoding (VBR)

Variable Bit Rate encoding compresses simpler passages more heavily than passages that are (more) harmonically rich, generally resulting in better quality MP3s. Unfortunately, not all MP3 players can accurately decode VBR-encoded MP3s, which is why this option is turned off by default. If you know that your target listener/s can decode VBR-encoded MP3s, you can switch this option on.

Quality

Keep this set to *Highest* whenever possible. Reducing the quality accelerates the conversion process, but at the expense of audio quality.

Use Best Encoding

Again, like the *Quality* parameter, if you uncheck this option, you will gain encoding speed at the price of audio quality. This should always be kept on, unless conversion time is an issue.

Filter Frequencies Below 10 Hz

When this option is checked, frequencies below 10 Hz (which are usually not reproduced by speakers, and are not audible to human ears at any rate) will be removed, leaving slightly more data bandwidth for the frequencies that we can hear, resulting in an improvement of the perceived “quality.” Only uncheck this if you’re experimenting with subsonic test tones, or exporting MP3s for whales!

Stereo Mode

You can select joint stereo or normal stereo mode. Depending on the original file, these settings may (or may not) offer any audible difference. Experiment with both settings to determine your preference.

Write ID 3 Tags/ID3 Settings

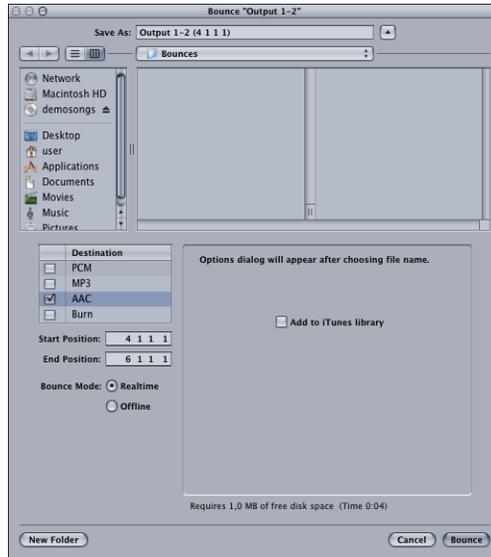


When the *Write ID3 Tags* option is enabled, ID3 tags are written to the file. These tags can be edited/configured in the dialog launched via a click on the *ID3 Settings* switch. All entries are made by double-clicking on the desired *Content* field(s) to the right of the corresponding *ID 3 Frame* entry, and typing in your text.

Add to iTunes Library

The *Add to iTunes library* option adds the encoded MP3 file to the iTunes library.

AAC Format Options



The AAC options are not directly available in the Bounce Dialog window (due to a limitation in QuickTime), with the exception of the *Add to iTunes library* option which adds the encoded AAC file to the iTunes library.

You first need to type in a file name, and press the *Bounce* button before you can access the AAC (*Sound Settings* and *Options > MPEG-4 Audio Compressor*) options.

When enabled, AAC disables PCM > Surround (following a warning message). Split Stereo is, however, possible.

Should the selected sample rate be higher than 48 kHz, a copy of the bounced PCM file is created—with an automatic sample rate conversion to 48 kHz before encoding. This conversion takes place because the AAC format does not support sampling rates higher than 48 kHz.

AAC Sound Settings

Compressor

Selects the compression algorithm used for AAC encoding. By default, this is MPEG-4 Audio.

Rate

A number of predefined sample rates are available in this pop-up menu, ranging from 8000 kHz to 48,000 kHz.

Size

These radio buttons allow you to select either an 8 or 16 bit output file.

Use

These radio buttons allow you to select either a mono or stereo output file.

Options

The *Options* switch launches the *MPEG-4 Audio Compressor* window, discussed below.

MPEG-4 Audio Compressor Window



Compressor

Selects the compression encoder. By default, this is AAC (Low Complexity).

Bit Rate

A number of predefined bit rates are available in this pop-up menu, ranging from 16 kbits/second to 320 kbits/second.

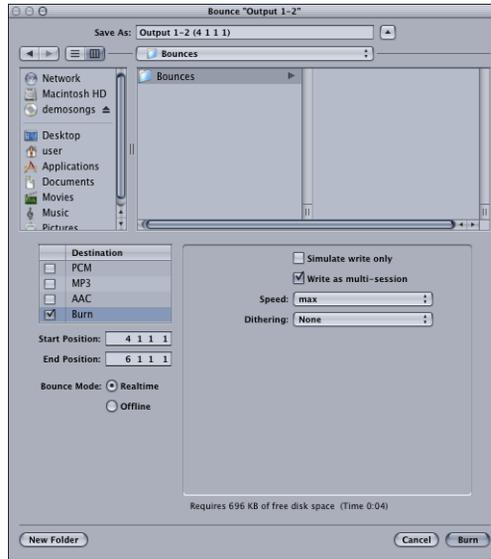
Output Sample Rate

A number of predefined sample rates are available in this pop-up menu, ranging from 8000 kHz to 48,000 kHz. The *Recommended* option selects a default option, based on other encoder choices you have made.

Encoder Quality

Keep this set to *Best* whenever possible. Reducing the quality will speed up the conversion process, but at the expense of audio quality.

Burn Options



Logic can directly burn Red Book audio to blank CDs.

Note: Enabling the *Burn* option automatically disables the *PCM > Surround* and *Split Stereo* options (following a warning message). This is because CD Audio only makes use of interleaved stereo files.

Should the selected sample rate be higher than 44.1 kHz, a copy of the bounced PCM file is created—with an automatic sample rate conversion to 44.1 kHz before encoding. This conversion takes place because the CD Audio format (Red Book) does not support sampling rates higher than 48 kHz.

Note: Should your system contain multiple CD burners, the first one detected is used.

Important: Some of the options listed below will only become active when blank CD media is physically placed in the CD recording mechanism.

Simulate write only

The *Simulate write only* option requires that a blank CD be inserted into the SuperDrive or ComboDrive. As the name suggests, this will simulate a CD burn, but will write no data to the blank media. This can be used either alone, or in conjunction with, the *Write as multi session* option.

Write as multi session

The *Write as multi session* option allows you to add a data session to the same CD at a later date—to add the Project folder, for example.

Speed

The first time you use the *Speed* pull-down menu, a request is made to the CD burning mechanism, which may take a while. Once the scan is complete, you may freely select from the available speeds.

Dithering

Use of the *Dithering* parameter is recommended when bouncing 24 bit recordings into 16 bit files.

Bounce & Burn

Clicking the *Bounce & Burn* switch initiates the Bounce and burns the audio to CD.

Note: Following confirmation of the file location(s), you may encounter further dialogs that will ask if you want to overwrite existing files. Use these as required.

Audio Object Types

The following section introduces you to Logic's different Audio Object types.

Track Object

The Track Object is used for playing back and recording audio signals in the Arrange window. You also control the signal of recorded tracks via the different elements of the Track Object.



The number of tracks available depends on two types of hardware limitations: the CPU power of your computer, if using native processing, or on the hardware limitations of DSP based systems.

If you are using the native engine, you can limit the number of tracks via the *Audio > Audio Driver > Max. Number of Audio tracks* setting for the individual driver/hardware, thereby limiting the amount of memory and processing power required.

The Track Object features the following elements (see “Elements of the Audio Object” on page 270): EQs, Inserts, Bus Sends, Input/Output, Grouping, Automation, Pan, Level, and Level meter, Mute/Solo, Mono/Stereo, Track Arming.

Monitoring with Effect Plug-ins

Record-enabled (armed) audio tracks—with assigned audio inputs—can be monitored with effects plug-ins inserted into the armed audio channel. In this type of setup, the effect plug-ins are monitored but not recorded. This can be useful during an overdub session, for example. If you’d like to record the audio track with effects, insert the effect plug-ins into the corresponding input channel (see below), rather than the audio track channel.

Example: During vocal recording, many artists prefer to monitor their performance with a little reverb, while the track is actually recorded dry. To do so, insert a reverb plug-in into the audio channel, arm the track and start recording. The reverb will be part of the monitor mix, but will not be recorded.

It is possible to combine pre-processing and monitoring with effects. You can, for example, destructively record a signal with compression by inserting a compressor into the respective input channel, while simultaneously monitoring the compressed input signal with a reverb (inserted on the track channel) that is not recorded.

The *Audio > Audio Hardware & Drivers > Software Monitoring* preference must be enabled if you wish to monitor/record with effects.

Input Object

The Input Object allows you to directly route and control signals from your audio hardware's input. Once an Audio Input Object is assigned to an audio channel, it can be monitored and recorded directly into Logic, along with its effect plug-ins.



The signal is processed—inclusive of plug-ins—even while Logic is stopped. In other words: Input Objects behave just like external hardware processors. Bus sends can be used pre or post-fader.

The Audio Input Objects can effectively replace your old mixing desk, or at least save time while bouncing:

Audio Input Objects make the bouncing procedure much easier, as there's no longer any need to record the audio signal of your MIDI devices before bouncing (mixing down) their output with the audio recordings. The live Audio Input Objects allow you to mix down the audio signal from your external hardware MIDI synthesizers and sound modules into a stereo mix (by bouncing an Output Object).

The Input Object features the following elements: Inserts, Bus Sends, Output, Grouping, Automation, Pan, Level, and Level meter, Mute/Solo, Mono/Stereo.

Pre-processing of Input Signals

Audio Input channels now process an incoming audio signal destructively: The input signal is processed by plug-ins inserted into the input channel. This means that once an Audio Input Object is assigned to an audio track, it can be recorded, and monitored, with its effect plug-ins.

Example: To avoid large jumps in level, it is often useful to record a vocal track with light compression. To do so; insert a compressor plug-in into the input channel and assign the Input Object as the input source of an audio track. During recording, the effect of the compressor is recorded with the track.

Note: To use the Audio Input Object as a “live input”, ensure that the Input Object has an assigned Output. This allows monitoring of the Input Object (with all effects) directly, without the need to assign it to a record-enabled audio channel.

Audio Instrument Object

The Instrument Object allows you to use virtual Software Instruments within Logic. Currently, the following are supported: Logic’s own suite of software instruments and AU compatible instruments. Logic supports up to 128 discrete Audio Instrument channels, dependent on available CPU resources and system RAM. The advantage of the integration of sampling and synthesis within Logic is that all tools necessary for audio recording, sample playback and synthesis plus effects and mixing can occur within your computer.

The Input Slot of the instrument Object serves as an insert slot for the software instrument.



After inserting an instrument, the Audio Instrument Object can be used just like a MIDI track in the Arrange window. The Audio Instrument Object can also receive MIDI notes via Environment cables from other MIDI instrument Objects. This is useful for creating sound layers of hardware MIDI instruments and virtual instruments.

Please note that the *Preferences > MIDI > General > Use Unified Virtual and Classic MIDI Engine* setting must be switched on to make use of these features.

When an Audio Instrument track is selected, it is ready to be played in real-time and consequently produces some system load. Normally, Logic releases system resources used by the Audio Engine when the sequencer is stopped. This is not true, however, if an Audio Instrument track is selected in the Arrange and is therefore available for real-time playing. Selecting a MIDI track or a normal audio track exits this “stand by” mode and releases reserved system resources the next time the sequencer is stopped.

Note: Muting an Audio Instrument track in the Arrange does not reduce system load.

The Audio Instrument Object features the following elements (see “Elements of the Audio Object” on page 270): Inserts, Bus Sends, Input, Output, Grouping, Automation, Pan, Level, and Level meter, Mute/Solo.

Accessing Multiple Outputs

Logic supports the EXS24, UltraBeat, and AU-compatible instruments that are capable of addressing multiple outputs. In addition to the “Mono” and “Stereo” submenus of the Audio Instrument menu, a “Multi Channel” submenu lists all Instruments that offer multiple outputs. A plug-in needs to be inserted from the “Multi Channel” submenu, in order to access its individual outputs.

Please note that not all plug-ins (Logic and third-party) are multi-output capable. If the Instrument does not appear in the Multi Channel submenu, it is not equipped with multiple output facilities. Please make sure that the instrument you wish to use is properly installed and authorized.

The first two outputs of a multiple output instrument are always played back as a stereo pair by the Instrument channel that the plug-in is inserted into. Additional outputs (3 and 4, 5 and 6, and so on) are accessed via Auxiliary Objects (see “Auxiliary Object” on page 303).

Software Instrument Pitch

The *Song Settings > Tuning > Software Instrument Pitch* parameter remotely controls the main tuning parameter for all software instruments by ± 50 Cents. Some instruments created by other manufacturers may not recognize this remote command.

ReWire

Logic supports the *ReWire* software interface from Propellerheads, a software manufacturer. ReWire is an interface between sequencer and audio applications. ReWire works with hardware supported by Logic's native audio engine (see "The Audio Hardware and Drivers Dialog" on page 377).

Please start Logic first, and then start your ReWire application(s). ReWire scans for ReWire-compatible applications or system extensions; Propellerheads' *Reason*, for example.

Logic will display the audio returns of ReWire-connected applications as Audio Objects: You're able to insert plug-ins and create sends to busses on these returns, as per a normal audio track.

In order to use the audio returns of ReWire-connected applications, select an Audio Object and choose the desired ReWire audio-return in the *Channel* pull-down menu of the Audio Object. You will find ReWire channels listed by name, along with the audio tracks, inputs, busses, and outputs in this menu. ReWire (or the application that the connection belongs to) generates the names for these channels. The name of a ReWire channel is irrelevant to Logic.

As an example, if a channel is called "Mix," it has no specific function related to that name as far as Logic is concerned. It's up to you to decide what to do with whatever channel. If there is no Audio Object for a ReWire return created in the Environment, no audio is transferred between a ReWired application and Logic. How does this work in practice with ReBirth, for example? In this scenario, you will find two channels called "Mix L" and "Mix R" within Logic. The two Mix channels return the summed mix of ReBirth's outputs. You will also find channels for every individual instrument. When creating an Audio Object for another channel such as the bass drum, for example, you will only hear the bass drum through that channel, and it is removed from the mix returns.

Logic is always Synchronization master. As Logic is also the Cycle master, *Skip Cycle* works, too.

The following functions are shared between the applications:

- start/stop,
- repositioning,
- cycle start and end,
- tempo change

Output Objects

Output Objects represent Logic's audio outputs. This is where level and stereo balance are adjusted; mastering plug-ins can also be inserted here, such as multi-band compressors or the Linear Phase EQ. The number of available Outputs is determined by the audio hardware in use.



Output Objects also provide the Bounce (see “Bounce” on page 285) function, which can be used for either; recording all audio into one stereo audio file (comparable to a master tape), or to merge several tracks (including all plug-ins and so on) into one stereo or mono track (depending on whether the Output Object is set to mono or stereo).

The Output Object features the following elements (see “Elements of the Audio Object” on page 270): Inserts, Grouping, Automation, Pan, Level, and Level meter, Mute, Stereo/Mono, Bounce.

Note: The Inserts of the Output Objects allow signal processing during the mastering process (as well as during normal playback). Typical mastering tools are the compressors, de-essers and equalizers such as the Linear Phase EQ. Please note that (for technical reasons) only plug-ins that don't require mono/stereo conversions can be used. In other words, you can use (s/s) plug-ins on stereo outputs, and (m/m) plug-ins on mono outputs.

Bus Objects

The Bus Objects can be used in several ways:



They can be used to route audio signals to external devices via the individual outputs of the audio hardware, allowing you to change their level and pan settings, and apply plug-ins, if you wish.

They can be used as subgroup channels, which control the level of several audio channels at once. As an example, all drum tracks or all different vocal takes could be routed to one stereo bus for control of their overall level—while still retaining the relative differences between the individual channels.

As busses can also be routed to other busses, several effect returns can be routed to the same subgroup, in order to adjust the level of all effects in the mix at once. This approach makes it much easier to handle the mixdown (particularly if automated).

To record the signal of a particular subgroup (for later use as a stereo track in the arrangement), route it to an unused Output Object, and use the Bounce function (see “Bounce” on page 285).

The Bus Objects can be used as effect returns: in this case the plug-ins serve as internal effect processors.

Effects such as reverb and delay are generally used as bus inserts. These Bus Objects are usually addressed with the send knobs of the audio channels, and act as effect returns.

These busses can be routed to other busses, or to an Output Object.

In the default song, the pre-set Bus Objects have been named “Returns”.

The Bus Object features the following elements (see “Elements of the Audio Object” on page 270): Inserts, Grouping, Automation, Pan, Level, and Level meter, Mute, Stereo/ Mono.

Auxiliary Object

The native Aux Object can be either mono or stereo. Aux input sources will appear as either stereo pairs, or single mono channels, dependent on the mono/stereo status of the Aux channel. It is possible to use the same input source for several Aux channels. Aux channels process audio signals non-destructively, in real time. Two Aux channels are pre-configured in a new song, by default. As with all other Audio Objects, additional Aux Objects can be created, and accessed, via the Audio layer of the Environment. Aux Objects are automatically made available as needed, in the Cha pull-down menu of the Object parameter box. When four Aux Objects are in use, a fifth is offered in the pull-down menu, when using six Auxes, a seventh is added and so on. This makes it possible to create up to 64 Aux channels in the Environment.



The input source of an Aux channel is selected with the input assignment pop-up menu. Possible input sources are: Bus channels, Input Objects (dependent on the available physical inputs of the audio card in use) and all software instrument outputs provided by Instrument plug-ins (Logic or AU). These additional outputs are only available to plug-ins inserted into an instrument channel via the “Multi Channel” sub menu. Aux channel Input sources—sent from suitable Instrument plug-ins—start from output 3.

Aux channels can also be displayed in the Track Mixer. Note: If the Aux channels are used as tracks in the Arrange window, ensure that the view filter of the Track Mixer is set to show Aux channels by activating the Aux button (track view). Activate the Aux and Global button (global view) if the Aux Objects are only used as Environment Objects (in other words, they’re not used as Arrange window tracks).

The Aux Object features the following elements (see “Bus Objects” on page 302): Inserts, Sends, Input, Output, Grouping, Automation, Pan, Level, and Level meter, Mute, Stereo/Mono.

Aux Objects as Bus returns

By definition, Sends (which are, in effect, the busses) are not available directly on Bus channels. Busses can, however, be set as the Input source for Aux channels. In doing so, the Aux channels act as bus returns, allowing the use of Sends. These Sends can be returned on additional Aux channels allowing the construction of complex effect routings. (In most cases, you won’t want to monitor the signal twice, so set the respective bus output assignments to “No Output.”)

Aux Objects and Software Instruments with multiple outputs

By default, all outputs of a Multi Channel (see “Audio Instrument Object” on page 298) Instrument plug-in are routed to the main output pair of the respective Audio Instrument Object. Subsequent Multi Channel Instrument outputs are sent to Aux Objects.

Master Object

The master fader changes all output gains. It acts as a separate attenuator stage; the level relationships between the Output Objects are not affected. This is very helpful as a proportional output volume control and is particularly useful for surround mode in Logic (fades of the complete surround mix).



In some cases, you might wish to prevent individual Output Objects from being controlled by the Master Object—outputs used as effect sends to external hardware devices, for example. Simply switch such Output Objects to Solo Safe mode by *Control*-clicking their Solo button, and they won’t be controlled by the Master Object.

Moving the master fader does not affect the position of the Output Object sliders, but rather, the signal levels directly. These level changes are reflected in the level meters of each Output channel. The Output Object features the following elements: grouping, automation, Level, and Mute.

Audio Configuration

Audio Configuration Window

The Audio Configuration window can be accessed via *Audio > Audio Configuration*, and *Options > Audio Configuration* in the Audio window.

The Audio Configuration window provides an overview of the Input/Output routing, as well as all inserts and sends of all Audio Objects that exist in the Environment (for a given audio hardware device). The various Object types are listed, with names shown on the left, and settings shown in columns. It makes no difference whether you change settings in the Audio Configuration window, the Track Mixer or the Environment (Audio Mixer); the setup will be instantly reflected in all locations. Use whichever you prefer.

The Audio Configuration window also shows the settings of any deleted or unused Audio Objects. If you create an Audio Object in the Environment (*New > Audio Object*), and then select the Channel, it will appear (with the currently assigned settings) and can be edited, in the Audio Configuration window.

Just as in the Object type pull-down menu of the Object Parameter box (which opens when you click-hold the *Channel* parameter), a channel setting displayed in bold type indicates that the channel is in use by an existing Object.

A dot in front of the name indicates that the Object is part of a stereo pair—whether it is controlled by another Object, or is, itself, the controlling Object.

Handling

Click-holding a parameter opens a pull-down menu that allows you to change settings, as per the Audio Objects in the Environment (or audio mixer). The top entry in the pull-down menu always assigns a neutral value for the parameter.

Moving and Copying Plug-Ins from one channel to another

Command-dragging plug-ins from one insert to another copies them along with all parameter settings. The cursor turns into a hand symbol while doing so. Holding Option-Command, copies the plug-in settings.

Resetting the Mixer

You can set all parameter types of the Audio Objects (of the selected audio hardware device) to a neutral default value in the Audio Configuration window. You can select from among *Edit > Remove EQs*, *Remove Plug-Ins* or *Remove Sends*.

Resetting the Audio Recording Path

Select *Edit > Remove Record Path* in order to reset the audio recording path.

I/O Labels

You can define names for each Audio Object's I/O options, which can be used instead of defaults like "Input 1" or "Output 8". Select *View > I/O Labels* to do so.

Be sure to select the right hardware in the Device menu. You can individually name any audio input, output, or bus for each audio hardware type.

To the far left, you'll see the default names. Just to the right of this, the names delivered by the relevant audio driver (as applicable). In the column to the right of this, you can double-click and type in a name of your choice. The width of the name bar is the same as that of Audio Objects shown in the Environment. Farther to the right, you can type in short labels, as used beneath the send knobs of the mixers.

The radio buttons individually define which name will be used for each I/O section (for the selected hardware type). The radio button will be selected automatically when a name is entered.

Deleting I/O Labels

To reset all names to their defaults, select *Edit > Reset Input/Output Labels*.

I/O Label File

I/O Labels can be individually defined for each hardware type, but are valid for all songs. The labels are stored in a separate file, located in the Logic folder. The file is called "IOLabels xxx" with "xxx" being the name of the hardware type.

Copy Entire Mixer Setup

You can copy entire mixer setups in the Audio Configuration window. There are two ways of doing so:

- You can copy settings between songs;
- You can copy settings between different hardware devices.

The latter only is possible if the audio hardware devices are controlled by drivers that utilize Logic's native Audio Engine (see "Audio Drivers" on page 377). This is how copying settings works:

Open the Audio Configuration window via *Audio > Audio Configuration*, and choose *View > All Components*. The devices are selected in the *Device* menu.

Between Songs

Select the song that contains the setup that you want to copy, and open its Audio Configuration window. Select *Edit > Copy*, and then select the target song, open its Audio Configuration window, and choose *Edit > Paste*.

Between Different Devices

Select the source device (*Device* menu). Select *Edit > Copy*, and change to the target device (*Device* menu, again). Select *Edit > Paste*. The standard Copy/Paste key commands can be used, as well.

Track Mixer

To open, select *Windows > Track Mixer*.

Note: If you press Option while opening a Mixer window, it will appear as a float window.

Unlike the Audio Mixer, the Track Mixer deals with both audio and MIDI tracks. Each channel represents an Object in the Environment: the audio channels are Audio Objects, the MIDI channels are instruments or parts (sub-channels) of multi instruments.

Tracks that don't have their own mixer parameters are not visible in the Track Mixer. These include Delay Objects (see "Delay Line Object" on page 230), Arpeggiators (see "Arpeggiator Object" on page 228), and so on. If several tracks in the Arrange window address the same track instrument Object, the instrument is represented by a single channel in the Track Mixer.

Note: You can adjust the vertical and horizontal display of the Track Mixer with the Zoom controls.

Display Modes

The Track Mixer has two display modes: *Global* and *Track* view.

In *Global* view, all MIDI instruments and all Audio Objects that exist in the Environment are displayed as mixer channels.

In *Track* view, Logic creates a mixer based on all tracks currently assigned in the Arrange window track list. It contains as many channels as there are tracks. The channels are laid out in the same order as in the Arrange window. Redundant tracks are suppressed, where multiple tracks represent the same output (Object). This could be two MIDI instruments with the same port and channel setting, or two Audio Objects with the same device and audio channel/track setting.

If you miss an Object you need for mixing (an Audio Output Object, for example), open *Global view* and double-click on the Object in question. It will then be added to the Arrange track list, and will appear in the Track Mixer when in Track view mode.

Track Filter

The *Track* menu is used to define the types of tracks displayed in the Track Mixer.

Track Filter Switching Techniques

You can set Global and Track views separately with the Filter Buttons.



- Command-click doesn't change the Track Filter setting when switching *Global view* on and off.
- Clicking without a modifier on a disabled track type will enable the view of this type, and disable all other types.
- Clicking without a modifier on a currently enabled track type will enable all types. A second click will cause the display to revert to a single enabled type.
- Shift-clicking allows you to individually enable and disable types, in any combination.
- Command-clicking if *Global view* is disabled enables *Global view*, and also enables the display of the current track type.
- Command-clicking if *Global view* is enabled simply disables *Global view*.
- Option-clicking moves the window position to the first track of the current type. Filter and *Global view* modes are not changed—with one exception: If the clicked type is currently disabled, it will be enabled.

The *Global view* can display tracks that don't exist in the current arrangement or recording folder. In this situation, it's impossible to select such tracks for recording. If you double-click on one of these tracks, it will automatically be created (and selected) in the current recording folder.

View Options

The *View* menu is used to customize the display to suit your requirements. You can individually switch off the display of; instrument names, program numbers, bank numbers, the user-defined knobs on the MIDI mixer channels (Assign), pan pots (Pan), faders (Volume) and track names and numbers to create more onscreen space. If you choose to remove the instrument and program names from the display, the channel retains its rectangular shape—without the tabs needed for long names. If you switch off the display of the instrument name alone, the track name is shown in its place.

If you enable the *Same Instrument Tracks* option, identical Arrange window tracks are also displayed in the Track Mixer. These tracks have redundant settings for volume, pan, and so on, so it's usually unnecessary to display more than one. The mute settings, however, may be different for each track.

Like the other editors, the Track Mixer can be stored as part of any Screenset (see "Screensets" on page 32).

Folders and the Track Mixer

The Track Mixer can not only display the contents of the highest level of the Arrange window, but also the contents of folders. The Track Mixer automatically registers any change in the folder structure, or instruments assigned to tracks.

If a folder is selected, or if the top window is an Arrange display of a folder when you open the Mixer, it will only show the tracks within the folder. If you click the directory close-box (the square button below the window close-box at the top left), you will switch the Track Mixer to the next-highest level; in this case, the level containing the folder. Double-clicking the folder channel restores the display of the folder. The display of *Folder Tracks* must be switched on in the *Tracks* menu for this to work.

General Tips for Using the Track Mixer

The following tips might help you make the most of the Track Mixer.

To create an arrange track using the Track Mixer:

- In Global view, a double-click on the background of a channel will insert a new (corresponding) track into the current Arrange window, provided that no corresponding track already exists.

To mute arrange tracks using the Track Mixer

- Option-clicking on the Mute button of an Audio Object will mute the corresponding Arrange window track, but will *not* mute the Audio Object. A second Option-click will un-mute the track.

Note: If the current Track Mixer view does not contain the Output or Bus Object, Global view will automatically be enabled. The appropriate view filter (Output/Bus) will also be enabled, ensuring that the selected Object type is visible.

The MIDI channel strips have little "LEDs," which turn green for Note On events, and yellow for all other MIDI information.

Send all Mixer Data

The selection of *Options > Send All Mixer Data* transmits all currently visible mixer knobs and fader settings to MIDI.

Track Selection when Playing or Recording

You can prevent the track selection from changing when making an adjustment to a channel, while Logic is in recording or playback mode. There's an independent parameter for each situation; *Options > Change Track in Record Mode* and *Options > Change Track in Play Mode*.

MIDI Channel Strips

Operation

This section deals with the MIDI channel strips of the Track Mixer, as well as those of the GM Mixer (see “GM Mixer Object” on page 221).

The MIDI channel strips work as a remote control for the mixing parameters of your sound modules and synthesizers (volume and pan, for example). This is the nature of a sequencer. The controls send MIDI Control Change Messages. They do not control any audio signal flow within Logic. Switch on all options in the *View* menu of the Track Mixer, so you can see all of the parameters described below.

Saving the Mixer Settings

The Mixer settings directly affect the Object Parameter box at the bottom left of the Arrange window. The current settings are saved with the song. If the memory of your sound module is not maintained by battery every time you switch it off, it will forget any settings made in Logic. To restore these settings after reloading the song, select *Options > Send to MIDI > Used Instruments MIDI Settings* from the main menu.

Extended GM, GS, and XG Functions

In addition to the GM Standard, there are extended standards created by Roland (GS) and Yamaha (XG).

GS and XG mode allow you to select different effect programs, and to control the level of the reverb and chorus effects.

- 1 Click-hold the GM field on the right side of the Mixer window. A pull-down menu appears.
- 2 Select the extended standard (GS or XG). Depending on your selection, the controllers for the extended effects will appear.
- 3 Select the desired reverb or chorus effect from the pull-down menu.
- 4 Program the desired reverb or delay time (*Time* parameter), by using the mouse as a slider.

Reset Button

The Reset button transmits a *GS On* or *XG On* command, and resets all controllers to neutral positions. This allows you to reset all connected sound modules to their standard settings, and begin a mix from scratch. The Reset button is only available in the Environment GM Mixer.

Controls

The *Track Mixer > View > MIDI Track Components* menu allows you to switch the display of the different MIDI Channel Strip controls on or off.

Bank

If your sound source “understands” bank select events, you can choose the bank number for each of the 16 MIDI channels. Please remember that not all synthesizers support bank select events. You can use several different bank select formats (see “Defining Custom Bank Selects” on page 218).

Program

The Program pull-down menu is used to select a sound by name. Each channel has its own pull-down menu. The top row selects programs for odd-numbered MIDI channels (1, 3, 5 ... 15), and the bottom row is used for even-numbered channels (2, 4 ... 16).

To select the sound for a MIDI channel:

- 1 Click-hold the sound name.
- 2 A pull-down menu opens, containing all GM sound names.
- 3 Select a sound from the menu, and release the mouse button. Logic selects the sound in the sound module.

Volume

You can use the volume fader to control the level of each individual channel. Controller 7 is sent.

Mute

The Mute button switches the volume of the channel between zero and the current fader position. In practice, this means that if the button is “down,” the channel is muted. If you switch the Mute button off, the current fader position (and value) is used.

If you want to mute a channel:

- 1 Click the Mute button of the desired channel.
- 2 Click the button again to reactivate the channel.

Pan

The Pan knob allows you to directly control the pan position of the sound.

To control the pan position of a sound:

- 1 Click-hold the Pan knob.
- 2 Move the mouse up and down. The knob moves according to the mouse position.

Note: Clicking a fader or knob while holding Option resets the value to a neutral value. The neutral value is zero for all controls except Volume (#7) = 100, Panorama (#10), Balance (#8), Resonance (#71), Release Time (#72), Attack Time (#73) and Cutoff Frequency (#74)—all of which have a default value of 64 (center position).

Other Controllers

You can send any controller data—to control different parameters of your sound source—with each of the upper rows of knobs.

Selecting Other Controllers

In the Track Mixer, you can simply click on the label above the knob to choose a different controller. In the *View > MIDI Track components* menu you can determine the number of controller knobs by choosing *Assign 1–5*. The default is set to two knobs.

In the Environment GM Mixer, use the text boxes on the left to choose different controllers.

Here's a description of the predefined General MIDI functions. Not all MIDI instruments will understand these Controllers:

Reverb (Controller Number 91)

This knob controls the reverb level. The further right you turn the knob, the louder the effect signal becomes (in other words, more signal from the channel is fed into the effect processor).

Chorus Depth (Controller Number 93)

This knob controls the depth of the chorus effect. The further right you turn the knob, the stronger the effect becomes.

LPF Frequency (Controller Number 74)

This knob controls the overtone content of the sound. Higher values make the sound brighter.

Logic features a very sophisticated, yet simple to use, track-based automation system that allows you to create and play back fully automated mixes.

In addition, Logic offers a range of automation features that complement the track-based automation system. These can be used in isolation, or in conjunction.

Automation—Introduction

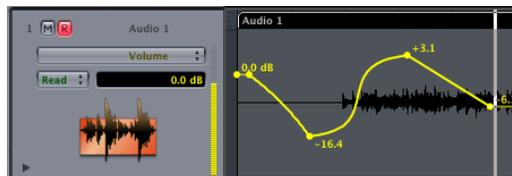
“Automation” is the ability of a mixing desk to record, edit, and play back the movements of its volume faders. Fully automated consoles not only record the motion of the volume faders, but the motion of all knobs and switches, including pan, EQ, and aux send controls.

All of Logic’s mix functions can be automated, without restriction. This applies to all plug-ins—the parameters of all effects and software instruments, plus all third-party plug-ins can be totally automated (with one or two exceptions, such as several Space Designer parameters, which cannot be automated in realtime).

Logic offers two types of automation: Track based and Region based.

Track Based Automation

The Track Based Automation system (see “Display” on page 315) is independent of MIDI and Audio Regions and takes place, as the name suggests, on the tracks themselves. Track Automation is also independent of Play or Record status.



There are three ways of writing and editing automation data in a track:

- Moving the on-screen faders and controls using different automation modes.
- Drawing automation data with HyperDraw (see “HyperDraw Functions” on page 323).
- Using Logic Control or another control surface.

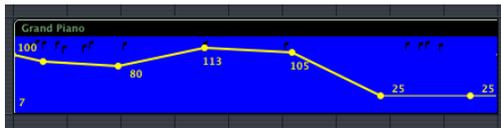
Track Based Automation is the recommended method for all automation tasks. It is sample accurate, and therefore, very precise. As sample accurate automation is processor-intensive, Logic provides options to partially or completely switch off the sample accurate mode via *Audio > Audio Settings*.

Moving Automation Data When Moving Regions

It's possible to move Regions with, or independent from, Track Automation data. Switch the modes by selecting *Options > Track Automation > Track Automation Settings > Move Automation with Regions*. You can choose between *Never*, *Always*, and *Ask*, which should be self-explanatory. *Ask* is the default setting.

Region Based Automation

Region Based Automation (see “Region Based Automation” on page 322) writes automation data directly into Regions as MIDI controller data.

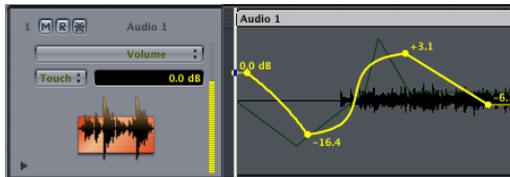


There are three ways of writing and editing this data:

- Moving the on-screen faders and controls in Record Mode.
- Drawing automation data with HyperDraw (see “HyperDraw Functions” on page 323); this is possible for both MIDI and Audio Regions; furthermore, the Score and Matrix Editors both allow the insertion of controller data via Hyper Draw.
- Drawing controller and other data in the Hyper Editor (see “Hyper Editor—Introduction” on page 455). You can also insert and edit controller data in the Event List (see “Using the Event List” on page 439).

Track Based Automation Display

Select *View > Track Automation* to display Track Based Automation data in the Arrange window. This is also available as a key command. As long as this function is unchecked, Regions appear as per usual. The gray shaded Track Automation area is only displayed when the vertical zoom is set to a sufficient height, as is the case with Region Based Automation (HyperDraw). As opposed to HyperDraw, engaging the Track Automation data display will automatically set a sufficient zoom level. Track Automation data is displayed on a transparent gray shaded area, allowing you to see the audio waveform in Audio Regions, and notes in MIDI Regions, at a reduced contrast level.



You can edit Track Automation data directly in this display.

Zooming of Individual Tracks

Each track can be displayed at an individual vertical zoom level: Click-hold on the very left lower edge (to the left of the track number) of the desired track in the track list, and drag downwards. Zooming of all tracks is performed with the Zoom Bars. Alternatively, you can use the magnifying glass of the Toolbox. The *View > Auto Track Zoom* function automatically enlarges the currently selected track.

Choosing the Parameter to be Displayed

You can select the parameter that you wish to display and edit in the pull-down menu of the panel which appears in the Arrange window track list. This can be the volume fader, pan pot, or any other parameter of the corresponding Mixer channel strip. The parameters are represented by different preset colors when displayed as a curve in the automation track. The most recently edited parameter will be displayed whenever you edit a parameter in the Track Mixer, a plug-in-window, or via a Logic Control unit.

Context Sensitive Display

In order to reduce the number of displayed parameters, the display is context sensitive, which greatly simplifies operation. This means that only parameters which actually control something in the selected Mixer channel strip (or its plug-ins) are displayed. The display of parameter names is also context sensitive: this is a major plus, because rather than seeing a meaningless number, you can see the name of the function you're dealing with in plain text. Parameters that already exist in the track (as automation data) are displayed in bold lettering in the context-sensitive menu.

Viewing Multiple Parameters

Background display of other parameters

The background of the automation track shows all other automation data (not the currently selected parameter) at a lower contrast level—when the track is at a sufficient zoom level. Volume is beige (dark yellow), Pan is dark green, everything else is dark blue. The transparency of background objects and the other track automation data can be adjusted to your needs in *Preferences > Display > Arrange*.

Individual automation track for each parameter

It is possible to view multiple automation data simultaneously on different tracks: The triangle in the lower corner of each track name in the track list allows you to create additional tracks for different parameters. If the triangle is closed, a click will add a track below the currently selected track. If possible, Logic will automatically set the automation parameter type of the new track to a type that's already recorded, but not currently shown.

Option-clicking the closed triangle will add as many tracks as needed to show all types of existing (already recorded) automation data. To ensure that the number of tracks created doesn't get out of hand, one Option-click will add up to 30 parameter tracks.

Option-clicking the open triangle will delete all tracks created for the “one track per parameter” automaton view. Please note that only the view is deleted, not the automation data itself. The automation data remains active, and can be viewed again by Option-clicking on the closed triangle.

Automation Modes

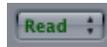
You can independently select the automation mode of every channel strip in the Track Mixer or Audio Mixer. The automation mode parameter is also visible in the Arrange track list, at higher vertical zoom levels. The automation mode can also be set via key commands. Given that Track Automation data can be recorded during playback mode, the default setting is *Off*, as any mix automation recording may prove disconcerting while arranging. You can choose between the following automation modes in any MIDI or audio (including Audio Instrument, bus, and output) Region:

Off

Off will disable the current Track Automation data without deleting it. No automation data will be written, read, or played back. If the current automation mode is *Off*, any edits to Track Automation data in the Arrange window will automatically switch the automation mode to *Read*. This ensures that the data, as currently edited, will be played.

Read

Read will automate the current track, using the existing automation data.



The data cannot be changed in realtime by touching/moving the fader.

Touch

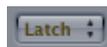
Touch will automate the current track in the same fashion as *Read*.



Should the fader be touched, the existing Track Automation data of the current fader type will be replaced by any new fader movements—while the fader is pressed/touched. *Touch* is the most appropriate, “standard” mode, used for creating the mix. It allows you to correct and improve the mix at any time, when automation is active. The time required by a parameter to return to its previously recorded setting, is set via *Options > Track Automation > Track Automation Settings > Ramp Time (ms)*.

Latch

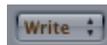
Latch basically works like *Touch*, but the current value will replace any existing automation data, after releasing the fader—when Logic is in playback (or record) mode.



To finish, or to end parameter editing, stop playback (or recording).

Write

In *Write Mode*, existing Track Automation data is erased as the Song Position Line passes it.



If you move any of the Mixer’s controls, this movement will be recorded—if you don’t, existing data passed by the SPL is simply deleted. Use *Options > Track Automation > Track Automation Settings* to determine the type of data that should be erased. The *Write Mode changes to setting* determines the mode that Logic switches to after a *Write* operation has been executed.

Be careful with the *Write* mode (and its settings), to ensure that you don’t erase your pan, bus, and EQ automation data by mistake, if your intention was only to erase volume fader information!

The Write mode of traditional mix automation systems will rarely be needed when working with Logic's advanced Track Automation features. It's mainly there to complete the selection of automation modes. It's easier to erase automation data by selecting *Options > Track Automation > Delete All Automation Data of Current Track* (or *All Tracks*, respectively). In earlier analog mix automation systems, the Write mode was the only way to erase automation data from tape when beginning a new project. The *Options > Track Automation > Write to End* and *Write to Right Locator* commands are self explanatory. One writes Track automation data to the end of the song, and the other to the right locator position.

MIDI

MIDI disconnects the Mixer controls from the Track Automation system, and switches to Region Based Automation (see "Region Based Automation" on page 322).



The fader will act like a standard external MIDI source, and will be recorded and played back as normal MIDI data in MIDI Regions.

Switching Automation Modes For All Channels Simultaneously

Hold Command when switching the mode of a channel strip, and all channel strips that were previously set to the same automation mode will switch to the selected mode.

Writing Track Automation Data

You have the following write options for Track Automation data:

- Move any fader or control of the selected channel strip—in the Track Mixer or Environment Mixer—with the automation mode (see "Automation Modes" on page 316) set to *Touch*, *Latch*, or *Write*. In real world usage, you'll rarely (if ever) use the destructive *Write* mode, which erases all automation data. The standard write modes are *Touch* and *Latch*.
- Choose a parameter in the Arrange track list, and move the value slider to the right of the track list, with one of the write modes engaged.
- Move the external faders (and other controllers) of your Logic Control or another suitable hardware controller that has been set up on your system, with one of the write modes engaged.
- Use HyperDraw (see "HyperDraw" on page 323) to manually draw in automation data

Important: The recording of Track Automation data takes place if Logic is in record or playback mode! The Arrange window track selection or audio record ready status is irrelevant. Whatever you touch/move will be recorded, when a channel strip is set to one of the write modes. The movement of Mixer controls (when in a write mode) can be used to overwrite and/or edit existing automation data, in real time.

Behavior in Stop Mode

In Stop mode, the Automation write modes are ignored, and no data is written if the fader is moved. There is, however, one exception: if there are no dynamic changes (no automation data), the current fader setting becomes valid for the whole song. This is the default behavior for all mix parameters, when you start a fresh song.

Deleting Track Automation Data

The following, self-explanatory, automation data erasure options are available.

Choose *Options > Track Automation >*

- *Delete currently visible Automation Data of Current Track*
- *Delete All Automation Data of Current Track*
- *Delete Orphan Automation Data of Current Track*
- *Delete All Automation Data of All Tracks*

Shift-Option–double-click opens a dialog that allows all automation data of the current type to be deleted. This is as per the *Delete All Automation Data of Current Track* option.

It is also possible to delete a selection of Hyperdraw nodes with Backspace. If no Region is selected, the selected nodes will be deleted when pressing Backspace. Use this function with care, to avoid the accidental deletion of Regions.

Editing of Track Automation Data in an Event List

Logic allows Track Automation data to be edited in a dedicated event editor. You can also open the folder which contains the (normally invisible) Track Automation data. As a core element of the program, Logic will always display every event as plain text in an Event Edit window. Please note, however, that this functionality won't be needed in normal music production situations, and is a real "expert" function. You can open the Track Automation event editor via the *Automation Event Edit* key command.

Track Automation Folder

Track Automation data is represented by a new class of "meta" events. These are an internal Logic event type that control processes that are not output via MIDI—although their data structure is somewhat similar to MIDI events. These meta events reside, like every event, in MIDI Regions, on tracks. The tracks, in which Track Automation data resides, are found in a dedicated folder which is normally hidden. You can display it via the *Automation Folder* key command. You will find a single MIDI Region that only contains Track Automation data on each track within this folder. This MIDI Region ends with the last Track Automation meta event. (Only tracks that contain automation data are shown in the Automation folder window).

You can edit these events with Region HyperDraw (*View > Hyper Draw*) and Track HyperDraw (*View > Track Automation*).

The display of the contents of the automation folder makes it easier to edit the automation data independently from Regions. In normal circumstances, however, it's usually quite useful to see the Regions while designing the mix. As such, you'll probably find that you rarely open this folder view.

Automation Quick Access

This feature makes Track Automation extremely fast and simple if you only have one hardware MIDI controller available (one fader on your MIDI keyboard, or maybe just the Modulation wheel). You can use this single hardware controller to access (and automate) the currently visible Automation parameter of the selected Track in the Arrange window.

Setting Up Automation Quick Access

Open the Automation Settings dialog: *Options > Track Automation > Track Automation Settings*.

There is a section called *Automation Quick Access*, which can be enabled or disabled via On and Off radio buttons. Once enabled, a dialog will prompt you to move the desired controller. Move the hardware controller that you'd like to use for Automation Quick Access. Click the *Done/Learn Message* button below. The other parameters shown (via a click on the *Edit* button) here will immediately identify and indicate the type of control element you are using (even quite exotic formats are supported). Disable the *Learn Message* button, by clicking on it a second time (the *Done* button), or close the *Automation Quick Access* dialog.

Once set up, you will have hardware control over any currently visible Automation parameter that is selected in the current Arrange track.

Enable/Disable Automation Quick Access

Should you choose the Modulation Wheel for Automation Quick Access (AQA), you might want to switch between its use for AQA and "normal" Modulation Wheel duties—as MIDI controller #1.

This is most efficiently done with the global *Toggle Automation Quick Access* key command.

Transform Track Automation Splitter

It is possible to integrate an external MIDI controller (Modulation Wheel and so on) into Logic's automation system, and record external MIDI information as Track Automation data. This is best achieved with the Automation Quick Access (see "Automation Quick Access" on page 320) feature, but it can also be done by using the Transformer Environment Object (see "Transformer Object" on page 224).

The Transformer Environment Object offers a new mode in the Transformer window: the *Track Automation Splitter*. If the condition matches, incoming events will be sent to the Track Automation of the Object connected to the top cable of the Transformer—after passing through the "Operation" field. Appropriate "Operation" field settings transform incoming MIDI data into Fader event data, allowing the automation of any parameter of the connected Mixer Object.

You will need one Transformer Object for each parameter that you wish to address and automate.

Example:

Control and automate the ES P (a detailed description of the ES P can be found in the Plug-In Reference) filter cutoff with an external modulation wheel (CC#1)

Minimal environment setup: In the Logic Environment, create a Transformer Object via *New > Transformer*. Connect the Physical Input Object to the Transformer Object. Connect the top output cable of the Transformer to an Instrument Channel Object, with the ES P inserted in the instrument slot. Connect the second Transformer output to the "Recording & Thru" Object (sequencer input). Open the Transformer Parameter box by double-clicking the Transformer Object. In the pull-down menu, select "Track Automation Splitter" as the transformer mode. As the input condition, set: | Status: Control | Cha: All | -1-: 1 |. As the output operation, set the event type to: | Status: Fader | Cha: 2 | -1-: 7 |.

In this setup, the modulation wheel will control the ES P filter cutoff of the respective instrument. Modulation Wheel movements can be automated via the usual automation modes (read, write, touch, latch).

Transformers need to be set up in a cascading configuration for each additional parameter that you wish to automate via external MIDI controllers.

Region Based Automation

Region Based Automation writes automation data directly into Regions as MIDI controller (or other) data.

Recording of MIDI automation data

Region Automation data is recorded just like regular MIDI events. Logic must be in Record Mode to capture this type of automation.

You have the following options for MIDI automation data recording:

- Set the automation mode of a Track Mixer channel strip to “MIDI”. The movement of any channel strip fader or control will be recorded on the corresponding track as MIDI controller data. In the case of audio channels, the track must not be in record enabled mode.
- Moving any Environment Fader (see “Recording and Playback of Fader Movements” on page 247) records the fader’s MIDI events to the currently selected track.
- External MIDI controllers can also be used to create and record events. (Please note that it is currently not possible to use Logic Control for this purpose, due to its high fader resolution).

In audio channel strips, all settings (including plug-in parameters) can be recorded as MIDI controller data. Record different parameters to find out which controllers are used for what parameters. It’s also possible to cable other Environment Objects, such as Instruments, Channel Splitters or MIDI Faders into Audio Objects. You may use these Environment Objects as track instruments in the Arrange, for the automation of the Audio Object they are connected to.

Drawing MIDI Automation Data

Controller data can be directly inserted with HyperDraw (see “HyperDraw” on page 323) in the Arrange, Matrix, and Score Windows. The Hyper Editor (see “Hyper Editor—Introduction” on page 455) serves a similar purpose, in a dedicated window.

Editing MIDI Automation Data

As MIDI automation data consists solely of MIDI events, it can be edited just like any other MIDI events, using the Event List (see “Using the Event List” on page 439), Hyper Editor (see “Hyper Editor—Introduction” on page 455) or the Transform window (see “Transform Window—Introduction” on page 587).

HyperDraw

HyperDraw is the easiest way to create and edit Automation data in the Arrange window. Changes to automation data are made by graphically inserting points, which represent fixed controller values. The points are then interpolated automatically by Logic, which creates a series of events that smoothly connect the first event with the last. These automatically generated events are recalculated every time you edit the curve points.

HyperDraw is available for both the Track Based (see “Display” on page 315) and Region Based Automation (see “Region Based Automation” on page 322) systems. The use of HyperDraw is almost identical for both automation systems.

HyperDraw for Tracks

Track HyperDraw is automatically activated when Track Automation is enabled in the Arrange Window (*View > Track Automation*).

HyperDraw for Regions

Region Automation is switched on for the selected Region by choosing a certain event type via *View > Hyper Draw > ...* This type of HyperDraw is also available in the Matrix window (see “Hyper Draw in the Matrix Window” on page 474) and the Score window (see “Hyper Draw in the Score Edit Window” on page 494), where a blue HyperDraw section is added below the editing area. You must set a large enough vertical zoom resolution in order to see the HyperDraw curves.

HyperDraw Functions

HyperDraw makes use of various tools, maximizing efficiency when drawing and editing automation data. In principle, the following applies to both Track HyperDraw and Region HyperDraw.

Automation Arrow Tool

This tool has various functions, depending on the setting of the pull-down menu just below the Arrange Toolbox:



Curve

You can bend the line between two nodes or any selection. There are 4 different curve types available: convex, concave, and two different types of S-curves.

Note: This function is also available when using the Standard Arrow Tool, by pressing Option-Control.

Select

You can rubber band any selection (of nodes) in the automation data. A click on a Region selects all currently visible automation events within the Region borders. Once an area of (or the entire) Region is selected, you can freely move the selection to the left or right. With Option-Control pressed, you can copy the selection to a different location. Please note that both operations will delete all nodes in the destination area.

Non-continuous selection

Shift-clicking with the Select tool selects other areas, in addition to an existing selection. This enables you to simultaneously edit non-contiguous selections.

Extended Selection

Shift-clicking on a node with the Select tool—in front, or following a selection—extends the current selection.

Regular Arrow Tool

This tool can be used for a variety of actions within the HyperDraw area.

- A short click into the empty HyperDraw area will add a new node.
- The very first click into an empty HyperDraw track creates a new node at that position, and another node at the beginning of the (HyperDraw) track. This ensures that you can't create parameter controls with "gaps" in the middle of a MIDI Region, but have full control over the parameter from the beginning of the automation track.
- A short click on a node will delete it.
- A short click on, or just outside, a line (not a node) will add a new node on the line.
- A long click on a line allows you to move the line, along with its two endpoints—the nodes that encompass the line.
- A short and a long click outside a line will create and select a new node, allowing you to move the newly-created node immediately.
- Option-long clicking on a selection allows you to copy the selection.
- Option-clicking, without a selection will select all automation data behind (following) the current mouse position, allowing you to drag the selection.
- An Option-double-click, without a selection will select all data.
- A long click, while holding Option-Control on a node, a line or a selection allows various curves to be set on a line, or across the entire current selection. This functionality is identical to the Automation Arrow tool in Curve mode.

Rubber band Selection

Shift-click and dragging allows you to make a rubber band selection. There are three options:

- Without further modifier keys, no new nodes will be created.
- With Option held, a new node will be created on each side of the rubber band area.
- With Option-Control held, two new nodes will be created on each side.

Multiple Selection of Nodes

- A short Shift-click on a node will toggle the selection of the node.
- A short Shift-click on a line will toggle the selection of the line.
- A short click on the background will deselect all.
- A click outside of the Track Automation data in the Arrange will deselect all.
- A long click in a selected area allows all selected nodes to be moved.
- A long Shift-click allows a rubber-band selection. The selected area will toggle.
- Moved automation data will automatically erase any data which exists in the destination area.

Relative and Absolute Value Changes of Selections

There are two choices available when changing the values of a selection of nodes:

- Clicking on a line or node enables you to change all values by the same absolute amount.
- Clicking outside a line, within the selected area (a node or outside a node), changes all values proportionately, by a percentage value.

Track Automation: Select All, Scaling

Command-clicking on either; the numerical or graphical value displays in the Arrange track list allows the following:

- A short Command-click selects all (current parameter) automation data of the track.
- A long Command-click scales all (current parameter) automation data of the track.

Pen Tool

The Pen Tool allows you to freely draw automation events.

Eraser Tool

The Eraser Tool allows you to erase automation events.

Value Display in HyperDraw

Numerical values are automatically displayed at HyperDraw nodes, if there is sufficient space onscreen. Numerical values are context-sensitive—the centered pan position is displayed as 0 (not 64), and volume is displayed in dB, as examples.

If no events exist for volume and pan, Logic draws a horizontal line of the current value (if available). If clicked, a single event of that value will appear on the HyperDraw track/area. Further clicks work as per usual.

Activating Region HyperDraw

To activate HyperDraw for the currently-selected Region(s), select *View > Hyper Draw...* You can select different HyperDraw modes for different Regions.

Event Type

You can select the following types of events directly from the HyperDraw menu:

- Volume
- Panning
- Balance
- Modulation
- Breath
- Foot Control
- Portamento Time
- Expression
- Surround Angle
- Surround Radius
- Surround LFE
- Channel Pressure
- Pitch Bend
- Program Change
- Note Velocity

The chosen event type is displayed as a controller number, or by name, in the upper left corner of the HyperDraw area.

MIDI Channel

The *View > Hyper Draw > Channel ...* menu item allows you to define the MIDI channel used for event display and editing. The chosen channel number will also be displayed alongside the event type.

HyperDraw—Note Velocity

Once active—by selecting *View > Hyper Draw > Note Velocity*—click-holding at any point in a HyperDraw window will activate the note velocity line tool, much like that found in the HyperEdit window. Releasing the mouse button changes the tool icon to a line, which can be visually placed onscreen. The end of the line is inserted by clicking a second time. This will automatically scale all note velocities, aligned to the inserted line. Please note that use of this option only makes sense when the Region area actually contains notes.

The Note Velocity Line Tool works in different modes:

- *Absolute*: With no modifier key pressed, the velocity of notes will be changed to match the values of the line.
- *Relative*: Command-click, the original and new note velocity will be analyzed. The resulting velocity is the average of both.
- *Just Selected*: with Option pressed, only previously selected notes will be affected.

Both Relative and Just Selected modes can be combined.

Deactivating Hyper Draw

To switch off Hyper Draw for selected Region(s), select *View > Hyper Draw > Disable*.

Other Data Types for Region HyperDraw

Autodefine

This option sets the Hyper Draw parameters automatically, making the first event in the Region visible.

Autodefine is not limited to switching the HyperDraw display to the first incoming controller, but it can also respond to other types of events as well. It responds in this order:

- Controller
- Aftertouch (Channel Pressure)
- Pitch Bend
- Program Change
- Note Velocity

Sustain Pedal (Controller 64)

Controller 64 (sustain) is displayed in a special way in HyperDraw: there is no graph, merely event “on” and “off” messages.

Defining other data types in Hyper Draw

If you want to use Hyper Draw to edit a controller that isn't directly available in the Hyper Draw menu, use *View > Hyper Draw > Other*, and select the number of the controller and the MIDI channel in the resulting window. As soon as you select a new Region, you will see the corresponding Hyper Draw parameters in this window.

This float window always displays the Hyper Draw parameters for the selected Region(s).

Key commands for Region HyperDraw

The following key commands are available in the Arrange window, to speed up the use of Hyper Draw:

- Hyper Draw: Disable
- Hyper Draw: Volume
- Hyper Draw: Pan
- Hyper Draw: Modulation
- Hyper Draw: Pitch Bend
- Hyper Draw: Note Velocity
- Hyper Draw: Other...
- Hyper Draw: Autodefine

As always, any defined key command is displayed beside the menu function.

Conversion of Automation Data

Track Automation data can be converted into MIDI data for Region Based automation, and vice versa. These commands are found in the *Options > Track Automation* menu. These functions allow you to move data (Volume, Pan, plug-in parameters, and so on) from Regions in the Arrange window to the Track Based Automation system, and vice versa—moving data from the Track Based Automation to Region Based (last two functions). Ensure that at least one Region is selected when using these functions.

Converting automation data

In the automation view:

- Command-clicking on an automated parameter will activate the parameter pop-up menu.
- Select a destination parameter in the menu.
- A dialog will ask you to “convert” or “copy & convert” the original parameter’s automation data into automation data for the destination parameter. A “copy & convert” of the original parameter data is kept, in addition to the destination parameter.

Moving from Region Data to Track Automation

Move Current Region Data To Track Automation

Moves the currently visible Region data (Volume, for example) to the Track Based Automation system.

Move All Region Control Data To Track Automation

Moves all Region Based automation data to the Track Based Automation system.

Moving from Track Automation to Region Data

This option only moves Track Based Automation data that falls within the boundaries of the selected Region.

Move Current Track Automation Data To Region

Moves the currently visible Track Based Automation data to a selected Region.

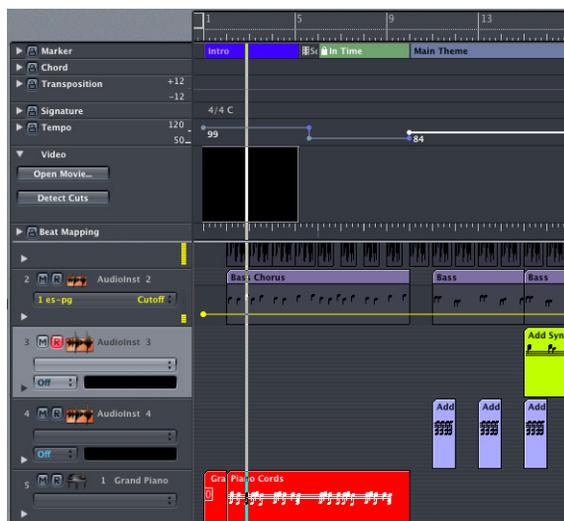
Move All Track Automation Data To Region

Moves all Track Automation data to a selected Region.

Global Tracks provide a perfect way to view and edit global events, such as Tempo, which affect all tracks in the arrangement.

Global tracks can be displayed in the following windows, just below the Bar Ruler:

- Arrange window
- Matrix Editor
- Score Editor (in linear view)
- Hyper Editor



There are several types of Global tracks:

- Marker track: contains *markers*, which are used to label bar positions and parts of the song. Their length, text, and color can be edited freely (for details on markers see “Markers” on page 157).
- Tempo track: contains all tempo changes of a song.

- **Beat Mapping track:** Allows you to assign the desired bar position to any musical event (both MIDI notes and distinct accents in Audio Regions). This makes it possible to adjust the musical timeline to the original timing of a MIDI or Audio Region that has been recorded rubato (free time, including speeding up and slowing down), or just without a metronome click. The audible outcome remains unchanged, but the resulting display will fit the musical timeline.
- **Signature track:** contains the basic key of the song and all time and key signatures, as they are displayed in the Score Editor.
- **Chord track:** contains chord symbols that can be derived from MIDI Regions or created with the mouse. These chord symbols may also be inserted into the score. The root note of the chords determines the transposition (pitch shifting) of all Apple Loops, and can also affect the playback of MIDI Regions.
- **Transposition track:** shows global transposition events. It is linked to the progression of the chord root notes in the Chord track: Changing a chord root will be reflected in the Transposition track and vice-versa.
- **Video track:** displays frames of a QuickTime movie as “thumbnails” that are perfectly synchronized with the music, making it ideal for film scoring. Cuts in the movie can be automatically detected and marked.

Display Options for Global Tracks

Global tracks are displayed or hidden by repeated use of the *View > Global Tracks* menu option. The *View > Global Track Components* submenu lists the individual Global track types. You may use these submenu items to toggle the display of each track type, one by one, or all at once with the *Show All/Hide All* options. Following the use of any of the *Components* commands, the *View > Global Tracks* command will only toggle the display of components previously chosen in the submenu.

Please note that there are also key commands for all of the following options:

- *Toggle Global Tracks*
- *Toggle Marker Track*
- *Toggle Transposition Track*
- *Toggle Chord Track*
- *Toggle Signature Track*
- *Toggle Tempo Track*
- *Toggle Beat Mapping Track*
- *Toggle Video Track*
- *Hide All Global Tracks*
- *Show All Global Tracks*

In the upper left corner of each Global Track name column, there is a small disclosure triangle pointing to the right. If clicked, the track height is expanded and additional controls become visible. A further click on the triangle reduces the track height. You can freely adjust the horizontal borders between tracks by dragging them up or down with the mouse.

The order of Global tracks can be reconfigured by grabbing any of them with the mouse in the track list (anywhere except the control elements), and dragging them up or down. The display order of Global tracks is saved independently for each window.

If the Track Protect buttons are visible (*Menu View > Track Protect Buttons*), any of the Global tracks can be protected by clicking on its Protect button, which will turn blue. This will prevent the track from being edited unintentionally.

How to Create, Move, Copy, and Delete Global Events

The data on most Global tracks are called *global events* (except on the Video and Beat Mapping tracks, to which the following descriptions do not apply).

Creating Global Events

To create a global event (a Marker or a tempo change, for example), use the Pencil tool and click at the desired position in the track. (If you haven't changed the default tool assignments, this is done by clicking while holding the Command key). Watch the help tag while holding down the mouse button: It displays the exact position and value (if applicable) of the event to be inserted, until the mouse button is released.

Selecting and Moving Global Events

Global events are selected with a simple click, and are moved and/or changed by dragging them with the mouse. We recommend that you keep an eye on the help tag while doing so. Multiple selection is achieved by Shift-clicking on the desired events. This can even be done in combination with the selection of Regions on Arrange tracks.

To select several subsequent events on the same Global track, you can use the rubber band selection method, while holding the Control key.

To select all events on a particular Global track, click in the desired Track List.

If menu or key commands for multiple selections are made in the Arrange window (such as *Select All*, *Toggle Selection*, *Select Inside Locators*), they will also apply to global events on all visible Global tracks. This can be useful for copying or moving an entire song section, inclusive of all signature and tempo changes, for example.

Note: Events on protected tracks will not be selected and—if currently selected—will be deselected by these commands. Consequently, there are several choices available should you wish to avoid having global events selected by any of these selection commands: Either you activate the Track Protect buttons of the desired tracks; or you choose *Edit > Deselect Global Tracks* after the use of any of these commands; or you simply turn off the Global track display temporarily, using the *View > Global Tracks* menu option or the corresponding key command.

Copying Global Events

You can use the same copy methods used for Regions and MIDI events on global events: Drag an event while holding the Option key (watch the help tag) or use the standard menu or key commands for *Copy* and *Paste*. The copied global event will be pasted at the current Song Position Line (SPL) location. If multiple events are copied, the first one will be pasted at the SPL, the others will retain their relative distance to the first copied event.

Deleting Global Events

To delete one or several global events, select the desired event/s and press Backspace or Delete, or just use the Eraser tool.

Marker Track

Markers can be placed at any position in the Bar Ruler or in the Marker track. The marker text, color, and length can be edited as desired. The main purpose of markers is to label different parts of a song, and to enable the quick selection and playback of these parts. Marker text can contain any information you like. Additional information about Markers can be found in “Markers” on page 157.

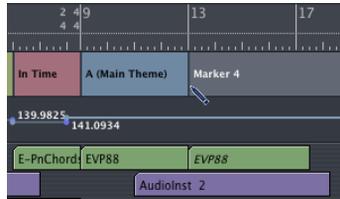
If the Marker track is visible, Markers will be displayed in it. If the Marker track is hidden, existing markers will be displayed in the Bar Ruler. The main advantage of the Marker track, in comparison to the marker display in the Bar Ruler, is that the Marker track allows markers to be copied, or changed in length, by dragging their border lines.

Note: If you click a marker in the Marker track while holding the Option key, the SPL will jump to the beginning of the marker (while the sequencer is running). This corresponds to clicking a marker with the Command key in the Bar Ruler’s marker display (if the Marker track is hidden).

Working With Markers

To create a marker:

- Select the Pencil tool, and click at the desired position in the Marker track.



Alternatively, you can make use of several menu and key commands: *Options > Marker > Create*, *Create Without Rounding* and *Create by Regions*. The latter command creates one marker for any selected Region, with the same position, length, and name as the Region itself. The same function is performed when you click the *From Regions* button in the Marker track, or if you drag a Region from an Arrange track onto the Marker track.

Note: You can also create markers that correspond exactly to the length and position of a Cycle by simply dragging the Cycle area down into the Marker track.



To delete a marker:

- You can use the Eraser tool, or just select the marker and press Backspace or Delete.

To move a marker:

- Just drag it with the mouse. The mouse cursor changes to an open hand during this operation. This is also possible with several selected markers.

Markers can also be assigned to an absolute time position, regardless of any tempo changes, which is useful in film scoring situations (see the section about the Video track): To do this, select the desired Marker/s and choose *Region > Lock SMPTE Position* or the corresponding key command. *Unlock SMPTE Position* will reverse this status. Locked markers are indicated by a padlock symbol in the Marker track.

To change the length of a marker:

- Just drag its right border. This can also be the beginning of the subsequent marker, especially if the length of the second marker hasn't been defined. The mouse cursor will change to a pointing hand when in the correct position for this procedure. Markers cannot overlap.

To copy a marker:

- Drag the marker while holding Option, or use the standard *Copy* and *Paste* commands.

Marker Color

To assign a background color to a marker, open the color palette (*View > Colors*), select one or several markers, and click the desired color in the palette.

Marker Text

If you double-click an existing marker in the Marker track, the *Marker Text window* will open, containing the default *Marker ##* name. This name is pre-selected, allowing you to immediately overwrite it by typing in the desired name. The “##” denotes the automatically displayed Marker number, which corresponds to the (marker) order along the timeline. You can also use the “##” characters in conjunction with other characters, if you’d like the marker number to form part of the name. More about marker text can be found in “Markers” on page 157.

Note: If you use *Enter* to create paragraphs in the Marker Text window, the first paragraph of the text (regardless of its length) will be displayed in a separate “title line” (of the marker) in the Marker track. This is unlike the marker display in the Bar Ruler, where all text below the first paragraph will also be displayed in the Marker track, depending on available space (you might want to change the height of the Marker track). This can be used for musical or technical notes, as an example. In this scenario, the marker color is only shown in the title line, with the remaining text displayed white on black.



If you want to edit a marker name immediately after creating it, hold Control-Option-Command while clicking on the desired marker track position: A text field will open, allowing you to type the desired name. Press Return to complete.



This method of quick text entry can also be applied to existing markers: Double-click the marker while holding Control-Command, or use the Text tool.

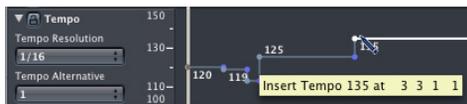
Tempo Track

The Tempo track displays tempo changes as nodes: dots connected by lines. By default, these dots are followed by horizontal lines that (at the bar position of the next tempo change) form right angles with vertical lines, connected to the node of the ensuing tempo change.

Note: If there is enough space in the Tempo track, the tempo will be indicated numerically (in bpm) alongside each node.

Insertion of Tempo Changes

Tempo events are inserted by a double-click (with the Pointer) or by using the Pencil tool. Watch the help tag and don't release the mouse button until the intended tempo and position are indicated exactly.



Note: If you hold Control-Option-Command while clicking in the Tempo track, a text field opens. You can type the desired bpm value into this field. Press Return or Enter, and a tempo event (of the typed bpm value) will be created at the clicked position.

Deleting Tempo Changes

To delete a tempo change, select it by either clicking the node itself or the line which leads away from it, then press Backspace or Delete. Alternately, you can double-click on the node or use the Eraser tool.

Continuous Transition between different Tempi

To create a continuous transition between two tempi, grab the dot at the tip of the right angle (above or below) the second node, and drag it inside. A curve or diagonal line will be the result. You'll find that this is quite similar to drawing track automation curves with the mouse.



The *Tempo Resolution* menu in the Tempo track defines the number of tempo changes that are actually performed when using curves: When it is set to 1/16, there will be four tempo changes per quarter note, 1/1 will only generate one tempo change per bar, which will result in a less smooth transition. This setting can be defined differently for each node.

To delete a tempo curve:

- Click the handling node (at the tip of the right angle) with the Eraser tool, or double-click on it.

Moving and Copying Tempo Changes

To move a tempo change, grab its node (or the line leading away from it) and drag it left or right. To copy it, do the same while holding Option. To prevent unintentional changes, moving a node is restricted to either vertical or horizontal movement. Put another way, you can either change the tempo value or its position, but not both at once. To alter the tempo in very small steps, press Shift while dragging the desired node up or down.

Tempo events can also be copied by using the standard *Copy* and *Paste* procedure. The SPL will determine the position for the first pasted event.

It is also possible to copy or move *multiple* tempo events at once: Use Shift-click or the rubberband selection method (while pressing Control) for multiple selection.

More About the Tempo Track

- The *Tempo Alternative* menu in the Tempo track allows you to switch between nine tempo alternatives (for details, see “Tempo” on page 597). To copy all tempo events from one tempo alternative to another, press Option while selecting the tempo alternative from the pop-up menu.
- Shift–double-clicking in the Tempo track will open the *Tempo List*.
- The *display range* for tempo events is adjusted automatically. The upper and lower boundaries of the Tempo track are labeled in the Track List. Dragging a node beyond the current maximum or minimum scale boundaries will result in an automatic adjustment of the range. You can also define the maximum and minimum ranges of the tempo display manually. To do so: Grab the maximum and minimum values in the tempo scale and drag them vertically, or double-click on either (or both) range(s) and type the desired numerical value into the text field(s). These user-defined values are displayed in yellow. If you want to reset to the automatic adjustment values, use the procedure described above, and leave the text fields empty.
- The Tempo track reacts to actions performed in the *Beat Mapping track*. Given this behavior, you should not make any changes in the Tempo track after you use Beat Mapping functions, or at least not if the original timing that the Beat Mapping is derived from is to be preserved.

Beat Mapping Track

A note for experienced Logic users: This function replaces the Reclock function of previous Logic versions. The *Beats from Region* function corresponds to the previous Guide Sequence option for mapping bar positions to notes, but it's easier to handle.

Basic Concept

You will generally play to a metronome click when recording in Logic. There are, however, instances where you'll want to record without a click, playing rubato, or at least not at a strict same tempo throughout. Another situation may be where you have an existing audio recording that wasn't recorded to a metronome click (and therefore contains slight tempo variations) that you want to add additional tracks to. In these situations, the Beat Mapping track helps to make the display of these types of recordings rhythmically meaningful—by defining the bar positions of existing musical events (both MIDI notes and accents in Audio Regions) without changing their absolute time position, thereby preserving the audible result with its original timing.

This is achieved in two steps: First, you graphically connect musical events (MIDI notes or *Transients* in Audio Regions, which correspond to the beginning of strongly accented notes) to the desired bar positions in the Beat Mapping track, by drawing lines between them with the mouse (a more detailed description of this procedure follows below). Logic will automatically insert a tempo change event for each of these bar position locations, causing the note to be played at its previous absolute time position, despite its altered bar position. A Logic song processed in this way will contain the same tempo variations as the original recording.

Presuming accurate Beat Mapping, everything will be “in time” with the metronome tempo, affording you a number of advantages for further song development:

- The metronome click can be used when recording additional Regions.
- Quantize functions can be applied to newly recorded Regions.
- Loops (both MIDI and Apple Loops) will automatically adjust to the tempo when used in the arrangement.
- MIDI Regions recorded without a click will be displayed in a musically meaningful way in the Score Editor.
- Additional MIDI Regions can also be created via the Step Input function, without sounding too “stiff”. This looser feel is due to the parts being played back with all tempo changes created by the Beat Mapping process.

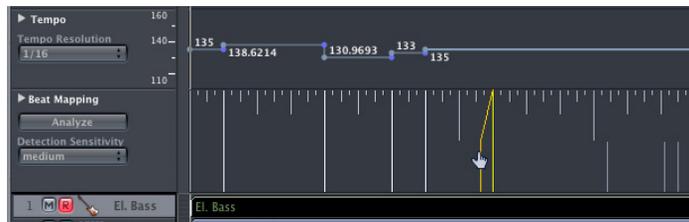
Beat Mapping with MIDI Regions

Let's take a look at the Beat Mapping procedure in the Arrange window. To test it, you'll need at least one MIDI Region that doesn't fit the current tempo. Create one by recording without a metronome click, if none are available.

In the upper part of the Beat Mapping track, you can see a ruler which contains a graphical representation of musical bars, beats, and sub-divisions. These reflect the *Global Format value* set in the Transport window (and also depend on the current zoom level).

To allocate the notes to particular bar positions, proceed as follows:

- 1 Select the Region(s) that you want to use for Beat Mapping. Once the Region is selected, short vertical lines will appear at the bottom margin of the Beat Mapping track. They represent the notes in the selected Region(s).
- 2 Start from the left, at the first bar position that you want to assign to a MIDI note: Click-hold at the exact, desired position in the Bar Ruler. A yellow vertical line will appear.
- 3 With the mouse button still held, drag the cursor down towards the line that represents the chosen note. A second, slightly darker, yellow line which is still connected to the same position in the Bar Ruler will appear. This line will follow the movement of the mouse cursor into the lower part of the track, forming an angle. Once this line is connected to the desired note, release the mouse button.



- 4 Logic will insert an automatically calculated tempo change, which can be seen in the Tempo track. This will ensure that the allocated note (and all other notes) will be played back at the same absolute time position as before, despite their altered bar position(s).
- 5 Move from left to right, adjusting further events along the time axis, to obtain the best Beat Mapping results.
- 6 If you make a mistake, you can erase any beat allocation by double-clicking on it, using the Eraser tool or by selecting it and pressing Backspace. When using Backspace, be careful not to erase other currently selected events or Regions by accident.

To erase *all* beat allocations, click anywhere in the Track List of the Beat Mapping track (except on the buttons and menus) to select everything in the track, and press Backspace.

Note: If you want to draw a connecting line from a bar position to a particular position of the original recording where no note exists, hold Control while drawing the connecting line with the mouse. This will allow the line to snap to any format subdivision.

Important: Beat Mapping is also possible in the Matrix, Score, and Hyper Edit windows, where you have the additional advantage of directly seeing the corresponding notes.

Beat Mapping with Audio Regions

This works in a similar fashion to that described above for MIDI Regions. The main difference is that Logic must first *analyze* Audio Regions in order to find rhythmically prominent spots, which can subsequently be linked to a bar position. During this analysis, Logic searches for *transients*: Positions where the audio recording becomes a lot louder—over a very short time span (a signal “spike”, in other words). This is typical of drum recordings, but the analysis of other instruments or complete mixes (depending on the musical context) can also produce usable results.

To detect transients, select the Audio Region and click the *Analyze* button in the Track List of the Beat Mapping track. Following analysis, the transients are displayed as small vertical lines at the bottom of the Beat Mapping track, just like the notes in MIDI Regions. The Beat Mapping procedure is as described above for MIDI Regions.



It is also possible to analyze several selected Audio Regions at once. An alternative method for Audio Region analysis is to drag them directly onto the Beat Mapping track.

A pop-up menu in the Track List allows you to set the *Detection Sensitivity*. Changing this setting will retrigger the analysis procedure. A higher *Detection Sensitivity* setting will detect more transients, which can be useful if dealing with less distinct accents in the music (such as rather soft drums in a loud mix). On the other hand, a higher *Detection Sensitivity* setting might lead to the detection and display of transients that have no meaning for the rhythmic structure of a Region. In general, you should begin with a lower *Detection Sensitivity* setting, and only switch to a higher setting if obvious rhythmic elements in the music aren't recognized correctly.

Note: The detection ability is independent of the overall volume of a Region. In other words, the results will be the same if you normalize a Region.

Beats from Region

The *Beats from Region* button (labeled *Beats from Rgn*) in the Beat Mapping track column is used for an automatic Beat Mapping method that works with a self-recorded “Metronome Region”: Use a MIDI track and an appropriate sound (such as a closed hi-hat or cross-stick) to record a one note per beat metronome click that fits the music in the existing Region/s.

If some of the Metronome Region notes are not in time with the original recording, you can edit their positions in any of the MIDI editors—in order to get them “in sync” with the music. Select the Metronome Region, and click the *Beats from Region* button. Logic will map all beats to the notes in this Region, and insert tempo changes to preserve the original timing, starting with the first beat in bar one. Although the audible result doesn’t change, the music will be displayed correctly with regard to its bar positions. In fact, this procedure is almost identical to the *Reclock* function, using a *Guide Region*, in previous Logic versions, but it’s much easier to handle.

Beat Mapping to Movie Cut Positions

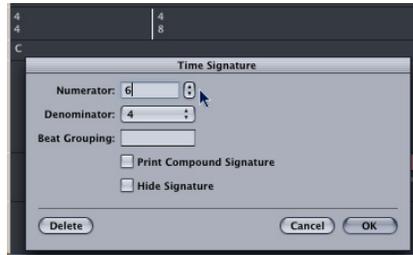
If the Video track is visible, a QuickTime movie is loaded, and the *Detect Cuts* function (in the Video track) is used on it, the detected scene cuts appear as available mapping positions (vertical lines) at the bottom of the Beat Mapping track. You can easily define a cut position as the first downbeat of a bar by allocating it to the bar position as described above.

Beat Mapping to Markers

If the Marker track is visible, you can select the desired marker (click) or multiple markers (Shift-click) as available mapping positions (vertical lines) at the bottom of the Beat Mapping track. Once done, you can hide the Marker track.

Signature Track

The Signature track shows all time and key signatures of a song. These can be created in either the Score Editor or directly in the Signature track: Click at the desired position using the Pencil tool. A dialog window will open, allowing you to set the time or key signature. Insertion of the event occurs after closing the dialog with the *OK* button. If you perform this procedure when the track height is reduced, a time signature change will be created. If the track height is expanded, you will see separate lines for time and key signatures, which can be independently clicked with the Pencil tool to create events.



The playback transposition for Apple Loops (and also MIDI Regions, if the *No Transpose* option is unchecked in the Object Parameter box) is controlled by the root note of chords in the Chord track. These root notes determine the global playback transposition—relative to the current key signature—shown in the Signature track. If no chords are available in the Chord track, the global playback key for Apple Loops and MIDI Regions is determined by the very first key signature (default: C major).

Apple Loops can contain information about the key they are in, and can be transposed automatically. They will be played back in the song key by default, which is defined by the first key signature event. No distinction is made between major and minor keys for these global transposition functions; in fact, only the root of the initial key signature is relevant for playback of Apple Loops and MIDI Regions.

Note: If a *Garage Band* song file is imported into Logic, the initial key signature will automatically be set in accordance with the “project key” of the *Garage Band* song. Any existing Apple Loops will be played back in this key, or rather, with the key’s root note.

Key signature changes *after* the initial key signature only affect the *display* of MIDI notes in the Score Editor—they do not have any effect on playback.

Similarly, even time signature changes don’t affect playback, but only the display of the Score Editor. You will not hear anything different when you change the time signature or insert a time signature change in this window.

Handling Signature Changes

Events on the Signature track can be selected, moved, deleted, and copied (drag them while pressing Option or use the standard *Copy* and *Paste* commands). Multiple selections are possible, even in conjunction with Regions, which is very useful when complete parts of a song, containing signature changes, are to be copied. In this situation, the *Edit > Select Inside Locators* option can be helpful. Note that the Signature track must be visible and must not be protected, in order to select and copy signatures.

If you double-click a signature in this track, a dialog box opens, allowing you to edit the signature.

Shift-double-clicking in the Signature track opens the *Signature/Key Change List*, where time and key signatures are shown in a list style editor, along with other global Score symbols such as repeat signs, double bar lines and so on.

Cutting Bars

You can use the Scissors tool in the Signature track to cut bars. As an example; to divide one 5/4 measure into a 3/4 and a 2/4 measure by cutting at the fourth beat of the 5/4 bar.

If you make a cut in the middle of a bar in a section where the time signature doesn't change, two corresponding shorter measures will be inserted, with the original time signature resuming after the cut.

Likewise, it is also possible to *merge* two subsequent measures into one longer measure by using the Glue tool in the Signature track.

Chord Track

The Chord track contains chord symbols. These can originate from different sources, and methods of creation:

- Use the Pencil tool at the desired position in the Chord track. A dialog window will open, allowing you to define the chord symbol.
- Use the Analysis function for MIDI Regions: Select the desired MIDI Region (preferably one containing complete chords) and click the *Analyze* button in the Chord Track List. The MIDI Region will be analyzed, with the resulting chords appearing in the Chord track. This also works for several subsequent Regions. Alternatively, you can drag the desired Regions onto the Chord track.



- The third way to generate a chord symbol is when a *transposition event* is created or altered in the *Transposition track*. In this scenario, the root note will be shifted accordingly. This behavior is due to the close links between the Chord and Transposition tracks.

Global Transposition Generated by the Chord Track

Any chord in the Chord track can affect global transposition, thus altering the playback key of Apple Loops and MIDI Regions. MIDI Regions will only be transposed if the *No Transpose* checkbox is inactive in the respective Object Parameter boxes. The transposition interval is derived from the gap between the chord root and the root of the first key signature in the Signature track. If a chord is created, this will immediately be reflected in the Transposition track.

You might come across situations where there are incorrect or missing chords in the Chord track. As an example: you record a MIDI Region, select it and use the Chord track's Analyze button. Normally this should work fine, as the Analysis algorithm is rather intelligent and knows all about harmonics. If the result of the Analysis process unexpectedly doesn't comply with your recording, Logic provides you with an easy solution: The Chord track's *Change Display Only* mode. If you activate this mode by clicking the *Change Display Only* option in the Chord track, you will be able to adjust the chords to match what you're actually hearing (the transposition events in the Transposition track are adapted accordingly). All changes applied to chords in the Chord track while the *Change Display Only* mode is active, will have no result on the playback of the corresponding MIDI Regions—these changes will only adapt the chords displayed in the Chord track to match the chords played in the MIDI Region.

Note: The *Change Display Only* mode is automatically activated while performing a chord analysis of MIDI Regions.

The *Change Display Only* mode does not work with Apple Loops used on Audio tracks. This should be no problem, as you normally will not need this function when working with Apple Loops. There is one exception, however: some Apple Loops contain chord progressions. These chord progressions are not displayed in the Chord track. Unfortunately, you can't use the Chord track's *Change Display Only* mode to match the displayed chords to what is heard. All changes in the Chord track will affect the transposition of the Apple Audio Loops. Activating the *Change Display Only* option doesn't help.

However, there is a workaround:

- 1 Simply cut the Apple Audio Loop exactly at the position of the chord changes.
- 2 Match the chords displayed in the Chord track with the chord progression in the cut Apple Loop files by entering the chords of each section manually in the Chord track. The individual Apple Loop parts are transposed accordingly.

- 3 Enter the inverted Transposition values of the chord root note changes in the Region Parameter box of each section, so that playback of the Apple Loop parts will match the original Apple Loop file.

As an Example:

- The Apple Audio Loop contains a chord progression with root notes of: C, F, G, and C. Cut it at the position of these chord changes.
- Enter C, F, G, and C at the corresponding positions in the Chord track. Assuming the original key is C, this is equivalent to a transposition of the second Region to +5 and the third Region to +7. If you played the whole part in this state, the original transposition of the audio material would be transposed by the amounts just entered in the Chord track, which isn't what you want!
- Set the Transpose value of the second Region to -5, and of the third Region to -7 in their respective Region Parameter boxes.

Playback of the whole part will now sounds just like it did before, and the correct chords are displayed in the Chord track.

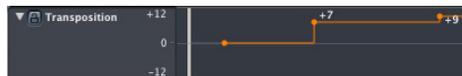
Handling Chord Symbols

The chord symbols in the Chord track can be selected, moved, copied, and deleted via the usual methods, as described for most of the other Global tracks.

Editing Chord Symbols

If you want to edit a chord, just double-click on it. A dialog box will open, allowing free changes to the chord symbol properties.

Transposition Track



The Transposition track shows global transposition events, which affect the transposition of both Audio and MIDI Regions. In MIDI regions, it changes the actual MIDI events themselves. Despite this data change to events, the Transposition track works “non-destructively,” as the global transposition of MIDI Regions can be changed multiple times, without actually altering any information. If the Transposition track is set to zero, Regions (and the events they contain) are played back as originally recorded.

Transposition events are closely linked to the progression of the chord root notes in the *Chord track*: Changing a chord root will be reflected in the Transposition track, and vice versa. Any alteration or creation of a transposition event will generate or alter the corresponding chord in the Chord track. All Apple Loops and MIDI Regions will be pitch-shifted accordingly. MIDI Regions will only be transposed if the No Transpose checkbox is deactivated in their respective Object Parameter boxes. The “zero position” of the Transposition track is determined by the current key signature in the Signature track. If the key signature changes during a song, the “zero position” of the Transposition track changes accordingly. The Transpose track always displays the difference between the Chord track and the Signature track at the appropriate chord position.

Note: “Regular” Audio Regions (Audio Regions that are not Apple Loops) will not be affected. Nor will Apple Loops that do not have a key definition (drum loops, for example).

Handling Events in the Transposition Track

The Transposition track contains nodes that are connected by vertical and horizontal lines. Each node represents a global transposition event, which determines the global transposition value until the song position reaches the next transposition event during playback.

Handling of transposition events works in a similar fashion to Tempo track events: They are created with the Pencil tool, and can be moved horizontally (along the timeline) or vertically (changing their transposition value) by dragging them with the mouse. Watch the help tag during these procedures to see the exact transposition value and bar position of that particular event.

If you hold Control-Option-Command while clicking in the Transposition track, a text field will open, allowing direct entry of the desired transposition value. After pressing Return, a transposition event of the typed value will be created at the clicked position.

To *delete* a transposition event, select it by clicking on the node itself (or the line to its right) and press Backspace, or use the Eraser tool.

Transposition events can be *copied* using the standard Copy and Paste procedure or by dragging them with the mouse while holding Option.

It is also possible to copy or move multiple transposition events simultaneously, which can be useful for repeated song sections: Use Shift-click or the rubberband selection method (while pressing Control) to make the multiple selection, then drag the first selected event to the desired position (while holding Option for copying), or perform the *Copy* and *Paste* commands. Again, watch the help tag while dragging the events.



The scale range for the display of transposition events is adjusted automatically: The upper and lower boundaries of the Transposition track are labeled in the Track List. Dragging a node or line beyond the current maximum or minimum values will result in an automatic adjustment of the range. You can also define the maximum and minimum of the transposition scale manually: Grab the maximum and minimum values and drag them vertically, or double-click on them and type the desired numerical value into the text field that appears. These user-defined values are displayed in yellow. If you want to reset to the automatic adjustment mode, repeat the procedure and leave the text fields blank.

Video Track

The Video track does not contain any global events, but serves as the “thumbnail track” (an overview containing single frames) for QuickTime video when creating film music.



Note: This global Video track replaces the *Video Thumbnail track* of previous Logic versions. If a song file (created with an older Logic version) which contained a Video Thumbnail track in the Arrange window is opened, the Video will be displayed in the original Video Thumbnail track view.

Note: You can easily insert a movie at the current mouse position by clicking in the Video track with the Pencil tool.

The number of frames displayed in the Video track depend on the track height and the zoom level of the window. All frames are aligned left, with only the very last frame aligned to the right. This guarantees that you can always see at least the first and last frames of a video, independent of the current zoom level. Given the left alignment of frames, the left margin of a frame will always be displayed at the exact position of that particular frame (except the very last frame).

There are no editing options in the Video track. It does, however, offer the *Detect Cuts* (button in the track column) function, which searches for all scene cuts in the movie. The Video track also offers the option to create *Movie markers*, which are displayed in the Marker track or the Bar Ruler. In addition, the first frame found after each detected cut will be displayed as a thumbnail, and the cut positions will appear in the *Beat Mapping* track as events, allowing bar position mapping (see “Beat Mapping to Movie Cut Positions” on page 340).

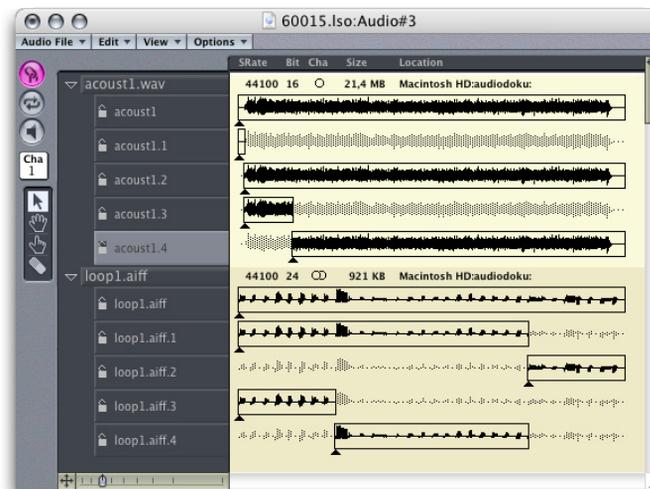
Movie markers have a special status compared to regular Markers: They are SMPTE-locked (they remain at the same absolute time position, regardless of any tempo changes) and they are automatically (after a confirmation dialog) deleted if the current movie is removed from the song. Movie markers are identified by a movie frame symbol.

Note: Some settings for the thumbnail display can be found in Logic’s Video Preferences (see “Video Settings” on page 639).

The Audio window provides an overview of all audio files used in the current song. It also offers a number of simple editing and conversion facilities that simplify audio file handling.

While many of the Audio window's tasks can be performed elsewhere in Logic, it offers a number of unique features that are discussed in this chapter.

Audio Window—Introduction



Logic allows you to access any digitally stored audio recordings (audio files) on your hard drives, in the most common Macintosh formats: AIFF (Audio Interchange File Format) and SDII (Sound Designer II format), and also Wave (.WAV) format files. Several other audio file formats are also supported, including; MP3,AAC, Recycle and Broadcast Wave.

By default, recordings made in Logic are stored in the Sound Designer II format. You can change the recording format to AIFF or WAV via *Audio > Audio Preferences... > Recording File Type*. Sound Designer I files can also be imported, played back and edited destructively in the Sample Editor, but Logic will neither record nor bounce this file type.

Audio files imported into a Logic song can be at any supported bit depth and sample rate. Logic supports bit depths of 16, 20, and 24 bits, and sample rates of 44.1, 48, 88.2, 96, and 192 kHz. Logic performs a real time, native sample rate conversion (see “Further Options” on page 376).

The Audio window is used to organize all audio files that are used in a Logic song. It doesn't matter whether these audio files have just been recorded, or whether they were copied weeks ago from a CD-ROM onto the hard disk. The Audio window gives a Logic song access to any compatible data on the hard disks.

The Audio window contains no positioning information about the files it lists. In fact, files that are not yet in use in the arrangement may be added to the Audio window. Files are assigned to the sequencer's time axis by arranging sections of the audio files, known as “Audio Regions,” in the Arrange window, much like MIDI Regions.

The Audio window can be thought of as an audio file catalog for the song. It also provides an overview of Regions that have been defined from each audio file.

You can define new audio files and Regions and edit, delete, or rename existing ones in the Audio window. When edited here, the accuracy is limited to units of 256 sample words. To make more precise edits, use the Sample Edit window.

These audio files and Regions can then be dragged directly into the Arrange window, where they may be arranged as Audio Regions.

The menus of the Audio window contain all operations related to the administration of audio files and Regions.

Opening the Audio Window

Select *Audio > Audio Window* (or Command-9) to open the Audio window. You can open several Audio windows at once (even within one Screenset)—to use different zoom factors, for example.

If you add an audio file to the Audio window, Logic automatically creates a Region that encompasses the entire length of the file.

You can create as many Regions as desired from the same audio file. There are no length limitations to Regions, as long as they don't exceed the length of the source audio file.

Regions can be moved with the mouse into the Arrange window. The portion of the audio file represented by the Region is then played at the desired song position.

Audio File Management Across Songs

Please use the Project Manager for audio file management across songs.

Layout

Overview

On the left side of the Audio window, you'll see a thin column. At the top, you'll see the mode buttons (see "The Mode Buttons" on page 351), and at the bottom, the tools.

The column to the right lists the audio files, and their Regions, by name.

Further to the right, Region waveforms are displayed graphically, in the large white area of the window. A Region is shown as a boxed, black, or colored area, while the rest of the audio file is shown in light gray, indicating that this part of the audio file is not used for the Region.

Zoom Functions

The Zoom Bar at the top right can be used to enlarge or reduce the vertical display.

The Zoom Bar at the lower left is for enlarging or reducing the horizontal display size—altering the time display of the Regions.

The Mode Buttons

The mode buttons allow you to select different operating modes. These affect both the display and the playback of Regions in the Audio window.

Link

Link mode in the Audio window means that whenever you select an audio Region in the Arrange window, the same Region is automatically selected and displayed in the Audio window.



You can switch link mode on or off by clicking the button featuring the chain link icon.

Hidden Regions (see "The Audio List" on page 353) cannot be displayed in link mode. If you want to display them, you need to *Show* (see "The Audio List" on page 353) the Regions.

Monitoring

You can play Regions directly in the Audio window. This monitoring is not related to the time axis of the sequencer. There are several ways to play a Region:



Playing from a specific position

Click-hold the desired Region in the waveform display with the mouse. Playback starts at the click point. This allows you to play specific sections.

Playback stops as soon as you release the button.

Playing the whole Region

If you want to play an entire Region, highlight its name in the list. Now click the button featuring the speaker symbol to start playback. Click the button again to stop playback.

You can also start or stop this type of playback with the *Play/Stop Region* key command.

Stereo playback

If a Region of a stereo file is selected, clicking the speaker icon plays both sides of the stereo file. If you click the icon while holding down Command or Shift, only the selected Region (mono) is played. If you subsequently select a Region from another stereo file, Logic returns to stereo playback.

Region Cycle

Regions may be looped continuously during monitoring. To switch “Region cycle” on or off, click the button featuring the circular arrow symbols. This mode applies to all Regions in the Audio window.



This cycle setting only affects monitoring in the Audio window, and has no effect on song playback. It should not be confused with the Arrange window Cycle function.

You can adjust the start and endpoints of the Region in real time, while the Region is being cycled. This is useful for setting precise Region lengths—when “polishing” drum loops, for example.

Selecting the Audio Output for Monitoring

The actual routing of audio signals to different outputs is done in the Arrange window (using the Audio Object in the track list).

You can, however, choose a specific audio hardware channel—for monitoring duties—in the Audio window. Set the desired output by click-dragging on the *Channel* button, just below the speaker icon.

The *Device* button below allows you to choose between different audio hardware systems, if you have more than one installed. If you only use one piece of audio hardware, this button won't appear.

Display The Audio List

The list provides an overview of all audio files used in the current song, and the Regions derived from them. This is where audio files can be added, removed, deleted, or renamed. Regions can also be created, deleted, and renamed.

Hiding and Showing Regions

Following the addition of an audio file, you will see the file name in the Audio window, in large print. This takes up minimal screen space, and shows as many currently used files as your zoom setting and monitor size will allow. There is a small triangular arrow directly beside the file name.

Click the small triangle to reveal an audio file's Regions. Much like the list display of folders in the Finder, this shows you the “contents” of the audio files—the Regions derived from the files. The arrow points downwards, showing the Region names in small print. Click the triangle a second time to hide the Regions.

You can also press Command while clicking on any audio file's triangle to quickly Hide/Show all Regions.

Activating the Display of all Regions

Selecting *View > Show All Regions* instantly displays all Regions—of all audio files in the Audio window.

Hiding the Display of all Regions

The *View > Hide all Regions* option instantly hides the Regions of all audio files. Click the small triangle to the left of the file name to view individual Regions.

Displaying the Lengths of the Regions

The lengths of Regions can be displayed in various units.

Select *View > Show Length as*; at the lowest level of this hierarchical menu, you can choose the display units for Region lengths.

Show Length as... > None

No length display.

Show Length as... > Min:Sec:Ms

Absolute time length of the Region in hours, minutes, seconds, and milliseconds.

Show Length as... > Samples

Number of sample words in the Region.

Show Length as... > SMPTE Time

SMPTE length, which unlike absolute time, uses frames and bits in place of milliseconds.

Show Length as... > Bars/Beats...

The Region is displayed in musical units: bars:beats:divisions:ticks.

If the tempo, time signature or division settings are altered, the display is automatically recalculated.

Displaying Information about Audio Files

Information on every currently loaded audio file can be displayed, from left to right, in the Region waveform display, as follows:

Sample rate (Hz), Bit Depth (Bit), Mono, or Stereo status (Cha), file size (kByte) and file path or folder (Location). Mono files are identified by a single circle symbol, and stereo files by a double circle symbol.

You can switch this display on or off by selecting *View > Show File Info*.

Show Files in Finder

The Audio File menu contains a *Show Files in Finder* option that, as the name suggests, will open (and top) a Finder window that displays the file location.

Sorting Audio Files and Regions

Sorting Audio Files

Audio files in the list can be sorted according to various criteria by selecting *View > Files sorted by...*:

Files sorted by... > None

The audio files are listed in the order in which they were loaded or recorded.

Files sorted by... > Name

The audio files are listed in alphabetical order.

Files sorted by... > Size

The audio files are listed according to size, in decreasing order.

Files sorted by... > Drive

The audio files are sorted according to the drive on which they are stored (hard disk, removable drive, partition).

Sorting Regions

The display of Regions can be sorted (within an audio file) according to various criteria by choosing *View > Sort Regions by...*

Sort Regions by... > Start

The Regions are sorted according to their time position in the audio file. This is the default setting.

Sort Regions by... > Length

The Regions are sorted according to their lengths.

Sort Regions by... > Name

The Regions are sorted alphabetically.

The Waveform Display outside the Region

Logic defaults to showing the waveforms outside the defined Region area in light gray.

You can alter the display by Option-click-holding inside the Region. A pull-down menu will appear, containing the following options:

None

No waveform display outside the Regions.

Bright

Waveform display outside the Regions colored light gray.

Middle

Waveform display outside the Regions colored mid gray.

Dark

Waveform display outside the Regions colored dark gray.

Overview Calculation

In addition to the actual audio data, an audio file also contains data required for graphical display of the waveform in the Audio window and Sample Editor (“Overview” data).

Automatic Overview Calculation

If the *Audio > Audio Setting > General > Create Overview after Recording* option is switched on, graphic overviews are automatically calculated immediately after audio recording.

If you switch off this option, overviews are not calculated automatically, but can be started manually.

Starting Overview Calculation manually

Occasionally, when loading/importing audio files, you may need to perform a manual overview calculation (if the audio files don't contain overview data). You can start the overview calculation of selected files with *Audio File > Refresh Overviews*.

Controlling the Overview Calculation

The calculation of audio file overview data is shown in a float window. This calculation occurs in the background, allowing you to continue working with Logic.



You can position this float window anywhere. The most recently used position is saved in the Preferences.

Double-clicking this window opens a dialog box that offers the following options:

- If you stop the calculation by clicking *Abort*, you can still play the audio file—but it will not be easy to edit without an overview!
- *Continue* performs the overview calculation in the background, as per usual.
- Clicking *Finish* transfers the calculation to the foreground, speeding it up considerably. The disadvantage is that you can't use your Mac for anything else, until the overview calculation is finished.

Operation Selection Techniques

There are several different ways of selecting audio files and Regions in the Audio window.

To select a single item, either click its name in the list, or on the waveform display.

Shift-clicking allows the selection of several items, even if they aren't adjacent to one another. You can also "rubber band" select multiple adjacent files in the list.

To select all items, use *Edit > Select All* (Command-A).

You can also use the up/down cursor keys to select the upper/lower audio file or group, and the left/right cursor keys to show/hide the waveform display.

Audio Files

Selecting the next Audio File

The *Select Next Audio File* key command selects the next audio file in the list.

Selecting the Previous Audio File

The *Select Previous Audio File* key command selects the previous audio file in the list.

Audio Files and Regions

Selecting used Regions

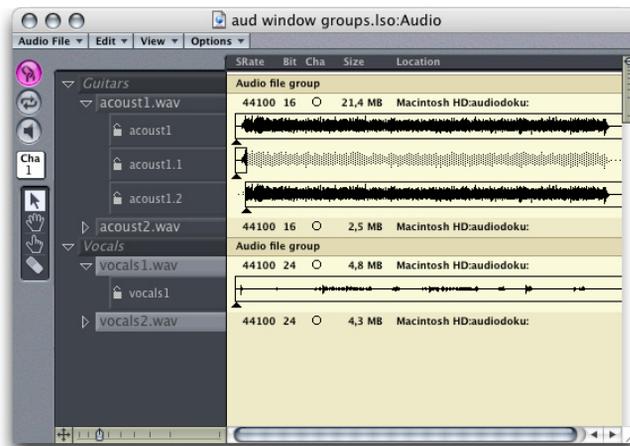
Choosing *Edit > Select used* will select all audio files and Regions used in the song arrangement.

Selecting unused Regions

Edit > Select unused selects all audio files and Regions that are not used in the current song arrangement. You can use this function at the end of a session or production, to delete any items that are not required (press Backspace to delete).

Audio Window Groups

You can “group” audio files together, making handling of large numbers of files easier and faster. In the image, you’ll see a *Guitars* and *Vocals* group, with several files in each. This separation simplifies handling, particularly if all files are similarly named. As examples, audio imported from another application may be named audio01, audio02, audio03, and so on, regardless of whether a vocal, guitar, or drum part.



Creating groups

There are two ways to do this:

- Select any number of files, then *View > Create Group*. Enter the desired group name, and you're done.
- The *View > Group Files by Location/File Attributes/Selection In Arrange* options create groups using the selected file's parent folder, the file's attributes (*type, stereo/mono, bit rate*), or the file selection in the Arrange window.

If existing groups have been created, you'll be prompted to delete or keep them.

The order of group names is laid out by the name of the alphabetically "lowest" folder if *by Location* is chosen.

If *by Location* is not chosen, group order is displayed as a summary of the file attributes (*16bit Stereo WAV*, for example)

Deleting Groups

Group deletion works just like the removal of a file from the Audio window. Simply select the desired group, and press the Backspace key. Alternately, *View > Delete selected Groups*.

Files that were formerly within deleted groups will appear in the upper level of the Audio window hierarchy.

Other Group Functions

- Option-clicking on the arrow to the left of a group closes/opens all groups.
- You can rename a group by double-clicking on the desired group name, entering the new name, and pressing the Enter key.
- You can add a comment to a group. The default comment is "Audio file group", which is shown in the right hand area of the Audio window. To change the comment, double-click in this area, and type in your desired comments.
- An Option-click on a group name selects all files in the selected group.

Edit Commands

All standard edit commands are available in the Audio window. As usual, they only apply to the currently selected items (audio files or Regions).

The *Cut*, *Copy*, and *Paste* commands only apply to the exchange of items between two different songs. An audio file can only appear once in a song's list of audio files, and therefore, cannot be copied within a song.

Cut

The selected audio files or Regions are cut, and moved to the Clipboard. They are removed from the Audio window. (key command: Command-X).

Copy

The selected audio files (and their associated Regions) are copied to the Clipboard. They remain in the Audio window. (key command: Command-C).

Paste

The contents of the Clipboard are added (provided it contains audio files and associated Regions from another song). (key command: Command-V).

Clear

Any selected audio files or Regions are deleted. You can achieve the same effect by pressing Backspace.

Note: The *Cut* or *Clear* functions do not delete audio files from the hard disk, they simply remove them from the Audio window of the current song. If (whole, or portions of) audio files are being used as Audio Regions in the Arrange, they will be deleted from the Arrange window as well.

If you actually want to delete the selected audio files from the hard disk, select *Audio File > Delete File(s)*.

Undo

Reverses the previous command (key command: Command-Z).

Not all actions can be reversed with Undo. Any function that cannot be undone will warn you of this before executing the function.

Regions

Creating a Region

Select the desired audio file, and choose *Audio File > Add Region*. The new Region will appear after the existing Regions in the list.

Copying a Region

If you select an existing Region, and use the *Add Region* function, a cloned Region is created.

Deleting a Region

You can use the Eraser tool to delete one or more Regions. If any of these Regions exist in the Arrange window, they will be removed as well. You should, therefore, be careful when using this tool. The Undo function is always available, however, should you inadvertently remove a required Region.

You can also delete any selected Regions by pressing Backspace.

Altering the Boundaries of a Region

You can directly alter the boundaries of a Region in the graphic display with the Region Edit (finger) tool. You can also use the normal mouse pointer. Just make sure that you grab the lower third of the Region when performing the following actions:

Moving the Start Point

To adjust the start point of a Region, grab the left border. The tool turns into a small hand pointing to the right. You can now adjust the start point.

Moving the End point of a Region

To adjust the end point of a Region, grab the right border. The tool turns into a small hand pointing to the left. You can now adjust the end point.

Moving the whole Region

You can also move an entire Region within an audio file, by grabbing it in the middle. The tool turns into two arrows pointing left and right. If the Region is very small, use the zoom function to enlarge the section. Make sure you can see the two arrows before making any alterations.

If you want to adjust the boundaries of the Region without moving the Anchor, hold down Option during the operation. This applies to moving the start or end points, as well as moving the whole Region.

Moving the Anchor

To move the Anchor, grab the small Anchor triangle below the Region. The tool turns into the Region Edit tool. A vertical guide line appears above the Anchor triangle.

Snapping to Zero Crossings

If *Edit > Search Zero Crossings* is switched on, adjustments to the start or end positions of a Region are snapped to the nearest point where the wave form crosses the zero axis. This ensures “glitch-free” playback. When adjusting the startpoint, the area preceding the selected point is searched. When adjusting the end point, the area that follows the Region is searched. This option is useful when defining Regions in the Audio window.

Search Zero Crossings also applies to all operations in the Arrange window.

Making Fine Adjustments

The graphic display in the Audio window is optimized for quick and simple organization of audio files and Regions. This involves displaying as many things as possible simultaneously in the window. Given this, the finest resolution for positioning the start and end pointers, or the Anchor, is limited to units of 256 samples. This is usually adequate, particularly if search zero crossings is switched on.

On occasion, however, you need to make precise adjustments—down to individual sample word level. Drum loops are a good example. The Sample Edit window is better suited to these situations. To open the Sample Edit window for a Region, double-click on it!

Protecting the Region Parameters

Regions can be “locked”, to protect against accidental alterations to the start and end points, or the Anchor position. The small lock symbol beside every Region can be opened and closed with a click. If locked, you can play the Region, but can’t edit it. This function should not be confused with delete protection: A protected Region can still be deleted.

Renaming Audio Files and Regions

To rename audio files and Regions in the Audio window, just double-click the name in the audio list. A text input box will appear, allowing you to type in a new name.

The following warning appears when renaming files:

Keep in mind other songs may use the same file! Do you still want to rename the file?

You should check if the audio file that you want to rename is used by another song. If it is, don’t rename the file, or it won’t be found or played by the other song.

Logic helps you in these situations:

- Logic alters the name of an audio file in all currently opened songs that use this file.
- If the file is half of a “split” stereo pair, Logic automatically assigns the new name to the other half of the (SDII) stereo pair.
- Logic also renames any backup files on the same drive.

If you rename a stereo file, Logic automatically assigns the new name to up to five files (both the mono files used in Logic, their backups and the stereo file). In this situation, it’s a good idea to store all files in the same location.

You can rename Regions whenever you like.

As long as Regions are named after their “parent” audio files, any renaming of the audio files is automatically carried over to their associated Regions.

File Administration

Record File

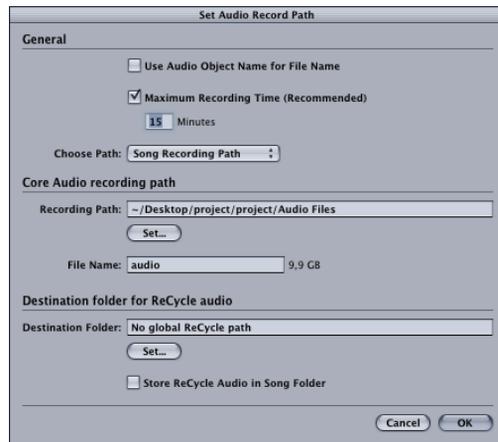
Defining the Record Path

Every recording in the Arrange window creates a new audio file. To keep track of your recordings, you should tell Logic where the data is to be written before you start recording.

You can also define a file name for the audio files that are recorded—a kind of working title—which Logic will automatically keep using, by appending a series of numbers to the file name for each subsequent recording.

The path (folder) for audio recordings can be set individually for each song. You can also define different paths for each audio hardware system that is running simultaneously (if applicable to your Logic system).

Select *Audio > Set Audio Record Path* or open the Record menu (click-hold the Record button) to access these settings.



Use Audio Object Name for File Name

If this option selected, the name of the Audio Object is used as the file name for the recording.

Pre-Allocate Recording Files

If this option is selected, Logic creates the audio file for the next recording when you record-enable the track. In addition, the audio file (buffer) for the next recording is immediately created at the end of every recording. This allows you to start audio recording more quickly.

Unused recording files are deleted when you quit Logic.

Maximum Recording Time (Recommended): xxx Minutes

This parameter defines the maximum recording time for new audio files, in minutes; this determines the size of the temporary recording file. Before any recording can take place, a file large enough to hold it must be created on the hard disk.

You can switch this option off, which will create a record file with the size of all available free space on the currently selected hard disk.

Disadvantages:

- the audio file may be heavily fragmented, if the actual recorded file is much shorter than the pre-created recording file.
- if you are using DAE hardware, there may be no space left for the Overview file. The Overview will then need to be calculated after the recording.

It is strongly recommended that you switch on this option, and set a maximum recording time.

If there's not enough storage space available to accommodate the time you have set, the maximum length of the recording is temporarily reduced. During recording, the Record float window (the one with the red bar) will display the remaining time.

Global Record Path/Song Record Path

The Global Record Path was available in earlier versions. It is stored in Preferences, and applies to all songs. The advantage is that you don't need to define a record path in every new song before you can record, provided that you don't mind recording files for every song into the same folder.

The Song Record Path allows you to organize the audio recordings for each song into its own folder. The advantage is that when you switch from one song to another, any new recordings are automatically stored in the current song's folder, without having to switch the path manually.

Set

These buttons can be used to define the path for each separate hardware system and the file name of the recording file. An incremental number is added to the name of every new recording. You can create a new folder (if required) in the dialog box.

To the right, you will see the current volume, and the remaining capacity (if the volume is registered). If you click-hold the volume, the entire path is displayed. This way you can see exactly which folder you are recording into.

You can change the path and name whenever you want, via the Set Record Path function.

When You Choose the Path Remember ...

- If the hard disk used by the path leads is not connected or is switched off, the path will be deleted.
- If you rename the volume, Logic will not be able to find it.

When You Enter the Recording Time Remember ...

The display of the remaining memory and the maximum recording time depends on the following factors:

- the number of tracks that you want to record simultaneously.
- the sample rate.

If you are starting Logic for the first time, this display refers to recording a single mono track. After every recording, Logic makes any unused memory available for more recording.

It is always advisable to choose a much smaller value than the maximum possible recording time. If you don't, there will not be enough space for further recordings, following the first recording. It's good practice to set this value one minute higher than the longest single take you expect to record.

If you set a long recording time, and then increase the number of tracks, or change the sample rate, and there's insufficient hard disk space, Logic will warn you via an alert.

Adding Audio Files

If you want to use an audio file in the current song, select *Audio File > Add Audio File*. An extended file selector box appears, allowing you to select one or more audio files.

Audio File Selector

Logic's add audio files selector box offers the following features:

- Adding several files at once.
- Adding or removing all files in the folder.
- The cursor stays at the last position after you have added a file—subsequent files can therefore be added by pressing Return.
- Any files that have already been added are filtered from the view.

Auditioning audio files:

- Channel 1 of your audio hardware is used for playback.
- Playback can be stopped at any time.
- Playback is not stopped if you change the folder or volume.
- A short standby pause (a delay before the file can be auditioned) ensures that you can scroll quickly through folders.

Done adds all selected audio files to the song and closes the file selector box.

Drag & Drop using Audio Files

The Drag and Drop functionality of Mac OS X is supported: you can drag any selection of audio files directly from the Finder into an open Audio window.

The end result is exactly the same as using the *Add Audio File* function. It can save you time, especially with large multiple selections.

You can also drag and drop audio files from the Finder directly into the Arrange. A corresponding entry will automatically appear in the Audio window.

Removing Audio Files

To remove an audio file from the current song, select its name in the Audio window and press Backspace. This does not delete the file from the hard disk.

MP3 Import

MP3 files may be imported into Logic by using the same methods employed when adding AIFF, SDII, or WAV files: namely by Shift-clicking with the pencil tool in the Arrange, using the *Audio > Add Audio File* command, via the Audio File local menu of the Audio window, or by dragging MP3 files from the Finder into the Audio window or Arrange.

When you import an MP3 file, Logic converts it into an AIFF file, and it is the AIFF file that is used in Logic. Logic does this because many functions, such as waveform display, sample accurate editing, and so on, would overtax the CPU if Logic had to constantly decode and re-encode the MP3 files in real time for each change or edit. Logic ensures the most efficient use of resources by converting the MP3s to AIFF on import.

Deleting Audio Files

Deleting Audio Files

In theory, audio files are displayed and organized by the operating system in exactly the same way as all other Macintosh files. You can therefore delete or copy them in the Finder. This has the following disadvantages, however:

- If you delete an audio file, you may not know if it is needed in a song.
- If you accidentally delete audio files, Logic warns you of this when you load the song. In addition, there will still be items in the Audio window and Audio Regions in the Arrange window which originally referred to the missing audio file, and have therefore been “orphaned”. This detracts from a clear overview of the song.

For this reason, it is safer to delete redundant audio files in the Audio window. First, select the audio files that you want to delete. Be careful, because once files have been deleted, they are gone for good. You cannot use the Undo function to recover deleted audio files.

Select *Audio File > Delete File(s)*. An alert message, informing you of the number of audio files about to be deleted, will appear.

Click *Cancel* to abandon the deletion process, or click *Delete* to permanently delete the files.

You should make sure that the files selected for deletion are not used in other songs.

Optimizing Audio Files

The *Audio File > Optimize Files* function allows you to delete sections of audio files that are no longer used in the song. This can usually free up a lot of wasted space on the hard disk.

Optimize Files can be used on any number of audio files. It works as follows for all selected audio files; Logic determines which (file) segments are not contained in any of the Regions. These segments are then deleted, and the used Regions are stored side-by-side in the audio file.

The Regions in the Audio window must be redefined by Logic during this process. The song is automatically saved after use of the *Optimize Files* function.

As this process physically deletes data from the storage medium, it cannot be undone.

For safety reasons, the *Optimize Files* function uses a Pre/Post Roll area of one second of audio data before and after each (used) Region.

Further File Functions

Saving a Region as an individual Audio File

If you want to create one (or more) independent audio files from selected Regions, use the *Audio File > Save Region(s) as* function. Use the file selector to choose the target folder for the new audio files. If you're only editing one Region (or two paired Regions from a stereo recording), you can also enter a name for the new audio file. If you are editing several Regions simultaneously, it's a good idea to name the Regions in advance, as the existing Region names will apply to the audio files derived from them.

A dialog box appears onscreen:

Add Audio Files to List of Audio Window? No/Add

If you want to add the new audio files immediately, confirm with Enter or *Add*. If not, click *No*.

There is a very similar function that allows you to convert selected Regions into individual audio files, accessible directly from the Arrange window.

Making Backups

The *Audio File > Backup File(s)* function stores duplicates of files in the same storage location as the original(s), with the extension "dup".

Don't forget the backup options that are available in the Sample Edit window.

Copying Audio Files

The *Audio File > Copy/Convert File(s)* function copies files to a different location on your hard disk (or other storage medium). When you copy a file, you can enter a new name in the file selector box (similar to the *Save A Copy As* command).

Logic checks if there's enough space to copy the selected file(s) to the target location. If a file of the same name exists at the target, Logic asks whether or not you want to replace it. Logic also provides the opportunity to replace the audio file used in the song with the file that you just copied.

Moving Audio Files

The *Audio File > Move File(s)* function enables you to move audio files on your hard disk. Unlike the copy function, the source file disappears after the operation.

If the source drive/partition is the same as the target drive/partition, the files are simply moved to the other folder. This is a very quick and convenient way of organizing the drive and the song.

Example

Choose "Select Used" from the Edit menu of the Audio window (this refers to the files being used in the Arrange window), and move them to a new folder. This folder will only contain the audio files used by this song.

Be very careful when using this function. A different song may use the same audio files. The next time you start the other song, you will need to locate the files that you have moved.

Logic updates the path information for all open songs that use a given audio file. This makes it easier to move (and reopen) audio files. Following the move of files to the new location, save all open songs to transfer/update all storage reference(s).

File Conversion and Exchange

Audio File Format Conversion

You can define the format of the destination file when you copy files using the *Audio File > Copy/Convert Files(s)* function.

All selected audio files can be copied into any of the following formats:

- ...*Original File Type*: The original format is used.
- ...*SDII File*: The copies are in the Sound Designer II format.
- ...*AIFF File*: The copies are in the Audio Interchange File Format.
- ...*Wave File*: The copies are in the ".WAV" format.

Convert to AAC or MP3:

There are also the two separate *Audio File > Convert to MP3* and *Audio File > Convert to AAC* functions, which allow you to convert audio files to the AAC (MPEG Layer 4) or MP3 format. A dialog will launch when either option is selected, allowing you to set the desired preferences. These conversions can be performed on one, or multiple, files.

When activated, a dialog will allow you to save a single file with any name. In cases where multiple files are being converted and saved, the existing file name will be used, with the appropriate file extension added—"partyman.aiff" will be converted to "partyman.mp3".

The default folder location for all saved files is the parent directory—the folder that contains the original files. This can be freely changed in the *Save As* dialog, prior to saving the files.

Exchanging Audio Files between Mac and PC

When converting audio files to the Wave format on the Macintosh, or when converting AIFF files on the PC, you can use long file names.

Wave files can be directly played on the Macintosh, without problems, in Logic's native Audio Engine. SDII Files can also be played on the PC, as long as the files are recorded at 16 Bit 44.1 kHz. It is generally recommended, when transferring files from Mac to PC, that you convert the files to Wave format (while still on the Mac), as the Resource Fork is lost in SDII files. (The Resource Fork contains detailed information about format, Sample rate and Bit definition).

The use of DOS-formatted hard disks with your Mac OS computer is not recommended, as its audio performance is significantly worse than the performance of an HFS+ drive.

To transfer an entire Logic song from Logic Mac to Logic Windows, open the Audio window and copy all audio files onto the MS-DOS drive (or the PC network drive, if available) as .WAV files. The song file (exported as a Logic 4.8 song) itself can be read directly on both platforms.

Logic Windows will recognize a song created on a Macintosh, and looks for "FileName.WAV" instead of the original files.

Likewise, to transfer from Logic Windows to Logic Mac, you need to export the audio files onto the Mac/HFS+ drive. Logic Mac will first look for "FileName.AIF" files, and then for "FileName.WAV" files, which are used on the PC.

Store the Logic song file in the same folder as the audio files. This will allow Logic to find the audio files immediately after loading.

Split and Interleaved Stereo Formats

The internal structure of multi-track hard disk recording systems is such that each individual audio track can be dealt with independently. Accordingly, a separate audio file is created for each track.

Logic can record stereo files in two different ways, one of which is by coupling two mono tracks, and therefore two audio files. This is known as the “split stereo” format. Select *Audio > Audio Preferences > Force record & convert interleaved into split stereo file(s)* if you want Logic to use this format.

Logic normally creates single files containing both channels of a stereo recording. This is called the “interleaved stereo format”. These are composed of a Region consisting of small alternate data packets from both tracks. Logic can record files directly in the interleaved format, giving stereo files recorded in Logic instant compatibility with other mastering or CD recording applications. Please note that not all hardware and driver models are compatible with this format, so all files recorded on these systems will be in the split stereo format. Please read more about this topic in the Universal Track Mode section.

The sections below on “split stereo” files only apply to the abovementioned hardware systems:

Automatic Conversion of Stereo Files

When the automatic conversion of stereo files is selected, the original stereo sound file is not deleted—Logic generates two new independent mono files from the stereo sound file. Don’t forget that this process takes up twice the amount of space on the hard disk.

The two new audio files are linked together in the Audio window to make a single “stereo unit”. Any edits carried out on one channel, automatically affect the other channel.

Special Features of “Split” Stereo Files

There are a few special features for dealing with “split stereo” sound files:

- In the file selector box, “split stereo” audio files are treated as a single file, even though strictly speaking, they are two independent files.
- In the audio list you can see both files. They have the same name—apart from the channel markings (L and R). If you rename one channel of a stereo audio file, the file for the other channel is automatically renamed as well.
- Their Regions can also be renamed.
- If you use the *Add Region* command to create a new Region, Logic does this for both audio files.
- Any alteration made to either Region is automatically transferred to the other Region. This applies to the start point, end point, and position of the Anchor.

- If either of these Regions is moved into the Arrange window, the other Region is also moved.

Converting Different Split Stereo Formats

Logic treats audio files with a name that ends in “.L” or “.R” as stereo files. These “name extensions” are used by ProTools, Session, or SoundDesigner II to identify “split stereo” files. Logic’s file management functions, such as *Rename*, *Create*, or *Revert to Backup* can also identify these name extensions.

Convert All

When you add stereo files using DAE, or other hardware that does not support interleaved files, the files need to be converted into the split stereo format. If you want to add several stereo files in the file selector box, Logic asks whether all files should be converted at once (“Convert All”).

Disconnect Stereo Files

Both sides of a stereo audio file are normally edited together. You may, however, wish to edit one side individually on occasion:

- Select the stereo file
- Select *Edit > Disconnect selected Stereo File*

You can now edit both sides of the recording as individual mono files. This function will only disconnect one stereo file at a time. If you want to reconnect the files, don’t define any new Regions.

Reconnect Stereo Files

The *Edit > Reconnect Stereo Files* command reconnects all disconnected stereo files in the song. Only files that were previously stereo are reconnected.

Manual Stereo Conversion

Convert to SDII Stereo

This command converts two (split-stereo) audio files into a single stereo file—in the SDII format. This is useful if you want to edit a “split stereo” file using a different program, such as CD mastering software.

Select the audio files and choose *Audio File > Convert to SDII Stereo*. Keep in mind that this only works for split stereo files. You can’t use Convert to SDII Stereo to combine two mono files into a stereo file.

Logic automatically stores converted SDII files in the same location as the original split files (provided that there’s enough room on the drive).

Convert to AIFF Stereo

Split stereo files can be converted into an interleaved stereo file—in the AIFF format—by using the *File > Convert to AIFF Stereo* command.

Reconvert from SDII Stereo

This command converts SDII stereo files back into two mono files, allowing them to be used in Logic, after edits in an external program (only necessary with DAE hardware).

Precondition: the mono files must be already registered in the Audio window. (If not, just add the stereo file, which will be automatically converted).

Select the audio files (or one of them) and choose *File > Reconvert from SDII Stereo*. The two audio files will be replaced by the externally edited stereo file.

Dealing with SDII Files

Logic allows you to access the Regions in SoundDesigner II files. (The SDII data format lets you store Region definitions).

Import SDII Regions

You can import the Regions of SDII files into the Audio window. This is useful if you want to play Regions from a long recording made with Pro Tools. Select the audio file and choose *Audio File > Import SDII Regions*.

Export SDII Regions

This command allows you to export one or more selected Regions from the Audio window into the SDII file. To export all Regions from an audio file, just select the name of the audio file and choose *Audio File > Export SDII Regions*.

Other Functions Involving Audio Files

Reassigning Audio Files (Update File Information)

If Logic cannot find one or more audio files—when opening a song, for example—the Regions are shown as “blank” gray areas in the Audio window.

If the files are available under a different name, or you want to assign a “replacement” file, you can do so as follows:

- Double-click the relevant Region, or select *Audio File > Update File Information*.
- Select *Locate* in the dialog, and a file selector box opens, allowing you to load the desired audio file.

What to Do if Logic Cannot Find an Audio File

Sometimes, Logic can't find a file which was previously used in the song. This could be due to one of the following:

- You have not connected the relevant hard disk, or you have renamed the volume.
- You have stored the files in a different volume, or moved them to another volume.
- You have renamed the files in the Finder, or renamed them in the Audio window of another song.
- You have deleted the files.

In these situations, Logic launches a dialog box. You can respond in any of the following ways:

Search

The current volume is searched for filenames. If the search is unsuccessful, Logic asks you if you want to search other volumes for these files. This enables you to assemble songs, even if you have copied or moved the relevant files onto other media.

Skip

(Don't search for this file). Use this function if you know that this audio file no longer exists, or was renamed. This button changes to "Skip All" if further audio files aren't found.

Skip All (for Several Files)

(Don't search for any more files). Use this function if you know that all audio files in this song no longer exist, or have been renamed.

Manually

You can manually define where to search for the file. A file selector, containing the names of the audio files being searched for, appears onscreen.

If more than one file with a matching name is found, you can select the correct file in a dialog box.

Strip Silence

Overview

The *Strip Silence* function allows you to create Regions automatically. The amplitude level of the audio material is the basis used to create the Regions.

Functional Principle

The principle is simple: all amplitude values below a set threshold are interpreted as "silence," and removed. New Regions are created from the remaining passages with a level above the threshold.

You can choose to replace the original Region in the Arrange window with these new Regions, without altering the timing of any of the passages.

The main uses are as follows:

- Removing background noise during gaps (noise gate). Unlike analog noise gates, strip silence works "in advance." There are no problems with cutting off the attack of the Region(s).
- Dividing a long section into several convenient segments (for deleting or sorting).
- For short percussive Regions (drum loops), you can simulate time compression/expansion by simply altering the tempo.
- You can even quantize the individual segments in an audio recording—something usually only possible for MIDI events.

Using the Strip Silence Function

First, select the Region in the Audio window. If you are using split stereo audio files, the corresponding Region of the other channel is automatically selected. Then select *Options > Strip Silence*. The *Strip Silence* window will open. There is also an Arrange window key command that allows you to open the Strip Silence window for a selected Region.

The Strip Silence Window



There are several settings in the Strip Silence window that directly affect the number and length of the newly created Regions. Every time you alter a parameter in the top part of the window, the graphic display of the Region changes accordingly.

Strip Silence Parameters

Depending on the audio material, all parameters can have an effect on the number and division of the Regions. You may need to experiment a little to obtain the desired results.

Threshold

The *Threshold* defines the amplitude level that a passage must exceed, in order to be defined as a Region. The units are shown in percentages.

In terms of the number and length of the Regions, this is the most important parameter. As a general rule: a higher Threshold leads to more, short Regions.

Examples: low values (1) create large, continuous Regions, high values (2) create more, short Regions

Min. time to accept as Silence

Min. time to accept as Silence defines the length of time that a section must be below the threshold value, before it is considered a "gap". The units are shown in seconds. The smallest division is one tenth of a millisecond.

Very small values tend to increase the number of Regions, because even short dips in amplitude are interpreted as silence. Higher values prevent sections of audio from being "interrupted" by fluctuating amplitudes.

Pre Attack Time

The *Pre Attack Time* parameter allows you to add a defined amount of “pre-roll” to the beginning of all Regions created by the Strip Silence process. High threshold values prevent any amplitudes with slower attack times from being “chopped.” This function is useful for non-percussive material such as; vocals, wind instruments, strings, and so on. The units are shown in seconds. The smallest division is one tenth of a millisecond.

Overlaps are permitted—the pre-delayed start point of a Region can extend back to the end of the previous Region—but only if the threshold value is not exceeded.

Altering the Pre Attack Time has no effect on the Anchor position, or the absolute position of the audio data on the sequencer time axis.

Post Release Time

Post Release Time allows you to define an automatic release time for the end points of all Regions. The units are shown in seconds. The smallest division is one tenth of a millisecond.

You can use this function to avoid cutting off amplitudes that fade out gradually (particularly if you have set a high threshold value). As examples; cymbals, open hi hats, snares with long reverbs, vocals, and so on

The *Post Release Time* parameter does not allow overlaps. This means that the Region’s end point cannot extend beyond the start point of the following Region.

Adjusting the Post Release Time does not affect the Anchor position, or the absolute position of the audio data on the sequencer time axis.

Search Zero Crossings

If the *Search Zero Crossings* option is active in the Strip Silence window, the Region start and end points are always automatically snapped to the nearest waveform zero crossings.

Click the check box, to toggle the automatic positioning to zero crossings on and off.

Other Strip Silence Functions

Replacing a Region in the Arrange

If you are editing a Region being used in the Arrange window, you can open a dialog window by clicking OK in the Strip Silence window (or by pressing Return).

If you want to replace the Region in the Arrange with Regions created by the Strip Silence function, click Replace or press Return. This ensures that the relative timing of the individual audio segments remains unaltered. Listen to the results, and if you’re unsatisfied, Undo it!

If you only want the new Regions to appear in the Audio window, click *No*. You can then drag them individually into the Arrange window, in the usual way.

Multiple Editing Using Strip Silence

Strip Silence always affects the selected Region in the Audio window. It doesn't matter if a Region was defined manually, or whether it is a product of a previously executed *Strip Silence* function.

As an example, you can use this method to roughly split up a whole audio file, and then divide the new Regions, using different parameters. The new Regions can then be processed again with the *Strip Silence* function—and so on.

Reassigning Audio Regions Using Strip Silence

Regions which already exist as Audio Regions in the Arrange window can also be split with the *Strip Silence* function. The position of the audio data along the sequencer time axis is not affected. This means that a recorded Audio Region can be immediately edited using *Strip Silence*. Several new Audio Regions are then created, which can be individually moved, copied, or deleted.

Automatic Positioning of the Anchors

When you create new Regions with *Strip Silence*, a separate Anchor is automatically created for each new Region. Logic always sets this to musical units, in accordance with the format value set in the Transport window. This means that when you're moving Audio Regions to fit in with the music, there will be "rounded" values in the help tag.

Uses for Strip Silence

Noise Gate

The most conventional use for *Strip Silence* is simulation of the classic noise gate effect. When used on long recordings with numerous gaps—such as vocals or instrumental solos—you can obtain better results by setting a low threshold value. Background noise is removed, without affecting the main signal.

Creating Segments of Spoken Recordings

With spoken passages, *Strip Silence* can divide a recording into sentences, words, or syllables. For film synchronization or jingles, you can move or reposition the speech segments by simply dragging them around in the Arrange window.

Tempo changes allow you to simulate a time compression/expansion effect, as the syllables automatically move closer together, or further apart.

Creating Segments for Drum Loops

Dividing drum loops into small segments is a good way of perfectly synchronizing them. As an example, in audio passages where the bass drum and snare are completely separate, you can often use *Strip Silence* to isolate each individual beat. The new Regions then behave much like MIDI events, with tempo changes "quantizing" them.

Optimizing Synchronization over long time-spans

Different computers, different synchronization sources (Internal or SMPTE code), different tape machines and—in theory—even different samplers or hard disk recording systems, will exhibit slight variations in clock speed. Changing just one component can lead to a loss of synchronization between recorded audio material and MIDI. This is particularly applicable to long Audio Regions.

This is another situation where the *Strip Silence* function can help, by creating several shorter Audio Regions, with more trigger points between the audio and MIDI events.

Further Options

Setting the Sample Rate

Logic performs a real time, native sample rate conversion. Any sample rate available in Logic (via *Audio > Sample Rate*) can be used for the conversion—even if your audio hardware does not support the selected sample rate.

The native software sample rate conversion facility matches the sample rate of any audio hardware, thereby allowing the playback of projects on virtually any audio system—even if the hardware is—in sample rate terms—not compatible. Nothing is lost in the process. Any internal processing and bouncing is always performed at the original sample rate, and at the highest quality, even in cases where the hardware does not support a particular sample rate. This facility allows you to work on projects originally created on high-end audio systems, with smaller setups.

Example:

A song was created with an audio hardware/setup at 96 kHz. Moving this project to a laptop, or setup that does not support the original project's sample rate, will commonly result in the wrong playback speed. The native realtime sample rate conversion facility will counteract this effect, allowing correct playback of the project on the laptop, at any sample rate.

High sample rates not only eat drive space, but also result in more CPU load, because everything has to be handled in half the time.

Varipitch/Varispeed synchronization

The real time sample rate conversion facility allows Logic's audio engine to follow an external MTC signal ("MTC continuous"), while maintaining the correct playback pitch and speed. This even works when recording in MTC-slave mode.

Specific Hardware Options

The Audio window menus provide various items related to specific audio hardware, such as Digidesign systems. Check them out.

To use particular audio hardware with Logic, the hardware's driver needs to be activated and configured correctly. This chapter explains how this is done.

Drivers are software programs used to enable various pieces of hardware and software. This allows them to be recognized by other computer programs, and to have the appropriate data routed to and from them, in a format they can understand.

Selecting, activating, and configuring a particular audio driver in Logic is achieved via the Audio > Audio Hardware and Drivers dialogs.

The Audio Hardware and Drivers Dialog

Logic's Audio Hardware and Drivers dialog offers three different panes: Core Audio, DAE, and Direct TDM.

In Mac OS X, all audio devices are accessed via Core Audio, an integral part of the operating system. Core Audio is a flexible, high-performance, low-latency audio system, which allows access to multiple audio hardware devices from several audio applications at the same time. Logic is compatible with any audio hardware which has a Core Audio driver. All information about using Logic with Core Audio hardware can be found in the following section.

Logic also supports DAE (Digidesign Audio Engine) and Direct TDM. These are the drivers for many Digidesign cards, and are primarily used for the operation of TDM hardware and/or access to their on-board DSP chips.

All information about the DAE and Direct TDM panes can be found in the ProTools manual.

Core Audio

Logic automatically recognizes any installed Core Audio hardware, and will use the default settings—defined in Mac OS X's Audio MIDI Setup utility (Applications > Utilities > Audio MIDI Setup). It can, however, be advantageous to optimize the settings for your individual hardware setup, particularly if you use several sound cards or a multi I/O card. This can be done in Logic's Core Audio pane, which offers the following options:

Enable

Click this box to enable the Core Audio driver.

Note: In situations where the preferred hardware is unavailable, such as when opening a song created in the studio on your PowerBook, or your audio interface is not connected or turned off, Logic will automatically select the built-in audio hardware of your Macintosh.

System Memory Requirement

The amount of free memory required outside Logic's assigned memory is indicated here. The requirement depends on the settings of the parameters described below. The memory requirement display is immediately updated when settings are adjusted.

Driver

Allows you to choose between any Core Audio Driver installed in your system, including the internal sound output.

I/O Buffer Size

This parameter determines the size of the buffer used by the audio hardware—for both input and output. Options range from 1024 down to 32 samples. The smaller the buffer size, the less "latency" you will encounter when monitoring while recording, or using software instruments.

Note: There may be a point where the selected *I/O Buffer Size* is too small for your system, and begins to affect playback. This usually takes the form of clicks, pops, and crackles. You should therefore aim for the lowest possible I/O Buffer Size value that doesn't introduce these types of artefacts.

As this parameter value is reduced, it places a higher strain on the CPU(s) of the system. On current model Macs, you should be able to reduce this value down to its minimum value. As a word of advice, if you find a higher (larger) *I/O Buffer Size* setting provides suitably low latency during record monitoring and software instrument playback, you should use it. This will minimize the impact on the CPU(s) of your system.

Recording Delay

This parameter is measured in samples. It allows the recording of Audio Regions to be delayed by a certain fixed value. It helps advanced users to compensate for any incorrect delay information that might be caused by the audio driver. You should not normally need to touch this parameter.

Max. Number of Audiotracks

The Audio Engine requires free system memory, which is not assigned to Logic or any other application. The amount of memory required depends on the maximum number of tracks to be played, and on the number of I/O channels supplied by the driver. This setting allows you to reduce the amount of memory required by the driver, by reducing the number of tracks. This may be useful when you want to run other applications or drivers simultaneously.

64 Busses

This checkbox allows the use of up to 64 Bus Objects. Logic normally restricts the number of Busses to 32, but if you need to create more, check this box, and add the desired Audio Objects.

Universal Track Mode

Universal Track Mode, when engaged, allows you to play back adjacent stereo and mono Regions on a single track. Even-numbered Audio Objects won't be regarded as the right channels of the odd-numbered stereo Audio Objects to their left, and every Audio Object has its own mono/stereo switch. Dependent on whether a mono or stereo Region is played back, the pan knob will behave as a Balance or Pan control. If you play back a mono Region and the pan is set to the center position, both channels of the Audio Object will output the same signal level. Please note that the Universal Track Mode has limited routing capabilities, as it is not possible to handle the left and right audio channel separately.

The non Universal Track Mode (UTM disabled) is useful if you wish to play different mono files for the left and right mono channels of one Audio Object, even when it is assigned as a stereo track. An inserted stereo/stereo plug-in on this stereo track receives different signals for the left and right channels.

Note: In order to change tracks to or from DAE/TDM, Universal Track Mode should always be switched off, and you should only work with split stereo or mono files. Also be aware that DAE/TDM does not currently work with interleaved stereo files. If your tracks need to be switched between DAE/TDM and other systems, split stereo files should be used. To do so, enable the *Audio > Audio Preferences > Global > Force convert interleaved into split stereo file(s)* option.

Larger Disc Buffer

This option influences the amount of audio data that is read from the disk in advance. This option is switched off by default, matching the demands of fast hard drives and powerful computers. If you encounter frequent error messages while running Logic in this mode, you should switch this setting on. This will allow you to play back more tracks, achieving higher reliability. Please note that RAM requirements are increased if this option is active.

24 Bit Recording

When this setting is active, Logic can record 24 bit files. Please note that this only makes sense if you are actually using a 20 or 24 bit interface. As long as your audio hardware is capable of this bit resolution, you can select this option in the Audio > Audio Hardware & Drivers window. 20 or 24 bit recordings offer a significant improvement in the available dynamic range, but require high quality peripheral components such as microphones, preamps, and high quality AD/DA converters. 24 bit files use one and a half times the disk space of comparable 16 bit files.

Software Monitoring

This option allows you to switch *Software Monitoring* (listening to the actual input signal) on or off. Please note that with *Software Monitoring* active, the audio signal is processed via software—a certain amount of audible delay (commonly referred to as “latency”) is inevitable. If you are listening to the recorded signal through your mixing desk, or your audio hardware supports hardware monitoring, you should switch this option off.

Process Buffer Range

This parameter determines the size of the native buffer used to compute mixes and effects. Choose between Small, Medium, and Large buffer sizes.

Note: Larger buffer sizes will increase latency. Dependent on CPU speed, buffer sizes that are too small might compromise real time audio processing.

ReWire behavior

When sending MIDI data to a ReWire compatible software instrument, you can choose between four modes:

- *Playback mode:* use when playing back MIDI tracks via ReWire. This setting requires less CPU power.
- *Live mode:* use when playing a ReWire instrument live. This settings requires more CPU power.

Maximum Scrub Speed

Normal means the playback speed is used, *Double* playback speed is two times faster.

Scrub Response

This parameter determines the reaction time for audio scrubbing. Choose the value that works best for your system configuration. Options are: *Slow*, *Normal*, *Fast*, *Faster*.

DAE and TDM

All information about using the DAE (Digidesign Audio Engine) and TDM with Logic can be found in the ProTools manual.

Audio Engine

The Audio Engine is the part of Logic that processes and controls all audio data for playback, recording, mixing, and effects.

Logic supports the following Audio Engine models:

Native Audio Engine

All descriptions of the audio functionality in this manual are based on the Native Audio Engine. Settings for different Audio Driver Models are nearly identical. This engine performs a realtime, native Sample Rate Conversion (see “Realtime Sample Rate Conversion” on page 381).

Digidesign Audio Engine (DAE)

In this case, Logic uses the external Audio Engine created for use with Digidesign hardware. Further information can be found in the ProTools manual.

Realtime Sample Rate Conversion

Any Sample Rate (*Audio > Sample Rate*) available in Logic can be used in the Native Audio Engine—even if your audio hardware does not support the selected sample rate. Nothing is lost in the process. All internal processing in Logic, including bouncing, is performed at the original song sample rate (*Audio > Sample Rate*), and will be performed independently of the sample rates supported by the audio hardware. Logic automatically uses the best matching sample rate supported by your hardware for playback.

This facility allows you to work on projects originally created on high-end audio systems, with smaller setups.

Example:

A song was created on an audio hardware/setup at 96 kHz. Moving this project to a laptop, or setup that does not support the original project’s sample rate, will commonly result in the wrong playback speed of the audio files. The real time software sample rate conversion facility will counteract this effect, allowing correct playback of the project on the laptop, at any sample rate. You can start a Logic project in the studio, continue on your laptop, and return to the studio with the new material.

Note: The set sample rate also applies for recording. As an example, if your audio hardware supports sample rates up to 48 kHz, but the song is set to 96 kHz, Logic will generate audio files at 96 kHz. You should be aware that the audio quality is not improved in the process. The quality of audio is still at 48 kHz, as determined by the recording hardware, despite the fact that the information is stored in a large 96 kHz file.

Important: Using higher audio sample rates often increases CPU load significantly.

Distributed Audio Processing

Distributed audio processing allows you to expand the processing capacity of your Logic Pro system by offloading calculations for software instrument and/or DSP effects to additional G5 Macintosh computers that are connected via Gigabit Ethernet. This is perfect when using numerous tracks of CPU-intensive software synthesizers or plug-ins, such as Sculpture or Space Designer.

Additional Macintosh computers do not require further copies of Logic Pro, nor any MIDI or audio hardware.

You can find the *Logic Node* installer on the Logic Installation DVD—simply run it and set the system volume of your Node machine as the destination. Logic Node has no parameters or GUI elements. It simply needs to be running on the Node machine before you start Logic Pro.

Note: If you plan to use a Macintosh solely as a “Node machine,” you may wish to place the *Logic Node* application in *Startup Items*. You may also consider the use of Apple Remote Desktop to control additional Macintosh computers from your primary system. In this situation, your Node machines don’t need their own monitors or keyboards.

Distributed audio processing actually uses the built-in networking capabilities of Mac OS X. You will need to set up an Ethernet network connection between all computers, via the Network pane of the System Preferences. Please consult the Online Help for details on setting up a network.

Note: You will need to disable the software firewall. Should you wish to access the Internet via your network, we recommend a hardware firewall or use of a separate computer with a firewall, as the router.

The primary (“host”) computer can be a single or dual processor G4 or G5 Macintosh, equipped with a 1 Gigabit Ethernet port. Node machines need one or more G5 processors, and also need to be equipped with a 1 Gigabit Ethernet port (which is standard on all G5 Macintosh computers).

Should you wish to run multiple nodes, a 1 Gigabit Ethernet switch is required.

Note: It is recommended that the network only be used for distributed audio processing—other activities may (and will) affect performance!

Enabling Distributed Audio Processing

The following presumes that the *Logic Node* application was properly installed on the Node Macintosh, and that it is running.

To set up, and activate Nodes:

- 1 Open the *Preferences > Audio > Nodes* pane.
- 2 Click the *Enable Logic Nodes* checkbox, and select the desired computer in the list below:
 - Checked, active (non grayed-out) Nodes are used by the host (Logic Pro system).
 - Grayed-out Nodes are either; not connected to the network, do not have the Logic Node application running, or are in use by other hosts. They can remain checked for future use (when the host is next launched).
 - Unchecked Nodes are not used by this host—they are available to other hosts.
- 3 The list retains a history of previously connected Nodes. You can remove Nodes by clicking the *Remove* button. This is useful if you've renamed a Node machine or if you are sure that a Node machine will never be used again
- 4 In the Arrange window, choose the *View > Track Node Buttons* option to show/hide the Track Node buttons.
- 5 Click on the desired Track Node button in the Track List, and that track's processing duties will be offloaded to a Node.
- 6 A second click on an active button will disable the distributed audio processing for that track.

Button Status

The Track Node buttons have three possible status indicators:

- *Disable*—the track is calculated on the local host (in Logic, as per usual).
- *Enabled/Inactive*—this track can potentially be calculated on the Node.
- *Enabled/Active* (glowing)—the track is actually being calculated on the Node.

If you hold Command while clicking on a Track Node button in the Track List, all tracks in the currently-selected display level (or folder) will be toggled. You can also use track button slide activation to enable Distributed Audio Processing on multiple tracks.

Other Things You Should Know

Logic will automatically determine if enabled tracks are actually calculated on a Node (and “which” Node, in the case of multiple Nodes), or on the host computer. This is dependent on system resources and network traffic.

The buttons are available for all Audio and Audio Instrument tracks. There are, however, two exceptions: EXS24 Instruments are always calculated on the host. The reason for this is the potentially demanding transfer of samples via the network, resulting in a slowdown of audio processing over the network. The sample library needs to be present on the host computer itself. The second exception are Multi Channel Instruments like Ultrabeat: they also can’t be calculated on a Node.

When an Audio Instrument track is selected, the Track Node button will automatically be deactivated. This ensures that the software instrument can be played without additional latency, caused by the network and processing lag.

Note: Compensation of latencies caused by the network and processing occurs on playback tracks—Audio or Audio Instrument, resulting in perfect timing—but this is obviously not possible for “live” performance tracks.

Note: It is not possible to calculate Input, Output, Bus, or Aux channels on a Node.

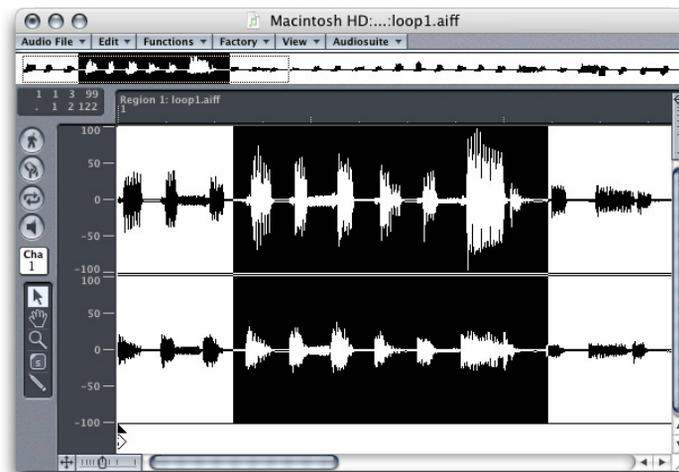
Logic automatically distributes Node enabled tracks to the available Nodes. The distribution is based on an estimate of how much performance a certain stream will cost on the host. While the CPU load of audio effects is relatively constant, the performance of software instruments may vary greatly, depending on the patch and on the number of simultaneously played voices.

Note: You can actually improve Node performance by limiting the “number of voices” parameter of your software instruments to the minimum required by the part.

The Sample Editor is used to perform extremely precise destructive edits on audio files.

The Sample Editor features a number of useful processing tools—collectively known as the Digital Factory. These allow you to time stretch and pitch shift audio, change sample rates, extract MIDI “grooves” from the audio and even the quantization of audio.

Sample Editor—Introduction



The Sample Edit window offers an enormous number of data-editing functions, which are used to process individual audio files. You can edit mono, as well as stereo files.

You can set the lengths of Audio Regions with extreme precision (down to single-sample resolution), by making use of the window’s adjustable zoom resolution. The Anchor points can also be positioned here, with the same degree of accuracy.

Opening the Sample Edit Window

There are various ways of opening a Sample Edit window:

- Select *Audio > Sample Editor*.
- Press Command-0.
- Double-click on any audio Region in the Arrange window; this opens the selected Region in the Sample Editor.
- Double-click on any Region in the Audio window.

If no Region is selected, Logic will ask if you'd like to load a new file into the Sample Edit window.

If you're dealing with an interleaved, or half of a "split stereo" file or Audio Region, both channels/audio files will be displayed in the Sample Edit window, with the left side on top, and the right side below.

If you open the Sample Edit window from the Arrange window, as opposed to the Audio window, the Bar Ruler is able to reference the Region's position in the song. You can tell all of this from the position marker lines in the Bar Ruler. A dotted line indicates no time connection (Audio window), while a broken line indicates a time connection for the Region being used in the Arrange window.

Elements of the Sample Edit Window

- The small waveform display at the top is the overview; the entire audio file is depicted here.
- The dotted frame in the overview shows the extent of the section visible in the display area.
- The Parameter box in the upper left corner below the overview shows the start point and length of the selected area.
- When the *Catch* ("walking man" symbol) button is activated, it ensures that the playback position is always visible in the window. The other controls operate as in the Audio window.
- In the center, you'll see the main contents of the Sample Edit window: the detailed waveform display.
- Left of the detailed waveform display is the Amplitude Scale (as a percentage, or 16-bit decimal values).
- The dotted line in the waveform and overview display is the Playback position line.
- The zoom bars are used to set the magnification of the detailed waveform display.
- The horizontal time ruler above the detailed waveform shows the name of the edited Region at the top left.
- Beneath that is the time position of the Region in the audio file, in various formats.

Display Waveform Overview



Between the Sample Edit window's title strip and Bar Ruler, you'll see the *overview*. This display always shows the full length of the currently selected audio file, regardless of the zoom resolution. Please note that the overview is not scaled; a kick drum sample lasting 0.3 seconds could take up the same space as a choral passage lasting 15 minutes.

During playback, the current position is indicated by a vertical line that moves in real time. This is visible in both the overview and the detailed waveform display.

The current selection is also displayed in the overview.

The section visible in the detailed waveform display is shown as a dotted rectangle in the overview.

Functions in the Overview

- A short mouse click on the overview displays the clicked area in the detailed waveform display.
- A long click resumes playback from this position. Releasing the mouse button stops playback.
- Double-clicking lets you listen to the sample from the clicked position.

Window Functions

The Catch and Link functions work in pretty much the same way as in the other edit windows.

Catch Mode

Catch mode ensures that the Sample Edit window always displays the area around the current playback position (whether you are playing the song, or monitoring the sample). Catch is turned on and off by either clicking the "walking man" button, or with a key command.



Link Mode

Link mode ensures that any Audio Regions selected in the Arrange window are displayed in the Sample Edit window. Link mode is turned off and on by clicking the “linked chain” switch, or the corresponding key command.



If you often work in Link mode, give this a try: open a Sample Edit window and switch on Link mode. Now close the window, and Logic will retain this status.

Double-click on the Region you wish to view, and you’ll see that the display in both windows is linked.

The Detailed Waveform Display Display Scale

Zoom Bars

The Zoom Bars work as they do in all other windows.

The Zoom Tool

Just as in the other windows, there is a zoom tool in the Sample Edit window’s Toolbox (the magnifying glass). If you use this tool to draw a rectangle, the selected area of the window will be magnified so that it fills the whole display area. Clicking once (with the tool) returns you to the previous zoom resolution.

If you hold down Command as you click the Bar symbols with the mouse, you can alter the vertical and horizontal zoom simultaneously.

X and Y Axis Scales

The Y axis vertical scale shows the waveform amplitude in percentage units (*View > Amplitude Percentage*). If you select *View > Amplitude Sample Value*, the scale will be displayed in sample units.

The X axis (the time ruler) shows the course of the audio file over time. You can select various scaling units in the *View* menu.

Don’t forget that this display format also affects the figures shown in the help tag, and the selection parameter field:

View > Samples

Displays the sample word number from the beginning of the song or audio file.

View > Min:Sec:Ms

Shows the scale in Hours:Minutes:Seconds:Milliseconds, from the beginning of the song or audio file.

View > SMPTE Time

Shows the scale in SMPTE time (in Hours:Minutes:Seconds: Frames). The time scale begins at the song start point (with the SMPTE offset, if applicable). When you use this scale, the absolute SMPTE value of the source clock is shown on the X axis.

View > Bars/Beats...

Shows the scale in Bars, Beats, Divisions, and Ticks, just like the Bar Ruler in the other time-related windows. The “zero point” is represented by “1 1 1 1”, but lengths are measured from “0 0 0 0”.

Absolute and Relative Time

The different axis scales in the Sample Edit window can be displayed relative to two different reference values:

- by reference to the time axis of the song (absolute position)
- by reference to the beginning of the audio file (relative position).

Relative Position

The units in the time axis (between the overview and the waveform display) are displayed with dotted lines when viewing the relative position. You will be in this mode if you open the Sample Editor from the Audio window, or if the Sample Editor is in Link mode, and you select a Region in the Audio window.

The beginning the section is automatically assigned the to the zero value, or in Bar/Beat terms, “1 1 1 1”.

This does not necessarily match the actual song position. The calculation of all remaining musical sections uses the current song tempo.

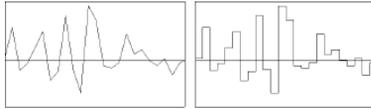
Absolute Position

You can recognize this format by the broken line below the units in the time axis. You will be in this mode if you open the Sample Editor from the Arrange window, or if the Sample Editor is in Link mode, and you select a Region in the Arrange window.

Time is measured from the start of the song, which is assigned a value of zero (or 1 1 1 1 in Bar/Beat terms). In this instance, the time axis shows the absolute (song) time, and the figures do not refer to the audio file.

Display Waveform as Sample Bits

You can switch from the usual representation of the waveform, to one that shows the structure of the recorded digital data, at high magnification levels on the detailed waveform display. You do this by selecting *View > Show as Sample & Hold*. This can be useful when eliminating clicks and pops from your recordings, for example.



Thanks to the clever use of oversampling techniques and lowpass filters at the D/A conversion stage, the stored sample bits (on the right) are ultimately converted into a signal waveform, more like the one shown to the left.

The Sample Edit Window in Use

Monitoring Sample Playback

Monitoring Sample Playback

There are various ways to play back the audio sections visible in the Sample Edit window, allowing you to hear audio during edits. Playback occurs independently of the song position. If you'd like to hear the selected audio passage in the context of the song, just use the Transport controls, as usual.

Selecting the Audio Output

The small boxes below the loudspeaker symbol allow you to select the hardware and output channel that you want to use for monitoring.

Set the number of the desired output in the *Channel* box under the loudspeaker symbol. Use the *Device* box just below it to choose between different kinds of hardware, if you have more than one type installed (if you don't, this switch will not appear.).

Playback from the Overview

Monitoring playback from the overview display is performed in exactly the same way as Regions in the Audio window. Simply click-hold at the point you want playback to begin. Releasing the mouse causes playback to stop. You can also start monitoring from any position by double-clicking on the overview.

Playing the Whole Audio File

The *Play/Stop All* key command allows you to play back the whole file, regardless of the current selection.

Playing the Current Selection

To play back the current selection, click on the loudspeaker switch. You can also perform this function with the *Play/Stop Selection* key command.



Playback from a Certain Position

If you double-click at any position on the time axis, the audio file will play back from this point, to the end of the current selection. If you double-click on a point beyond the selected area, the audio file will play until its endpoint is reached.

Checking the Position of the Anchor

The *Play/Stop Region to Anchor* and *Play/Stop Region from Anchor* key commands allow you to check the Region Anchor position, by listening to the parts just before and after the Anchor.

Cycle Playback Mode

You'll find the Cycle button on the left-hand side of the Sample Edit window, just above the Loudspeaker button. If you turn this on, the currently selected audio section will cycle continually when playback is engaged.



You can change the start and end points of the selected area while monitoring it in cycle playback mode. This makes it easy to edit the start and end points of (say) a drum loop, until it loops perfectly. When you're satisfied, you can turn the selection into a new Region with the *Edit > Selection > Region* function.

Playing Regions

In general, you can only play currently selected parts of files from within the Sample Edit window. There is, however, a key command that toggles between playback of the whole Region and stop—regardless of the selection. This key command is called *Start/Stop Region*.

When you open the Sample Editor by double-clicking on a Region, it will automatically be selected in the Sample Editor. The same thing happens when you click on a Region, while the Sample Editor is in Link mode.

Scrubbing

Click-hold on the time axis and move the mouse. The recording should play back, following the speed and position of the mouse.

GoTo Commands

The scroll bars along the bottom and right edges of the Sample Edit window scroll through the detailed waveform display in the usual way.

If you're trying to reach a specific point in the audio file, some of the keyboard short-cuts listed below may be of use to you. You can define your own keystrokes for these commands in the Key Commands window (see "Key Commands" on page 44).

These commands move the corresponding point to the center of the waveform display.

- *Goto Selection Start*
- *Goto Selection End*
- *Goto Region Start*
- *Goto Region End*
- *Goto Region Anchor*

Making Selections

Selecting the Whole Audio File

You can select the entire audio file with the *Edit > Select All* function, or Command-A.

Manual Selection

To select a particular section of an audio file, click-hold on the start or end of the area you want to select, and move the mouse to the right or left.

To Change the Boundaries of a Selection

Shift-clicking on a selection changes its existing start and end points. The proximity of your click to the beginning/end of the selection determines whether you change the start point or end point boundary. The closest one wins...

Changing the Farthest Selection Limit

If you hold down Option-Shift, the more distant selection boundary is changed (rather than the nearer).

Moving a Selection

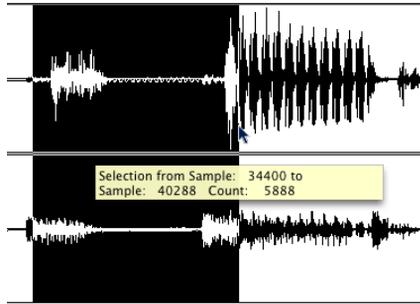
Option-click, and dragging shifts the whole selection, without changing its length.

The Selection Parameter Box

The start point and length of the current selection are shown in the Selection Parameter box. The format depends on the display setting in the *View* menu.



The start point and length are displayed in a separate help tag while making a selection. The format is sample words.



The Relationship between Selections and Regions

When you open the Sample Edit window by double-clicking on a Region, the Sample Edit waveform display will open with the entire Region selected. Changing the selection has no direct effect on the borders of the actual audio Region. The playback monitor only plays back the current selection.

Logic offers two functions that govern the interaction between selections and audio Regions. These will allow you to create and edit Regions with the minimum of fuss.

Selecting the Region

The *Edit > Region → Selection* function selects the entire Region, currently shown in the Sample Edit window. The current Region is the one selected in the Audio window (or the Audio Region selected in the Arrange window).

This function is useful if you want to reselect the entire Region for cycled playback, after performing a number of edits, for example.

Turning a Selection into a Region

If you want to turn your current selection into an audio Region, use *Edit > Selection → Region*. This enables you to define an audio passage as a selection, and then convert it to a Region, in place of the originally selected Region.

Creating New Regions

To define a new Region from an area you've just selected, select *Edit > Create New Region*. You can define this function as a key command.

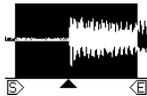
Editing Regions in the Sample Editor

If accuracy is what you need, you should edit the start and end points of Regions in the Sample Edit window, not the Audio window.

The same goes for any adjustments you make to the Anchor, which in many cases should really be placed on the amplitude peaks, rather than at the start of the attack phase of the sound. A good example would be recordings of brass instruments, which may take some time to build to a peak. Moving the Anchor to these peaks forces the Region to snap to the grid of your arrangement, using the Anchor as the pivot point. The flexible zoom settings allow you to be as precise as you like, going right down to the level of single bits, at the highest magnification factor.

Important: Be careful! Any changes to the Anchor point will change the relative position of the audio Region in the song. Given that the front of a Region is the default position for the Anchor, you must also take care when changing a Region's start point.

The small markers on the lower edge of the waveform display provide direct access to the boundaries of the Region and the Anchor. As usual, you can just grab them, and pull.



- S = Region Start
- E = Region End
- Triangle = Anchor

Protecting the Anchor point

If you move the start or end points of a Region past the Anchor point, the Anchor point will also move. This is often not what you want to happen.

Hold down Option while moving the start or end markers to prevent the Anchor from moving. Keep in mind though, that the Anchor can never be to the left of the Region start point, so it will move if you drag the start of the Region past the Anchor (to the right), even with Option pressed.

Search Zero Crossings

If this editing option is switched on, Logic will search for the nearest point where the waveform crosses the zero amplitude axis whenever the start or end points of a selection are changed. This avoids glitches in playback. The program looks for zero crossing points just before the start point, and beyond the end point.

Drawing Waveforms with the Pencil

The pencil tool allows you to correct clicks and pops or clipping, by manually drawing in the waveform. The edges of drawn-in waveform sections will be automatically smoothed.

As long as the mouse button is held down, the drawn waveform can be replaced by the original—by moving the mouse back.

When Option is pressed, drawn-in changes will affect both stereo channels.

Editing Commands

The Sample Edit window features the usual *Cut*, *Copy*, *Paste*, *Clear*, and *Undo* commands in the *Edit* menu (or from the keyboard).

All of these commands (except *Copy*) actually change the data of the audio file itself; in other words, they behave destructively.

Cut

Cuts a selected passage out of an audio file, and copies it to the Clipboard. All following audio sections move forward to fill the gap.

Copy

Copies a selected passage to the Clipboard, leaving the selected area in its original location.

Paste

Inserts the contents of the Clipboard at the cursor position, or start point of the selection. If there is no selection available, the cursor acts as the paste point (it is shown as a thin dotted line). If audio data is present behind the paste point, it is moved back to make room for the Clipboard contents. If anything is selected at the time of the paste, it is deleted and replaced by the Clipboard contents.

Clear

Erases the selection, without placing it in the Clipboard. All data beyond the deleted passage is pulled forward to fill the gap.

Undo

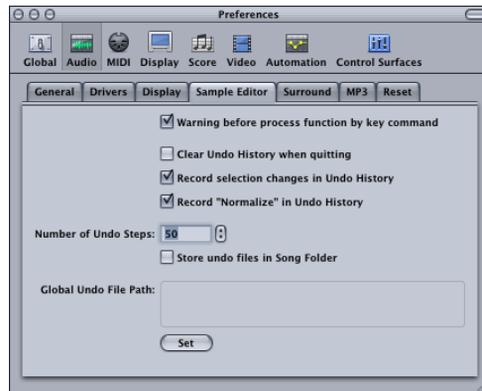
Cancels any edit command used, and reverses its effect. This also works with the destructive editing commands (see “Functions” on page 398).

The *Undo* function in the Sample Editor operates separately from the rest of the program (see next section). This allows you to try out the edit in the Arrangement. If you don't like it, you can return to the Sample Editor, and reverse the edit with the *Undo* function.

Space is reserved on the hard disk for armed tracks, which is not available for undo files. Logic therefore automatically switches off record-ready status for audio tracks if the disk is nearly full, thereby making edits possible in the Sample Editor.

Sample Editor Undo Preferences

Several options that accompany the Sample Editor's multiple undo functionality can be found in the Audio preferences.



- *Clear Undo History when quitting*—switch this on to automatically delete the Undo History for all edited audio files, when you exit Logic.
- *Record selection changes in Undo History*—switch this on if you wish to undo and redo changes to selected area(s) in the Sample Editor.
- *Record "Normalize" in Undo History*—disable this parameter if you don't want to create any undo files once the *Normalize* function is invoked.

Note: As normalization is generally the last step in sample editing, this parameter (if active) can destroy the undo history. As a safety feature, a warning pops up if an undo history exists (and the switch is on), providing you with the opportunity to create an undo file.

- *Number of Undo Steps*—limits the maximum number of recorded undo steps. Use the mouse as a slider to adjust the step value.
- *Store undo files in Song Folder*—switch this parameter on if you would like the undo history to be stored in a sub-folder alongside the song.

Note: This is switched on by default if the song is part of a project (see "Projects" on page 59).

- *Global undo file path*—all undo history files are saved into a "global" location (a user-defined folder) if the *Store undo files in Song Folder* option is not switched on.

Backup Copies

Automatic Backups

Logic will ask you if you wish to make a backup copy of the file you're working on (unless one already exists), before you perform a destructive edit in the Sample Editor.

Activate the *No Dialog* button to avoid this question being asked again, while editing in the current window.

You can even turn off the dialog altogether in the *Audio > Audio Preferences*. In this situation, you'll only be asked when the program is first loaded, and when you make your first edit. You can reply as follows:

Process

No backup is made and the edit is performed. You won't be asked the question until the next program launch.

Cancel

Stops the edit.

Preferences

Opens the Audio Preferences window, allowing you to reactivate the Backup dialog box, so that it appears every time you attempt a destructive edit.

Manual Backups

You can make manual backups of the file you're editing, or replace it with a backup version at any time—using a variety of functions:

Audio File > Create Backup

Creates a duplicate of the audio file you're working on (with the extension ".dup"), and places it on the same level, in the same folder.

Audio File > Revert to Backup

This function completely replaces the current audio file with the backup (provided one exists, of course). A warning message informs you of the creation date of the backup file, before the current file is replaced.

You cannot reverse this function with Undo.

Audio File > Save A Copy As

Copies the current audio file to the location of your choice.

Audio File > Save Selection As

Saves the current selection as an independent audio file. You can choose whether you wish to bring the file into the Audio window, following the save.

An interleaved stereo file is created when the source file is an interleaved stereo file.

Update Arrange Position

Edit > Update Arrange Position, when engaged, means that altering the Region start point (or, more specifically, the Anchor position) in the Sample Editor also affects the position of the Region in the Arrange window. This ensures that the position of a given audio Region stays at the same place in the arrangement. When moving the Region start point back, the remaining portion of the Region will start playback at a later position.

Such edits have always been possible with Logic—but you needed to alter the start point of the Region in the Arrange window. The *Update Arrange Position* option allows you to make these edits more precisely in the Sample Editor, without changing the position of audio in the Arrange. This is dependent on the Region start and Anchor points being set to the beginning of the audio file (so that dragging the Region startpoint also drags the Anchor).

This is the most common scenario: Anchor and Region start are always at the beginning of the audio file, whenever you record audio or add an audio file. Moving the Region start also moves the Anchor, as the Anchor can not precede the Region's start position.

- If *Update Arrange Position* is engaged, moving the Anchor won't change the audible result. The movement of the Anchor in the Sample Editor and the new position in the Arrange are automatically compensated for. Moving the Region start in the Sample Editor will lead to the same result as dragging the Region startpoint in the Arrange window. This is the default setting.
- If *Update Arrange Position* is disabled, moving the Anchor changes the position of audio Regions in the Arrange window.

Functions

This section describes various Sample Edit window functions that are ideal for polishing audio recordings. You can use these to add the finishing touches to your work.

Each of the commands only affects the currently selected portion of audio. If you want to use them to alter the whole audio file, use the *Select All* function beforehand.

All of the functions described in this section are destructive, and change the files stored on your hard drive. You can, of course, use the Undo function.

As the Undo function in the Sample Editor works independently of the rest of the program, you can try out an edit in the Arrangement and make changes there. As soon as you open the Sample Editor again (or bring it into the foreground), the Undo function is available for the last destructive sample edit.

You are asked to confirm these functions as a safety measure. This confirmation dialog box can be turned off by selecting *Audio > Audio Preferences > Warning before process Function in Sample Edit (Menu)*.

Data altering processes can be cancelled while underway by pressing Command-period. The audio file will be retained in its original state, even if it appears that a portion of the editing function has occurred.

Normalize

Normalization is a process that raises the maximum level of a digital signal to a certain amount—typically to its highest possible level, without introducing distortion. Normalizing is activated by selecting *Functions > Normalize*.

This is done in the following way; Logic finds the point with the highest volume (–x dB) in the currently selected audio, and determines how far this is from the maximum possible level. The level of the whole selection is then raised by this amount. The dynamic balance of the audio passage remains unaltered—it merely gets louder.

Functions > Settings provides an option to select the desired maximum level (as a percentage or in decibels). It might be useful not to select 100% (0 dB), should you wish to increase the gain of the overall signal afterwards, say with an EQ. This might result in clipping, if you set the normalize level too high.

These settings are automatically stored in the Preferences when quitting Logic, and therefore apply to all songs.

The start and end points for the section being normalized should generally not fall within a continuous section of audio, as this will result in abrupt increases in volume after normalization. The start and end points should therefore be located in sections that also contain pauses. Occasionally, you should remove any unwanted, audible noises that fall in musical gaps with the aid of the “Silence” function.

Change Gain

You can use *Functions > Change Gain* to raise or lower the level of an audio passage by a specific amount.

A dialog box appears onscreen, allowing you to set the required level change in percent (*Change relative:*) or decibels.

If you click on *Search Maximum*, the highest peak level is determined, and a value is then calculated for use when normalizing the audio file.

results in absolute: displays the maximum level that will be achieved by changing the gain (by the amount shown in the *Change relative:* box).

You should never make a gain change that results in a value over 100%, as this will result in digital clipping.

Click *Change* (or press Return) to perform the gain change.

Fade In/Out

Fade In

Functions > Fade In creates a fade in. You can set up the fade-in time period directly in the currently selected audio. Volume is set to zero at the left start point of the selection, and the fade-in occurs over the length of the selection.

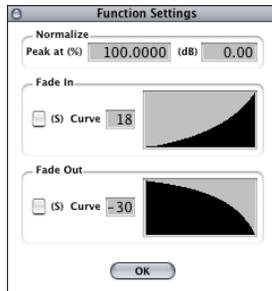
Fade Out

Functions > Fade Out works in the same way as fade in, except that the fade works in the opposite direction. This lets you fade passages out automatically. This function is destructive.

If you use the Silence (see “Silence” on page 401) function to remove unwanted background noise from silent passages, small jumps in volume can sometimes appear at the start and end points of selections, as well as on the edges of the audio signal. In this situation, zoom in, and select a small area surrounding (just before and after) the startpoint of the signal, then use the fade-in function.

Fade Settings

The *Functions > Settings* panel allows you to adjust fade curves. Positive or negative values determine the shape of the curve. The checkbox on the left allows you to create s-shaped curves.



These settings are automatically stored in the Preferences when quitting Logic, and therefore apply to all songs.

Non-destructive alternatives

Common fades (such as the typical fade-out at the end of a track) can also be achieved with the mixers, automation, or HyperDraw. The Arrange window crossfade tool also offers a very flexible, non-destructive fade option.

Silence

You can use *Functions > Silence* to remove all data from a selected area. The waveform material contained in the selected audio passage and the corresponding amplitude values are all set to zero. You can use this function to silence unwanted background noise in quiet passages.

Invert/Reverse

Invert

Functions > Invert completely reverses the phase of all currently-selected audio material. All negative amplitude values become positive, and vice versa. While this doesn't audibly change the file, if heard in isolation, you can use Invert to correct phase cancellation errors, particularly if you're mixing down to mono. This is extremely useful when several out of tune signals (or several signals processed through chorus effects), are to be mixed down to mono. The process depends heavily on the audio material.

You can also use the Invert function to decode MS recordings, but it's far easier to use the DirMixer plug-in for this task.

Reverse

Functions > Reverse reverses the selected audio passage.

Trim

Functions > Trim erases all Regions that aren't selected. Use it to remove unimportant passages from the start and end of your audio files.

Make sure that the areas you are about to delete do not contain any Regions that you may need. Regions outside the selection will be lost, and Regions that fall partly outside will be shortened. If any such Regions are being used in the Arrange, an alert box appears, giving you the option to cancel the trim function.

Remove DC Offset

Poorly constructed audio hardware can result in direct current (DC) being layered over the audio signal. This results in a vertical shift in the waveform position, which can be clearly seen in the Sample Editor.

During playback, this can cause crackling sounds at the start and end of the audio Region.

Functions > Remove DC Offset centers the waveform around the zero amplitude line, to avoid crackling at cut points.

Search Peak/Silence

Search Peak

Functions > Search Peak scans the currently selected Region for the sample bit with the greatest amplitude value. The cursor in the waveform display is then placed on this bit.

Search Silence

Functions > Search Silence scans the selected audio for sections containing silence (“digital zero”). The cursor is then placed at the start of the first section found, that fits this description.

Adjust tempo...

Just like Automatic Tempo Matching in the Arrange, the *Adjust Tempo by Selection & Locators* function adjusts the song tempo, according to the current locator positions and Sample Edit window selection.

The operation is similar to the Arrange function; it only refers to the selection in the Sample Edit window, rather than the overall Region length.

Loop Functions

The *Edit > Loop → Selection*, *Edit > Selection → Loop* and *Edit > Write Loop to audio file* functions are specific to the EXS24 sampler. Please see the Plug-In Reference for details on the EXS24.

Digital Factory

Operation

The Digital Factory functions are accessed via the Sample Edit window's *Factory* menu.

- Open the Sample Editor by double-clicking a Region in the Arrange, or the Audio window.

This selects the whole Region.

- Or: select the area to be edited.
- Or: press Command-A, to edit the whole audio file.

The Digital Factory functions always affect the selected area.

- Select *Factory > ...*
- Make the desired settings in the float window that appears.

Some Digital Factory functions offer a *Prelisten* button that provides a rough idea of the expected result. (Not available for all digital audio hardware).

- You can start playback if you wish. Even though the functions alter the data in the audio file, they can still be performed while the file is playing.
- Click the edit button at the bottom (*Process & Paste*). The label on the edit button varies, depending on the function.

The top line of the Sample Edit window keeps you informed about the function's progress.

The selected area of the audio file is replaced by the edited audio material.

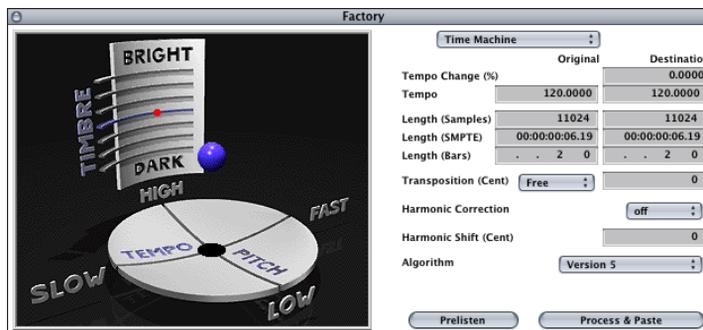
Options

- Selecting *Edit > Undo* (or Command-Z) allows you to compare the edit with the original, at any time. You can continue to work in the Arrange window, as the Undo function of the Sample Edit window operates independently of the rest of the program.
- You can repeat the edit with other Regions or audio files, without needing to close and reopen the chosen Factory window. The function is only performed on the selected material.
- You can also use the pull-down menu at the top edge of the window to switch directly between the individual functions of every Digital Factory process. The two sides of the *Factory* menu (separated by a horizontal line) divide the Digital Factory into "Machines" (large float window) and "Functions" (small float window).

If you are playing your song (containing MIDI and audio data) while editing audio material, owners of slower computers may experience slightly "jerky" playback of the audio material. MIDI playback will continue to function correctly. The editing time also increases slightly while the song is playing.

Time and Pitch Machine

The Time Machine allows you to radically alter the time structure of audio files, including time compression/expansion, and pitch transposition. When changing the pitch, you can also correct any alteration of the formants. Pitch shifting without formant correction causes a phenomenon commonly known as the "Mickey Mouse" effect.



Overview of the Time and Pitch Machine features:

- Time compression or expansion without transposition,
- Pitch transposition with or without altering the length and tempo,
- Correction or alteration of the timbre (sonic character),

- any combination of these functions.
- Consider the Time Machine to be a universal tool for control of the pitch, tempo, and sonic character of digital recordings. Each of these parameters can be addressed independently. The current settings are visually represented by the position of a ball in a 3-dimensional graphic display, where the axes are time, pitch, and timbre (sonic character).

Opening the Time & Pitch Machine

To open the Time Machine, select *Factory > Time & Pitch Machine*.

Parameters

Most of the parameters are mutually dependent; you don't need to enter them all to get a good result. We suggest that you don't adjust a parameter unless you know what the value should be.

The left "column" (*Original*) displays the present value, and the right column (*Destination*) is used for entry of the desired target value for the edit.

Tempo Change (%)

Tempo alteration in percent. (There is no original value shown).

Tempo

Tempo in bpm (beats per minute). Make sure you set the right length in bars, or the correct original tempo will not be shown on the left!

Length (Samples)

Length in samples.

Length (SMPTE)

Length in SMPTE time.

Length (Bars)

Length in bars. If you have already adjusted the song tempo to the Region that you're about to edit, the original value will automatically be set correctly. If not, you need to manually enter the original length here.

Transpose (Cent)

Transposition of the sound material in 1/100 semitone units (cents).

Free Transposition

You will see the *Free* pull-down menu next to the *Transposition* parameter.

This is the most common setting when using the Time Machine. It means that the program performs "free" compression/expansion or transposition. In this situation, the pitch and tempo of the audio material are completely independent of one another.

Classic (Correlated) Transposition

Switch the pull-down menu from *Free* to *Classic*. The Classic mode is for situations where you want to transpose a selected Region, and also affect its tempo. This produces an effect that you're probably familiar with, as it simulates the sound of changing tape speed. In this scenario, the pitch, sonic character, and playback speed all change.

Audio Algorithms

Version 5 algorithm

This is the well-known algorithm of Logic 5 and earlier versions.

Any material

This is the most universal algorithm, which should be able to handle any kind of material—it is the new default setting when using the Time Machine. The following algorithms can, however, deliver better results in cases where the audio material exactly matches their specifications.

Monophonic

A specialized algorithm for monophonic material—an individual voice, brass, or woodwind instrument.

Pads

Use this algorithm on polyphonic material with harmonic content—choirs or string sections.

Beats

This algorithm perfectly maintains the timing of percussive material. It should be your first choice for all kinds of drum loops.

Using the Graphic Display

To the left of the Time Machine window, you can see a graphic representation of the current settings. You can grab the ball within the graphic, and freely move it to adjust the compression/expansion, and pitch shift. The further the ball deviates from the center position, the harder the algorithm has to work, and the lower the expected sound quality will be.

Also remember that the quality of the result depends greatly on the source material.

Don't let this keep you from experimenting. Feel free to try extreme settings for compression/expansion or transposition. In such cases, the result may not always be what you expect, but it might be just the "effect" you're looking for.

You can move the ball in the 3-dimensional display with the mouse. Naturally, only two dimensions can be accessed at once; use Shift to switch between two different 2-dimensional planes (enabling you to reach every point of the 3D graph). Holding Control, Option, or Command limits ball movement to one axis, allowing independent timbre, transposition, or length changes.

You can also grab and move the shadows of the ball. These are its projections on the timbre axis, and the transposition/time plane, respectively

The position of the ball directly effects the numerical values, and vice versa.

You can reset the ball and all numerical values to centered (neutral) positions by simply double-clicking in the graphic display.

Time Machine—Harmonic Correction

Harmonic Correction

Activating *Harmonic Correction* alters (corrects) the formants that define the timbre (sonic character). If *On*, the formants in the transposed material remain unchanged. This means that the original timbre (or the physical size of the resonance body) is maintained, resulting in a more natural sounding transposition. The only trade-off is that calculation takes more time.

Switching *Harmonic Correction* to *Off* shifts the complete spectral structure (including formants) of a sound, in accordance with the transposition value. This is the “normal” type of transposition, as seen in other programs, or the pitch shift algorithms of effect processors. These algorithms are also included in the Time Machine, and can be used for much faster calculations, or when you want the “effect” of pitch shifted formants.

Harmonic Shift

If *Harmonic Correction* is activated, you can also use the Harmonic Shift parameter to independently alter timbre. The units are cents—100 Cents = 1 semitone.

If you select the same value in both *Harmonic Shift* and Transposition, no correction occurs, and the result is as if *Harmonic Correction* is switched *Off*.

If you set *Harmonic Shift* to zero, the formants don't change. This avoids the unwanted side effects of traditional pitch shift algorithms.

If you set *Harmonic Shift* to –300, for example, and the Transpose value to zero, the sonic character of the material will be changed as though it was transposed three semitones down—but without an actual transposition in pitch. This means that a musical “C” remains a “C”, but the timbre of the sound (a voice, for example) becomes darker.

Time Machine—Technical Background

The Technology of the Time Machine

The Time Machine analyzes the spectral components and dynamics of the digital audio material, and processes the result. The high-grade algorithm endeavors to retain as much spectral and dynamic information as possible, and minimizes phase variations. In stereo files, the phase relationship between the left and right channels is fixed, and not altered. Doubled sound events are kept to a minimum. This approach produces a high quality result, which is smoother than what you're probably used to hearing from other products, despite the speed of the process.

You should, however, bear in mind that apart from resampling (transposition), the Time Machine has to achieve the "physically impossible": when a sample is lengthened, information needs to be "invented." This should be as realistic as possible. Conversely, when a sample is shortened, information has to be cut out. This cut information should be as unimportant to the overall character of the sound as possible. Lengthening is more difficult than shortening, and if you have a choice, it's better to speed up a drum loop than it is to slow it down.

There's always a small deviation between the set stretch or compression factor, and the actual result. This is because the algorithm needs some freedom to optimize the spectral and dynamic integrity (the sound quality). The deviation from the set value is only a few milliseconds (or fractions of a bpm). This shouldn't present a problem, as the absolute deviation is independent of the length of the processed section. Put another way, this means the deviation is no greater in longer files.

About Harmonic Correction

The entire spectral structure is usually shifted when audio is transposed—whether the method used is digital (editing samples), or analog (changing the tape speed). During this process, not only is the fundamental pitch transposed, but all of the sound source's resonances (formants) are shifted as well—as though the whole instrument or singer is being reduced or enlarged. This, of course, is not natural. Voices transposed up by "normal" methods will sound like Mickey Mouse, or conversely, if transposed down, like Darth Vader.

The Harmonic Correction feature of the Time Machine allows you to correct this unnatural spectral shifting of formants.

You can also shift the formants without transposition. This means you can alter the physical size of the sound source's resonance body—to give female voices a male character and vice versa, for example—while keeping the pitch in tune. This is a remarkable effect, allowing you to change sounds so that they appear to have been made by unusually small or large instruments.

Harmonic Correction is completely different from the effect of an equalizer. You could never use an equalizer to change the apparent size of a resonant cavity.

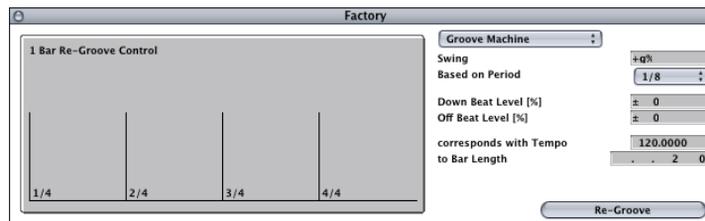
The quality of Harmonic Correction depends strongly on the source material, because the algorithm has to make “intelligent” decisions between tonal and atonal components of the recording, and handle them separately. This decision is not always definite, and is handled subjectively by the algorithm. These decisions are more simple when dealing with monophonic material than with complex stereo material, but the algorithm is able to handle a complete mix. Even the phase correlation of stereo recordings is maintained. Nevertheless, it’s possible that some material will not be processed satisfactorily. We urge you to experiment, in order to obtain the best results.

Harmonic Correction is a highly sophisticated DSP process, which is far more complex than time compression, and therefore needs more calculation time. Considering the complexity of the task, the algorithm is extremely powerful, highly optimized and very quick.

If you need to save time, you can obtain exactly the same results by first performing a normal transposition, followed by a Harmonic Correction. If you need to find the exact transpose value by trial and error, simply switch off Harmonic Correction. As soon as you’ve found the right transposition value, do an independent Harmonic Correction, with the same value, in a second step. This method allows you to even do Harmonic Corrections on audio files that were transposed with the “old” Time Machine.

The Time Machine’s Harmonic Correction was developed in collaboration with Prosoniq.

Groove Machine



The Groove Machine allows you alter the feel, swing, or groove of the digital audio material, in percentage steps. We call it “digital re-groove”.

Opening the Groove Machine

First, make sure that the tempo of Logic exactly matches that of the selected audio material.

Select *Factory > Groove Machine* in the Sample Editor. The function is executed by clicking the *Re-Groove* button.

Parameters

Alongside *Swing*, you can set the percentage for the swing factor. At 50% there is no change—you normally get the best results around 55% to 65%.

The *Based On Period* parameter determines whether the audio material should be edited on the basis of eighth note, or sixteenth note swing, in the Groove Machine.

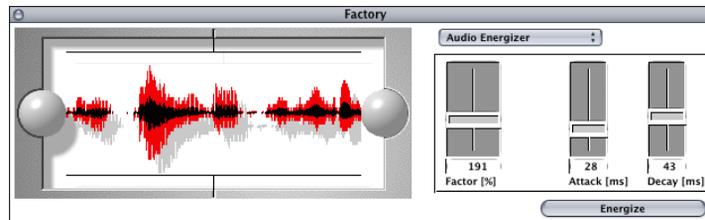
The *Down Beat Level* and *Off Beat Level* parameters determine whether the down beats (or off beats) in the audio material should be raised or lowered. Positive values increase the level, negative values reduce the level.

Bear in mind that raising the level of normalized audio material can cause distortions (particularly on the down beats, which are usually louder).

The *Corresponds to Tempo* parameter automatically transfers Logic's current tempo to the Groove Machine.

The length or tempo of the selected audio material must be defined, or the Groove Machine won't work accurately. The length can be defined in musical values (bars, beats, divisions, and ticks) via *to Bar Length*, or you can set the tempo directly by using *corresponds with Tempo*.

Audio Energizer



The purpose of the *Audio Energizer* is to increase the perceived volume of audio material, while altering the sound as little as possible, and without causing clipping. Digital distortion (which would be the inevitable result of simply increasing the level, and which sounds very unpleasant) is avoided by using this algorithm.

You could compare the effect to that of an analog tape which is saturated by a high recording level. The distortion factor and effect on the audio material is much lower, however.

Here's an example of the effect. If a normalized audio file (audio data which is already at the maximum dynamic range) is edited, the effect is as follows: a VU meter will show a higher level, indicating increased average energy in the signal. A peak display will show the same level as before, as the maximum signal level has not been exceeded.

Opening the Audio Energizer

Select *Factory > Audio Energizer* in the Sample Editor. The function is executed by clicking the *Energize* button.

Parameters

The main parameter is *Factor*. This is where you select the amount of average level boost. 0% means no alteration, while higher values produce an increase in energy. The setting you make here will depend on the audio material, situation, and personal taste. Begin by trying values in the 40 to 100% range. Values below 10% will have little effect, values over 100% can lead to undesirable alterations in the sound, depending on the material. Values over 200% are not recommended with normalized files, because they will have detrimental effects on the sound and its dynamics. They can also greatly increase the required computation time. On non-normalized audio data, even high values can be effective because the overall level is initially increased to its maximum, without affecting the dynamic range.

The *Attack* and *Release* parameters control the steepness of the algorithm's filter. You can try increasing these values to double or four times the default, if the result sounds too "digital" or "raw". This can happen if small elements among the main events in the original signal are boosted. As an example, the reverb portion of a sound can become louder.

The perceived loudness of the overall audio material is increased. If the material contains anomalies such as noise, these will also be increased, and sometimes become audible. If necessary, you can edit the result with the noise reduction function (*Silencer*) on a low setting, or make use of Logic's effect processing capabilities.

Silencer

The *Silencer* consists of two component functions which can be used separately, or in conjunction:

- Noise Reduction lowers the level of any noise in the signal, such as tape noise.
- Spike Reduction tries to identify and reduce signals such as pops or clicks.

You will probably use Noise Reduction more often than Spike Reduction.

Opening the Silencer

Select *Factory > Silencer* in the Sample Edit window.

Noise Reduction

The purpose of Noise Reduction is to reduce the noise components of the signal, and also affect the main signal, particularly the high frequency elements.

The process is "single ended", meaning it affects material which is already recorded, and there is no need to "decode" the signal during playback. This means that even noise present in the original signal can be processed.

Operation

Set the *Spike Reduction* function to *off*, so that only the *Noise Reduction* function is used. Click the *Process* button to execute the function.

There is only one parameter for controlling the intensity of the process. *Off* means no edit, *Min* is the smallest possible edit, small numbers have a small effect and *Max* produces the maximum possible reduction of the noise component. The “correct” value depends on the quality of the material, and your own personal taste. Good quality material should only be edited using *Min* or 2. You will probably only notice minor changes in the sound. Bad (noisy) quality material should be processed at higher values or even *Max*. If the setting is too high, the treble component of the signal will be reduced.

The *Silencer* function is optimized for normalized data. Low level material should be normalized first.

Spike Reduction

The aim of *Spike Reduction* is to identify and reduce signals such as pops, clicks, or digital spikes, in order to reconstruct a hypothetical “original” signal.

Operation

Set the *Noise Reduction* switch to *off*, so that only the *Spike Reduction* function is active. Click the *Process* button to execute the function.

The *Sensitivity* parameter controls the automatic recognition of spikes. When set to *High* (sensitivity), relatively small signal spikes are identified. When set to *Auto*, the threshold is controlled automatically by the program.

The *Method* parameter controls the intensity—the way these spikes are processed. *Gentle* is the weakest algorithm, and only slightly smooths the original signal, while *Aggressive* is the strongest. All of these settings filter the original signal at the identified points.

By contrast, the *re-build* setting completely replaces the often unusable original signal with an artificially generated estimate of the original signal, at the identified points. This synthesized signal is created by analyzing the audio material surrounding these points.

Experiment with the parameters. If the *Sensitivity* is too high, there’s a danger that very sharp transients in the main signal will be identified as spikes. Depending on the audio material, it’s sometimes impossible for the program to distinguish between the two. This is particularly the case if the decision between “spike or main signal” is merely a matter of taste—with some “click-like” bass drum sounds, for example. The attack phase of these sounds can have similar characteristics to static on vinyl.

If the automatic identification does not produce satisfactory results, pops, and clicks can also be removed manually. Select the relevant area in the Sample Editor, and carry out a spike reduction using the High Sensitivity and. Filter 5 settings. This method is easier than manually drawing waveforms with the Pencil tool.

Sample Rate Converter

The Sample Rate Converter is used for sample frequency conversions.

Opening the Sample Rate Converter

Normally, you'll want to convert the sample rate of an entire audio file. To do this, select the whole audio file in the Sample Editor (Command-A).

Select *Factory > Sample Rate Convert*, and click the *Convert* button.

Parameters

Source (Hz)

This shows the previous sample rate of the audio file. To enable changes to incorrectly stored sample rate formats (after editing in other programs, for example)—or for effects—you can enter any value you like here. You should only change this parameter if you know what you're doing.

Destination (Hz)

Enter the desired sample rate that you want the selected area converted to.

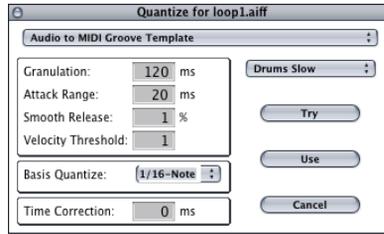
Audio to MIDI Groove Template

This function enables Logic to create MIDI groove templates from digital audio material. This allows you to extract the “feel” (the precise rhythmic references) from drum loops or other samples containing rhythmic passages, and use the resulting groove template to quantize MIDI Regions.

The following example explains how to do this with a one bar drum loop:

- 1 Load the drum loop into Logic by selecting *File > Add Audio File* (Audio window).
- 2 Drag the new Audio Region into the Arrange window.
- 3 Open the Sample Editor by double-clicking on the Region.
- 4 Select *Factory > Audio to MIDI Groove Template*.

Parameters



The first four parameters control the analysis algorithm. They are listed in order of importance:

Granulation (ms)

This determines the time span of louder components in the audio material, which Logic uses to derive information for velocity points in the groove template. The most useful values are usually between 50 and 200 milliseconds, depending on the tempo of the audio material.

Attack Range (ms)

This tells the program how long the attack phases of the sounds in the audio material are. As an example, drum and percussion instruments have short attack times of less than 20 ms, while string instruments have longer attack phases. The best values for most instruments are usually between 5 and 40 ms; Many instruments are near 20 ms.

Smooth Release (%)

This parameter is specifically for processing audio material containing sounds with a long release and/or reverb. This makes it easier to convert these sounds into quantization points. The setting used here should generally be between 0 and 5%, except when processing passages containing sustained, distorted guitars, or similar sounds.

Velocity Threshold

This parameter sets the threshold level. All signals that fall below this value are ignored. In most cases, a value of 1 is suitable, except when processing very dense, loud material with soft background noises.

Basis Quantize

This function enables you to add artificial trigger points at positions where there are no trigger points present. The groove templates obtained using this method are suitable for situations where you need more quantization points than are contained in the audio material.

The identification of trigger points in the audio material is not affected by this parameter.

Time Correction

This parameter allows you to compensate for any time delays that may occur when external samplers or synthesizers are triggered by MIDI notes. These time delays are sometimes very noticeable, particularly if the connected device is playing a MIDI Region (that was quantized with an Audio-to-MIDI groove template) at the same time as the original audio material. You should be able to compensate for this effect by using settings between –20 ms and 0 ms.

Instrument Type

This pull-down menu (*Drums Slow*) contains various presets for the Audio-to-MIDI parameters, which are suited to specific types of audio material. You can use these presets as starting points for your own processing.

Your own parameter settings are stored in the Logic Preferences file.

At the bottom of the Sample Edit window, you'll see three fields labeled: *Audio Qua*, *Basis Qua* and *Result Qua*.

Audio Qua

Displays the quantization points identified in the audio file.

Basis Qua

Shows the quantization points selected as the *Basis Quantize*.

Result Qua

Shows the quantization positions in the new groove template, which are produced by the combination of the two values above.

Clicking on an audio trigger point will prevent it from being transferred to the template. These manually selected points will be “grayed out”.

When you click *Try*, Logic will apply the new groove template to all selected MIDI Regions, allowing you to preview the result.

Adjust the parameters until you are happy with the result, and then click *Use*.

Clicking *Use* saves the new groove template, and installs it in the current song. It then appears at the bottom of the list in the Quantize pull-down menu (the menu found in the Region parameters of the Arrange window, and also in the Matrix and other editors that allow quantization).

You should switch off the *Edit > Search Zero Crossings* option in the Edit menu of the Sample Editor when using this function.

Audio to Score Streamer

This function transforms a monophonic audio recording into musical notation, by creating a MIDI Region that corresponds to the recorded melody. This allows you to play a MIDI sound module in unison with an audio recording or—transposed— as a second voice. This function is best-suited to producing melody notes from a clearly sung vocal line. It also works best with non-legato performances.

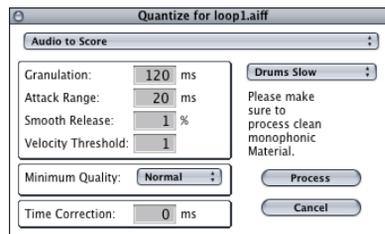
The Audio to Score Streamer creates a MIDI Region in the Arrange window, containing the optimum interpretation of the audio data. The notes are displayed in the Score window, immediately after the conversion.

Opening the Audio to Score Streamer

Begin by selecting the MIDI track in the Arrange window that you want the new MIDI Region placed on.

Select *Factory > Audio to Score*.

The parameters for the Audio to Score function are similar to those used by the Audio to MIDI Groove function (see “Audio to MIDI Groove Template” on page 412).



Minimum Quality is the only extra parameter. It lets you select between normal, or high quality processing, as the preset value of the program. This allows you to deal with situations which demand the highest possible processing quality. The *Normal* setting is more tolerant of audio trigger points that aren't perfectly in tune, but it can generate wrong notes. If the minimum quality is set to *High*, Logic only accepts audio trigger points of a clearly identifiable pitch. Indistinct trigger points are replaced by notes with a pitch of C3 and MIDI channel 3, labeled as an *undetected mark*.

When analyzing audio material containing clearly identifiable pitches, you will find that good results can be obtained from either setting.

Click *Process* to execute the function.

A MIDI Region containing the generated data is automatically created in the Arrange window, on the selected MIDI track.

A Score window, containing the transcription of the audio file generated by the function, opens automatically. The Score Editor uses a score style called *Audio To Score* with three staves. This style can be edited just like a normal score style. The three staves contain the following information:

Staff 1 contains the pitches that were most clearly recognizable. All of these notes are assigned to MIDI channel 1.

Staff 2 contains the pitches that were less clear—if the pitch is wrong, or could not be clearly identified by the first analysis. These notes are assigned to MIDI channel 2.

Staff 3 contains all other information provided by the function, on MIDI channel 3. As an example, detuned pitches produce a “dummy” note (C3 on MIDI channel 3). This can happen if the trigger point has a very short attack, or if the note has a high interference element (such as click noises or buzzing guitar strings).

Depending on the selected file, notes can be detected more or less reliably. If the detection is certain, MIDI notes are assigned to MIDI channel 1. If not, they are assigned to C3 on MIDI channel 2, so that at least the starting point and length information can be retrieved. The threshold for “certain identification” is defined by the quality parameter. Logic also offers the option to define pauses as notes. This is especially useful for MIDI Groove templates, and ensures that they don’t contain gaps. These gap-filling notes appear as C3 on MIDI channel 3. They represent breaks, rather than sound events.

A few tips on getting the best results from the Audio to Score function:

- You will only get good results with clearly identifiable, monophonic audio material. Solo voices, strings, and piano can be easily analyzed, as can any recordings with distinct pitches.
- Experiment with different parameter settings for data processing. Be prepared to make several attempts, to determine the optimum settings for a particular recording.

Quantize Engine

This function allows you to use a MIDI Region template (within reason), to quantize an audio recording.

This is done by using a dynamic time compression/expansion algorithm. The function is similar to the Groove Machine, except that the quantize template can reflect values other than just 8th or 16th note swing grooves. Even user-defined MIDI grooves can be used.

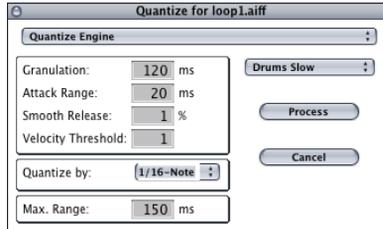
The Quantize Engine is the reverse of the Audio to MIDI Groove Template function.

Opening the Quantize Engine ...

First, select the Audio Region that you want to apply the groove template to in the Arrange window.

Select *Factory > Quantize Engine*.

Parameters



The analysis parameters are identical those used for the Audio to MIDI Groove Template (see “Audio to MIDI Groove Template” on page 412).

Quantize by

This pull-down menu sets the required quantization. The same templates available for MIDI data are found here.

Max. Range

This is where you set the maximum time (in milliseconds) that an audio peak can deviate from the relevant quantization point in the groove template, while still being interpreted as “quantizable”.

Small values are suitable for editing audio material of a similar groove.

Large values allow you to use a groove template that deviates more from the original groove. This, however, increases the risk of misinterpretation.

Operating tips:

You should first use the pull-down menu at the top right, to select a set of parameters that correspond to the characteristics of the audio material. Start by experimenting with smaller values for the *Max. Range* parameter (as small as possible, and as large as necessary).

Third Party Plug-ins

The Sample Editor allows the use of third party plug-ins. These plug-ins work destructively—the result of the editing process is written into the audio file.

Digidesign Audiosuite plug-ins

Audiosuite plug-ins can only be used with hardware addressed by the DAE (Digidesign Audio Engine). Any properly installed Audiosuite plug-in will be displayed in this menu.

Preferences

Audiosuite > Preferences allow you to set the buffer size of the Preview mode. A smaller buffer size results in a faster response to changes of plug-in settings during preview, but requires more processing power.

A Logic song can use many different files which are not part of the song itself, but can be found as a variety of file types stored on the computer's disk drives.

These are the audio files, the settings of the plug-ins and software instruments, the samples and instruments of the EXS24 sampler—and maybe even Quicktime movies. Any of these files can be requested by different songs. As an example, the settings for your reverberation plug-ins will often be requested by different songs. All of these files can be managed with the Project Manager.

The Project Manager is launched via the *Windows > Project Manager* menu entry.

Main Functions

The Project Manager allows you to organize the following types of data on your disk drives:

- Song files
- EXS24 Instruments
- Audio files (and sample files for the EXS24)
- Quicktime Movies
- Setting files for all plug-ins (including software instruments)

The Project Manager recognizes the dependencies and relationships between these files. It recognizes which songs point to which audio files, and recognizes which samples are played back by which EXS instrument. (EXS samples are audio files as well. Any audio file can serve as a sample for the EXS24, in fact).

Please note that although a Logic song file saves all parameters of each inserted plug-in, the song does not point to independent setting files for each plug-in.

In order to collect all necessary information, the Project Manager must first scan all drives, or at least all folders, used for the abovementioned files. Dependent on disks sizes and the number of files, this may take quite a while, but the process runs in the background, allowing you to continue working. The resulting database is global (not song dependent), and is stored separately from Logic's preferences, in a special Logic PMData folder, found in the Preferences folder.

These are the main benefits of the Project Manager:

- With the *Save as Project* function, you can save a song with all associated files. This allows you to save all necessary files into a folder that can be burned to CD, enabling easy transport to another location. This avoids any missing EXS24 Instruments, audio files or samples that you need to search for, or reconstruct, in the studio.
- Once the data is evaluated by the Project Manager, you can safely delete projects while avoiding the deletion of any files required for the playback of other songs/projects.
- Beyond saving and deleting, moving, and copying of all data required for a project is quick and easy.

Modes

You can switch between the three basic operating modes in the Project Manager—*Browse*, *Find*, and *Scan Paths*—via the pull-down menu in the upper left corner.

Browse

The *Browse* mode displays all file types, laid out in category folders on the left side of the interface. You can set and use bookmarks for any folders.

As soon as you choose a specific file type, you will see all matching files displayed on the right-hand side of the window. All relevant information for each file is also displayed, including: location (path) and two optional comment fields. Clicking on the triangle icon beside an audio file will display the waveform, and a listing of songs in which it is used. You can use the monitoring feature (similar to that found in the Audio window), or launch the Sample Editor by double-clicking on the waveform overview. Movie files can also be opened by double-clicking on them (linked to the current song).

Click on the triangle beside song file names to view a list of audio files and EXS Instruments that are used in the song.

Find Mode

This mode activates a powerful search engine that allows you to search for all kinds of files which fulfil specified criteria, such as: name, file type and size. Further functions are available for audio files. It is possible to limit searches to up to five definable paths. All search criteria can be saved to personal "filters," with individual names.

Scanning

Before you can make use of the Project Manager, you must first scan your disks. This process will retrieve all relevant information from all relevant files: all audio files, all songs, all EXS instruments, all Settings (plug-in/software instruments) and all Quicktime movies.

Scan Paths

It is recommended that you define Scan Paths prior to the initial Scan. Select *Scan Paths* (not *Find Mode* or *Browse*) in the pull-down menu to the top left of the Project Manager window. Any drive or folder excluded here will not be scanned. Two buttons allow you to define paths which should never be scanned (*Add exclude path*). Within these excluded paths, there may be specific sub-folders that you wish to scan, despite the folder that is higher in the hierarchy being excluded (*Add include path*). If you define nothing, all local volumes will be scanned in their entirety. Dependent on the number and size of the drives, and the number of files contained on these volumes, this may take a while. In using Scan Paths, you can speed up the scan significantly. As an example, you can exclude folders that contain thousands of “business” files, that have nothing to do with your audio and music applications.

- Use *Add exclude path* to define hard disks and folders that are never used for media files—Library and System folders, or irrelevant volumes.
- Define *Add include path*, for the Logic folder (for global EXS Instruments), your global sample library folder, and the folder or volume used for your projects and songs. This path will be scanned, even if inside an excluded folder or disk.

Please note that you can include sub-folders of excluded folders, or exclude sub-folders of included folders. Put another way: sub-folders can have priority over folders higher in the architecture. This means that you can define the “Applications” folder as an excluded path, but define the “Logic” folder (inside the “Applications” folder) as an included path, as an example. In this case, the “Logic” sub-folder will be scanned, while all other sub-folders inside the “Applications” folder won’t be scanned.

- If you wish to remove a defined path, select it and click *Remove Path*.

Included paths will be displayed on the right-hand side of the Project Manager window.

- Included paths are indicated by a (+) icon that precedes the path name.
- Excluded paths are shown below, and are indicated by a (–) icon that precedes the path name.

Scan

Select *Browse* mode via the selector to the top-left of the Project Manager (not *Find Mode* or *Scan Paths*). If you don't select a specific folder in the left half of the Project Manager window, the scan process will scan all disks—according to the defined exclude and include paths, if any. If you can't recall the locations that you may have previously saved any of these file types to, you should perform a global scan.

You can start the scan process with *Functions > Scan*. The scan process can take some time, depending on the amount of data, and number and size of your hard disk drives. You can continue working in Logic's other windows during the scan process.

When the scan is completed, a folder structure appears on the left side of the Project Manager window, if *Browse* mode is selected.

Following this initial scan, please select *Functions > Save Project Manager data* at once. This ensures that—barring unforeseen circumstances—this time-consuming scan procedure will never need to be repeated. The Project Manager's database is automatically saved every time you quit Logic.

During the scan process, the Project Manager checks every filename suffix (".aif(f)" for audio files in the audio interchange file format, for example) and the file type of every file on your disks. Every file that appears to be an audio, song, EXS Instrument, setting, or Quicktime movie file will be analyzed for its relationship to other files. As an example: the relationship could be between a song file that points to an audio file used as a Region within the song. This is the type of information the Project manager deals with, and stores in the Project Manager database.

You can rescan at any time. As a tip, we recommend that you only scan specified folders, where you expect to find these files. This saves time. You can choose the desired folders directly in the browser, and select *Functions > Scan*, or, if the respective folder does not yet appear in the browser, select *Functions > Scan folder*.

Expanded Scan

Functions > Expanded Scan works much like the standard Scan, but there's a difference. Expanded Scan analyzes absolutely every file, regardless of whether or not the file type or suffix matches one of the file types being searched for. This allows you to select any file, even if its suffix was changed manually in the Finder, or if the file type information is invalid. The expanded scan takes much longer to analyze a file. We only recommend the use of this function on folders where you expect to find such files. The function is especially useful in cases where specific files you expected to find during the normal Scan don't show up.

Scan Folder...

Functions > Scan folder is identical to *Scan*, but with the standard *Scan* command, you can only scan folders that appear in the Project Manager Browser. What about new folders that the Project Manager hasn't yet noticed? If you select *Functions > Scan folder*, a folder selection dialog box appears onscreen.

Stop Scanning Process

Functions > Stop Scan Process is self-explanatory. This function is especially useful if you accidentally start an expanded scan of your entire disk/system. You'd probably want to stop this. All data detected up until the *Stop Scan Process* command will not be lost.

Browse Mode

File Types

In order to follow the Functions described in the following paragraphs, please select *Browse* (not *Find Mode* or *Scan Paths*) in the selector at the top left of the Project Manager window. Use *Functions > Scan folder*, and select a folder that contains songs and audio files. If these file types are located on different drives, perform two folder scans in order to view the appropriate Project Manager data. You can also scan all of your drives completely, but this may take a while, depending on the number of files/disks. Deselect any current selection in the Browse menu, and select *Functions > Scan* to do so. You can continue working in Logic during the scan.

You'll find the hierarchical structure of the Browser self-explanatory. After a full scan, the top-most hierarchical entry—above all of the disk names—is "Media on Disk". The next level of the hierarchy is for the various data types:

- Audio Files
- EXS 24 Instruments
- Logic Plug-in Settings
- Movie Files
- Song Files

Remember that audio files can be referenced by both; a Logic song and an EXS24 instrument.

Sub-division of Audio Files

Audio files are sub-divided into:

- AIFF files
- Recycle Files
- Sound Designer I Files
- Sound Designer II Files
- WAV Files

These are different audio data formats that Logic can read/use without conversion.

Drag and Drop of Audio Files

You can drag all regular audio files directly from the Project Manager into the Arrange and Audio windows. If the Audio window is closed, you may also use *Functions > Add Selected File to Audio Window* to add audio files to a song, without placing them in the Arrange window.

Browser Display

Left and Right Parts of the Project Manager Window

Every item in the gray Browse section is a folder. This also includes the display of sub-folders (the right-most) in the hierarchy. The contents (the files) are always (and only) displayed on the right-hand side. Click on an item in the lowest level of the hierarchy (one of the right-most items—with no triangular arrow): The files in the selected folder will appear on the right-hand side. To the left of each entry, you will see arrows that display more information about the file and its relationships to other files, when clicked.

- For audio files, the waveform is displayed, along with songs and EXS24 instruments that refer to this audio file.
- For songs and EXS24 Instruments, the audio files they refer to are displayed.

If you are using the default key commands, you can use the cursor keys to navigate the Project Manager window.

Renaming Files

If you hold Control and double-click on a file in the right half of the Project Manager window, you can enter a new name for the file. In doing so, the new name information will automatically be updated in the references of all other related files. You should never rename audio files on the desktop, as this will destroy all existing references. All file types can be renamed as desired.

Meaning of the Colors

On the right-hand side of the Project Manager, the files and their respective information are displayed in different colors.

- Black: This is a resolved (valid) reference from within a song or an EXS instrument, to an audio file—which means there's a known path that is working fine and is in good order.
- Green is used for the name, information, and location info for the audio file, if the triangular arrow is clicked.
- Grey is the color of duplicates. Logic is intelligent when it comes to recognizing duplicates: Even if the names and info are different, Logic will analyze the files byte by byte. If the audio is identical and the length (duration) is identical, the Project Manager will recognize that the file is a duplicate.

- Red is the color of unresolved References. This means that there's no file of the respective name in the folder path that was saved with the song or EXS instrument. This is quite common with samples that you have copied from CD to hard disk via the operating system's drag and drop functions. From now on, you should use *Functions > Install from...* and you will never again encounter a red, unresolved reference. To make your life even easier, the Project Manager features an intelligent function that automatically resolves red references.

Edit Menu

Cut, Paste, and Clear

When you copy, move, or delete files from within the operating system (on the desktop), the Project Manager isn't aware of these changes, and therefore can't recognize the new locations of the files. As such, we recommend that you perform these operations with the *Cut*, *Paste*, and *Clear* functions of the Project Manager Edit menu. This ensures that the Project Manager database is always up to date, regarding the location (and existence) of any relevant files.

Note that it is possible to update the database at any time.

- *Cut* allows you to select files that shall be moved.
- *Paste* is used to define a destination folder for these "cut" files.

If you move (*Cut* and *Paste*) audio files, all songs and sampler instruments referring to these files will automatically be updated to reflect the new file locations.

- The *Clear* function actually deletes the files from disk.

Caution! "Cleared" files will not only be removed from the Project Manager database, but will be moved to the Trash folder. Next time you empty the Trash, the files will be deleted and can not be recovered!

If you wish to define a new folder (which is not yet known by the Project Manager) as destination for the move or copy process, make use of the *Functions > Move Selected* or *Copy Selected* functions.

Select

Select All

Use this command to apply operations to all files that are visible in the right-hand side of the window. Note that this function does not select all files in all folders. Only the entire contents of the folder selected on the left-hand side of the Project Manager window will be selected.

Select Unused/Unreferenced Audio Files

Edit > Select Unused Audio Files and *Select Unreferenced Audio Files* are functions that can be used to select particular audio files that are not currently in use. Most commonly, this function will be used when you wish to delete them, or place them in a folder where they can be stored for possible future use.

This function looks for all song and EXS instrument files, and then checks if these songs or EXS instruments can/cannot find their related audio files. *Select Unused Audio Files* selects all audio files that are not referenced by any song or EXS instrument. Put another way: These are “orphaned” files that have no “used by:” info when you click on the triangular arrow alongside their names.

Select Unreferenced Audio Files is a little smarter. This function also selects the unused audio files, but goes one step further. It also checks for songs or EXS instruments that attempt to point to audio files with identical names. Their path reference might be wrong, but this could be re-established by performing *Functions > Find unresolved files for selected*.

Edit > Select Unreferenced Audio Files will not select unreferenced files with “suspect” names—files of a suitable (used) name that “could” be in a song/belong to an EXS instrument, thus protecting them from being deleted accidentally.

This type of disorganization is typically created by copying folders manually from a sampling CD-ROM to the hard disk, via the operating system’s drag and drop facilities. From now on, you can avoid this from happening: Whenever you want to add folders from sampling CD-ROMs or hard disks, use *Functions > Install files from...* (from within the Project Manager). This will ensure that all references are up to date.

Find Duplicates for Selected

This is a smart function that finds and selects duplicated files. The files may even have a totally different names or file types—but will be recognized as duplicates nonetheless, as long their length and content (audio data, comments, and so on) is identical. The slightest difference in content means that a file won’t be regarded as a duplicate.

Delete Duplicates for Selected

The function name explains its use. The algorithm used for the detection of duplicates is as per that mentioned above.

Functions Menu

Check for Modified Or Deleted Files

This function is used to ensure that all scanned data is still present, and has not been changed. This process also runs automatically from time to time. This function is useful for updating the selected data in the Project Manager's database, should you have deleted, moved, or copied files using the operating system. Normally, this isn't recommended, but in real life, these situations sometimes occur. As an example, copying a bunch of songs and audio into a folder in order to burn that folder onto a CD-ROM, for backup purposes. After the burn procedure, you might want to move the original folder to the Trash. By using *Check For Modified Or Deleted Files*, you can ensure that the Project Manager no longer expects/looks for the existence of this folder.

Thanks to the Project Manager database, it's much more convenient to backup projects systematically: Use Logic's *File > Save as project...* feature to backup songs, associated audio and settings data to a folder that can be copied to a CD-ROM. This feature is, in fact, the major benefit of the Project Manager. If you always work systematically, you normally won't need to use the *Check For Modified Or Deleted Files* option.

Clear Scanned Data

This function, as its name implies, clears the scanned Project Manager data. If you select nothing, the entire database will be cleared. This would normally not be desirable, but may be useful if you had totally reorganized the contents of your disk. This may be the case if you've backed up all of your data to CD-ROMs, following the production of an album, and have cleared all songs and audio files used for the album.

If you select a folder in the Project Manager Browser, the Project Manager data related to the contents of that folder will be cleared. This is useful if you wish to exclude a folder from being associated with any file.

Save Project Manager Data

This option allows you to save the Project Manager's database manually, even though this occurs automatically whenever you quit Logic. For power users who never quit Logic, this is a good option for saving the database, especially after the completion of longer scan procedures.

Remember that the Project Manager data is not saved with songs. The database is independent of song files as it is related to all files.

Install Files From...

This is the function to use when importing sampling CDs which contain both audio files and EXS instruments. It's also appropriate for the importation of songs (with all related audio) from a CD-ROM which was burnt on another computer running Logic. The import function is not restricted to CD. It can be used for any media type, including external hard drives, network folders or any folder that's accessible from your system.

- Selecting *Functions > Install files from...* opens a file selector window.
- Select the medium and folder you wish to install. This does not necessarily need to be a sampling CD with EXS instruments. Importing songs and their related audio (and settings and Quicktime movies) works in the same way.
- Press *Choose*.
- Another file selector window appears, allowing you to define the destination folder. The destination must, of course, be a hard disk—not the source CD-ROM which can't be written to.
- You may wish to create a new folder by clicking on the dedicated button. Either way, the following dialog will provide an opportunity to define the sub-folder that you wish to save the Project into.
- Press *Choose* and a dialog will appear which allows you to set the Install Options.

Install Options

- If you *Check Don't install duplicates*, no files (audio, EXS instruments or songs ...) will be installed, where duplicates already exist on the destination disk. The algorithm is intelligent, but can take a while to analyze the data. It recognizes duplicates even if the filenames are different, by analyzing each byte of the files. You should only use this function if you suspect that the audio files to be installed already exist on your destination disk.
- *Only install needed files* looks for the names of files which are missing, according to the Project Manager database, and only installs files with matching names. This is particularly useful for sampling CD-ROMs that have been installed manually, but improperly.
- *Copy, Move, or Leave Instruments to global folder* relates to the global EXS Sampler Instruments folder, and only deals with EXS "Sampler Instrument" files (.EXS). It's recommended that all EXS instruments only be placed in this "global" folder ("Sampler Instruments" in the Logic application folder). For CD-ROMs, copying and moving is identical, but this is not the case with exchangeable media such as FireWire disks. If you select *Move*, the originals (on the FireWire disk) will be deleted. If *Leave* is used, the EXS Instruments will remain on the medium, and only the audio files will be "installed".
- *Subfolder Name* allows you to create (and name) a new sub-folder for copied or moved EXS Instruments. If you delete all characters in the entry *Subfolder Name*, no sub-folder will be created, and the installation will be performed directly into the selected "destination" folder.

Pressing Enter (“OK”) will execute the installation. The current status of the data evaluation and copying process is displayed as a small progress bar window.

Consolidate Selected Songs

In these days of big, fast hard disk drives, it’s recommended that all files used by a song be stored in a single folder. Within that folder, a standardized structure for every song is desirable.

Functions > Consolidate Selected Songs is a function that organizes all song-related files into a well-sorted, standardized file structure—which will hopefully be adopted as a convention by all Logic users for all projects.

This is how it works:

- 1 Be sure to select *Browse* mode (not *Find Mode*, or *Scan Paths*) in the panel to the top left of the Project Manager window. Navigate to the folder that contains the song that you wish to consolidate. Remember that in the Browser, you’ll find it in the “Song files” sub-folder
- 2 Select the desired song in the right-hand side of the Project Manager window. If no song is selected, the *Functions > Consolidate Selected Songs* option will be grayed out.
- 3 Select *Functions > Consolidate Selected Songs*. A file selector will be displayed. Feel free to create a new folder, and/or select the desired folder for the project, then press Enter. The following file selector window will provide you with the opportunity to define the sub-folder into which the project will be saved.

The following dialog allows you to set various options.

Consolidate Song Options

- Create a sub-folder for the entire project by typing an appropriate name into the *Project folder Name* field. If you don’t enter a name, no sub-folder will be created in the folder selected beforehand.

The following functions allow you to determine the type of data you’d like to save into the destination folder.

Please note that the approach is quite different if you wish to consolidate a project for transport to another studio location (burning a CD with everything on it), or whether you just want to reorganize the files on your disk. The *Copy*, *Leave*, and *Move* functions are self-explanatory: If you select *Move*, the original will be deleted.

- When you want to export projects to a folder which is destined for CD-ROM burning, select *Copy* for all file types. It’s rare that the audio files used by the song should not be copied or moved to the new project.

- If just keeping order on your hard disk, select *Leave* for any EXS samples and sampler instruments that are not specific to the song (drums, strings, bass, and so on ...). When song-specific samples are being utilized, all of the EXS24 data (Sampler instruments and samples) should be copied into the dedicated folder.
- Whether to copy or move the Quicktime movie depends on your video data structure, and whether or not the CD-ROM has the capacity for all audio and video data.
- For the *Unused Audio*, there are different options available. *Unused Audio* indicates audio files present in the song's Audio window, which are not used as regions in the Arrange window. In practise, this might be vocal takes that weren't used in your arrangement, but that are still present in the Audio window. The *Unused Audio* parameter determines how these files are handled. If you choose *Like Used*, they are handled like the used audio files, and will appear in the same folder. If you select *Separate*, a dedicated sub-folder for the unused audio files will automatically be created. This allows the unused files to be easily identified, which is convenient when deciding on which files should be moved to the Trash. Choosing *Separate* for the Unused files is a good option when you're unsure of whether or not these files may be used later. The other plus is that Logic won't ask for missing files when the song is reopened—even if the files are not used in the arrangement. Consolidated song files "know" where these files are saved. If you select *Leave*, the files will be left where they are, which makes it easy to delete the old version of the song, along with all unused files.
- *Include songs sharing files with this song* is a smart function that automatically collects and collates all related song versions into a single dedicated project folder, along with all other versions that share the same audio data. You may want to uncheck this option in cases where an audio file is used in a variety of totally different song projects. The function is only relevant to audio files in the Audio window, not to the sample files used by the EXS24.
- *Delete empty folders after moving*: In cases where you decide to Move files, you might wish to automatically delete remaining empty folders. You should keep this smart function checked, as long as you don't intend to "refill" these original folders.
- *Set Song's audio recording path*: If you're not yet finished with all recording sessions for a song, it's a good idea to allow the Consolidate function to set the song's audio record path for you. Future recordings will automatically be placed in the right folder structure, if you keep this option checked.

Execute the Consolidate process by pressing OK (or Enter). A small progress window is shown at the top left of the screen. Check the new structure after consolidation to see how the files have been organized.

Add Selected Files to Audio Window

Most Project Manager functions don't relate to the song that's currently opened. This option is an exception: As the name implies, *Functions > Add selected Files To Audio Window* adds the audio files selected in the right half of the Project Manager to the Audio window of the currently opened song.

You can also drag and drop audio files from the Project Manager window directly into any open Arrange or Audio windows. *Functions > Add selected Files To Audio Window* is quite useful for quickly adding various audio files into a song without placing them in an arrangement yet.

Find...

Find Used Files for Selected

The “selected” files of the following functions refer to songs or EXS instruments. In other words, this functionality is only available if you have selected one or multiple songs or EXS24 instruments.

Remember that you must first select a file in the right half of the Project Manager window—or a folder on the left.

The *Functions > Find Used Files for Selected* option searches the audio files for a given song or EXS instrument, even if valid references already exist. On occasion, different files can have the same name, which can lead to incorrect resolutions of file relationships. By using *Find Used Files for Selected*, all files with the appropriate names will be recovered, and you can select the desired ones manually in the dialog.

Find Unresolved Files for Selected

In cases where a song or an EXS instrument cannot find their related files (unresolved file references), *Functions > Find Unresolved Files for Selected* forces the Project Manager to search for any file with the right names that are missed by the song or EXS instrument. These references can be easily identified by color (red—along with the triangular arrows that point to them). In cases where only one appropriate file name is found for an unresolved reference, the Project Manager will automatically choose that file. The referenced file will then be shown in blue.

This function is intelligent. If there's more than one matching file name, and the found files are identical, *Find Unresolved Files for Selected* chooses the file with the folder path that best matches the song (or EXS instrument). If there are several matches of the file name, but the found files are not identical, a dialog will open, allowing you to select the desired file. The files are compared byte by byte in order to define whether or not they are identical.

Move/Copy...

Move Used for Selected EXS-Instruments

- This function is used for EXS instruments only. It allows you to move all audio files (samples) that an EXS instrument utilizes into another folder—and change the respective references in one pass.
- *Create Subfolders* creates a dedicated subfolder.
- *Delete empty subfolders* removes empty folders, which may be left after a move. Normally, it's recommended that you leave this parameter checked.

Move Selected

This option allows files to be moved from folder to folder, with the Project Manager keeping track of how all references for the respective files change. This ensures that they will “find” each other, next time you open a song or load an EXS instrument. The function works much like the *Copy* and *Paste* functions in the Project Manager *Edit* menu. The difference is that *Functions > Move Selected* opens a folder selection dialog, allowing you to create new folders and to select folders that are not yet present in the Project Manager Browser.

Copy Selected

Same as above, but copies of the selected files remain in their old location. Any references will be updated to the copy destination. If you wish to make copies without changing existing references, copy the files outside of Logic, with the operating system's copy feature.

Comments

Set Comment for Selected

Each song, EXS instrument, and each audio file can have two comments (see “Comments” on page 436) as a part of the file structure itself. There's one exception: The setting files for plug-ins do not inherit comments in their file structure. The Project Manager, however, also remembers comments for setting files. The Project Manager retains the comments that are part of every audio file, EXS instrument, song, and video, as well as for the settings files (which don't allow comments in their own file format). The Project Manager is the tool used to display and edit these comments.

View Menu

Show Details for Selected

This function is used to enhance the display of audio files. You may have already noticed the triangular arrow which is used to open the waveform display and the green reference information (the display of the songs and EXS instruments pointing to the file). By clicking on the triangular arrow to the left of the audio file name, you switch on/off the display of the details (waveform and references). By using *View > Show Details for Selected*, you can switch the arrow for all selected audio files, simultaneously.

In order to speed up the “Creating Waveform Display” progress bars that might show up, double-click on one and choose Finish.

The green reference information is also available for EXS instrument files. In this case, it lists all songs which make use of the selected EXS instrument.

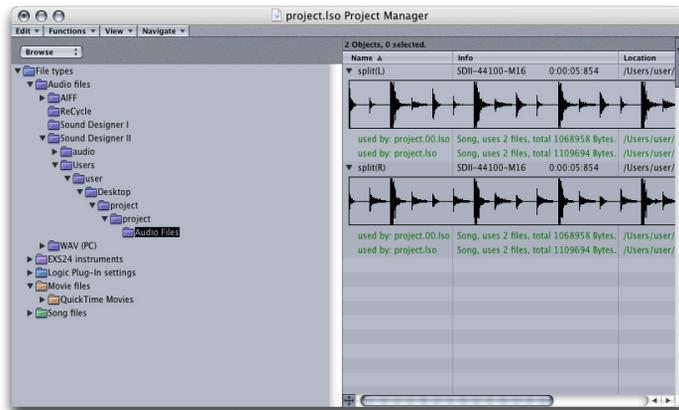
You can also apply *Show Details for Selected* to folders (selected on the left side of the Project Manager window) if they contain only audio files or EXS instrument files.

Hide Details for Selected

Having read the preceding paragraph, this is self-explanatory. This View function closes the detailed information (waveform and references) for the selected audio files, so that a greater number of file names can be seen simultaneously.

Show Selected Files in Finder

The View menu of the Project Manager contains a *Show Selected Files in Finder* option that, as the name suggests, will open (and top) a Finder window that displays the file location.



Sort

Allows you to determine the criteria by which you would like the entries sorted:

- Date
- Size
- Name
- Info
- Location
- Comment 1 or 2

The order can be changed via *View > Sort > Up* or *Down*, respectively.

Sorting, by name, info, location, or comment, is alphabetical.

Show Comment

Shows or Hides the comments (see “Comments” on page 436) associated with a file.

Log File

If you choose this option, a simple log of all actions previously performed in the Project Manager is displayed, allowing you to reconstruct what you did. The Project Manager manages a multitude of files in parallel. Therefore, there’s no undo function. But if you, say, moved a file to the wrong location and didn’t quite remember where that was, here’s a way to retrace your steps.

The Log file also is accessible for other applications that can display ASCII files—for example TextEdit.

The PM.log file is located in *Home > Library > Preferences > Logic PMData*.

Navigate

Usually, you navigate in the Browser using the cursor keys.

The Navigate menu allows accelerated navigation in the Browser through the use of bookmarks.

Bookmark Selected Folder

If you select a folder, no matter what its level in the hierarchy, and click *Navigate > Bookmark Selected Folder*, this folder will appear in the *Navigate* menu from now on. You can easily access the sub-folders and files in it, by clicking the desired entry in the *Navigate* menu.

Current

Selecting a folder and clicking *Navigate > Current Folder* hides all other folders, providing more room for the display of sub-folders within the folder. This offers you a better overview of the folders and files you intend to work without the irritation of, say, video and settings folders that you don’t intend to work with at the moment.

Up

This navigate function moves the Browser one folder higher in the hierarchy level, showing all other folders sharing the same location/at the same level as the currently selected top-most folder.

Top

This makes all folders visible and moves the browser to the top level of the hierarchy, allowing navigation to all files.

Back

By double-clicking a duplicate, a used file, or the song or EXS24 Instrument, the respective folder will be browsed to. By selecting *Navigate > Back*, you can easily return to the folder that contains the file that was previously selected.

Project Manager Preferences

In the *Preferences > Global Preferences*, there are three preferences for the Project Manager.

Load Project Manager database on program launch

Load Project Manager database on program launch simply defines when the database is loaded. As this takes a few seconds, you can launch Logic without reading the database immediately, thus starting Logic a little faster. The database is loaded as soon as you open the Project Manager window for the first time. Engaging this parameter is simply a matter of taste, and of how often you use the Project Manager. It has no effect on Logic's functionality—apart from the time taken for the database to be loaded.

Check for deleted files after loading Project Manager database

Check for deleted files after loading Project Manager database does exactly what the parameter name says. The check for files that have been deleted by dragging them to the Trash with the operating system shouldn't be necessary, if you're disciplined enough to only "trash" files from within the Project Manager. If your working style isn't quite so "proper", you can ensure that the Project Manager doesn't miss a thing by checking this option. Needless to say, this procedure always takes a little time. If you're relatively disciplined, and only move things to the Trash from within the Project Manager, you can reassure yourself that nothing's been lost by periodically checking for deleted files manually (*Function > Check for modified or deleted files*). If you can maintain this level of discipline, then you can leave this preference unchecked, and save yourself some time.

Search files using:

The following search functions affected by the *Search files using:* preference only deal with a case that should never happen. The case in question involves files that aren't in the location that's been saved with the song or EXS instrument, when loading a song or EXS instrument.

In the real world, however, you may occasionally and inadvertently move files on the desktop, without using the Project Manager's copy and move functions.

When opening a song or EXS24 instrument, Logic expects its audio files to be found in the locations saved with the song or EXS file. Even in earlier versions (prior to 6), Logic didn't just offer a file selector box, in cases where files couldn't be found where they should reside. In such instances, Logic would automatically search for the appropriate files with the right names on all disks, in every folder. As you may already know, this procedure could take a little while, especially with complex EXS instruments. This behavior still is possible.

Search files using: Search engine Only tells Logic to search for every file on all disks, when a song or EXS instrument is opened, and its respective audio files cannot be found. Thus, every possible matching file with the right name will be found, but the search process takes a relatively long time depending on the number of files and number and size of disks to be searched. This search method was used by Logic 5 and earlier versions.

Search files using: Project Manager Database Only instructs Logic to search for the file using the Project Manager's "knowledge" about the location of every file. If you haven't scanned the appropriate folders or haven't performed *Functions > Check for modified or deleted files* since the problem was created, the search may fail. The benefit of this setting is that *Select for searching files use Project Manager Database Only* is fast. If a song or EXS instrument fails to find its files, you should rescan and *Check for modified or deleted files*.

Search files using: Project Manager Database and Search Engine instructs Logic to use both strategies for searching. Advantage: Logic will not bother you with an error message while opening a song or EXS instrument if the necessary audio files are on your disk at all. Disadvantage: you will not recognize if an audio file is missing in the Project Manager's Database.

Comments

Each song, EXS instrument, and each audio file can have two comments as a part of the file structure itself. There's one exception: The setting files for plug-ins do not inherit comments in their file structure. The Project Manager, however, also remembers comments for setting files. The Project Manager retains the comments that are part of every audio file, EXS instrument, song, and video, as well as for the settings files (which don't allow comments in their own file format). The Project Manager is the tool used to display and edit these comments.

Displaying and Editing Comments

In the Project Manager's Browse or Find Mode, select *View > Show Comment 1* and *Show comment 2*. There are always two comments. Use them as you like. There's no functional difference between them—in fact these comments have no function at all, despite reminding you of something. When displaying both comments, you may wish to enlarge the window a little, or to move the borders between the columns of the table. To do so, just grab and drag them.

Double-click on the Comment entry of the respective file, and a box will appear onscreen. Type the comment into the text box and press Enter when done.

Set Comment for Selected

You can simultaneously enter a text Comment for all selected files. A “comment text” window appears, where you can type in the information. There are separate functions for the first and second comment.

Write Comments to Files if Possible

The Project Manager allows two explanatory comments of your choice for all files. Select *View > Show Comment 1* and *Show Comment 2* respectively, in order to display these comments. Often, it’s desirable to write comments for multiple files in one pass. This is what *Functions > Set Comment for selected...* are designed to be used for.

The comments can become part of the files, and thus recoverable whenever you perform a new scan, even after you should have selected *Functions > Clear scanned data*. But there is one exception to this rule: The comments cannot be written into setting files. With setting files, the comments only reside in the Project Manager’s database (and would be lost, in cases where you cleared the scanned data). With all other file types (all audio, instruments, and songs) the comments become part of the Project Manager’s database along with the files themselves.

In order to transfer comments which have been typed in the Project Manager to the files themselves, use *Edit > Write Comments to Files if possible*. The process only applies for files that you have actually selected on the right-hand side of the window—or to all files inside the folder that you have selected on the left side.

Remove Existing Comments from Files

Having read the paragraph above, this function is self-explanatory. Again, the operation only applies to files that you have actually selected in the right half of the Project Manager window.

The Event List displays MIDI data in the form of an alphanumeric “list”, combining all of the data editing functions of the other editors.

The Event List, while not as “pretty” as other Logic editing windows, is extremely powerful. This chapter discusses the many specific uses where the Event List is your best choice for data handling and editing.

Using the Event List

The Event List is used whenever you need to make precise alterations to recorded data, and where the graphic display of the other editors is not as well suited to the task. It is the only editor that provides access to all recorded event data. You can also restrict what you see, allowing you to only edit specific event types.

Opening the Event List



To open the Event List and view the contents of the selected Region, select *Windows > Event List*, or use a user-defined key command for *Open Event Editor*.

Display

The event type buttons allow you to “filter” the display, removing individual event types from the Event List, limiting the view to the specific types of events you’re interested in. Click the desired button with any tool (except the pencil).

If a button is grayed out, that event type will not be displayed.

All functions only affect the displayed events, thus protecting any non-displayed events from any alterations you may make.

Here is a short overview of the filter buttons.

The note symbol denotes *note events*. The symbol with the dual-digit, seven-segment display denotes *program change events*.



The hand wheel symbol with a marker in the middle (pitch bend wheel) denotes *pitch bend events*. The hand wheel symbol with a marker at the bottom (modulation wheel) denotes *control change events*.



The single weight symbol denotes *aftertouch events* (channel pressure). The multiple weights symbol denotes *polyphonic key pressure events* (polyphonic aftertouch).



The SysEx symbol denotes *SysEx events*. The symbol with a row of zeros and ones is called the *full message* button. This does not filter out any type of event, but affects the amount of detail displayed for all event types.



The Event List display is normally restricted to one line per event. When the full message display is active, all information stored along with the event is also shown. This is particularly important for editing SysEx messages. When examining note events in the Event List, you will also notice Logic’s internal score layout information included in the list. You can edit this in the Event List if you wish, but it serves little purpose.

Operation

Scrolling

Clicking either of the scroll arrows moves the display up or down by one event. The event at the position marker is always selected (the existing selection changes as you scroll). The scrolling speed can be varied by vertically moving the mouse. The *Scroll to Next/Previous Event* key command is also available from the Event window, and has the same end result.



If the MIDI Out button is switched on, every newly selected event will be played. This allows you to scroll through the list and audibly monitor the events as you go.



If you want to keep the selected event where it is, use the usual scroll bar functions.

Selection

Selection Techniques

When selecting events with the mouse, you should click near the status column, to avoid any unintentional parameter alterations.

You can use any of the standard selection techniques here: individual selection by clicking on objects, multiple selection using the rubber band, or both of these (without altering the previous selection), in conjunction with Shift. Don't forget you can also make *selections* according to specific criteria with the *Edit* menu.

Any events hidden from the display by clicking on the event type buttons, are immediately deselected. This ensures that all functions only affect the displayed (and selected) events.

Special Selection Functions

Some selection commands (which can be accessed from the Edit menus of all Editor windows) can also be utilized by selecting an item with the mouse, while holding down additional modifier keys.

- If you click on an event while holding down Option, you select all events between the last event that was selected, and the current one.
- If you hold down Control and select an event, all similar events will also be selected.
- If you select an event while holding down Control-Option, all identical events will be selected.

Event Editing

Adding Events

To add an event, click on the desired event type button with the pencil (or any other tool, while holding down Command). The event is then added at the current song position, and is automatically selected.

Duplicating Events

To duplicate an existing event (to alter the parameter value of the copy, for example) click on the original event with the pencil. An input box appears—use it to enter the position for the newly-duplicated event. If you press Return, the duplicate will appear at the same position as the original.

Pasting from the Clipboard

When adding events using the Clipboard's *Paste* function, a position input box will appear, allowing you to type in the position of the first event. Once again, if you confirm by pressing Return, the original position of the event is retained. The relative positions of other copied events are also always maintained.

This means that the events are not added at the song position, as in the graphical editors.

Moving Events

To move an event in time, alter its position indicator. As soon as you alter its position, the list is automatically sorted, even though the currently selected event remains the same.

Altering Values

Event positions or parameter values can be altered in the usual way by using the mouse as a slider (grabbing and dragging), or with text input (double-click on the parameter value and type in a new value).

You cannot alter the type of events using this method, however. To alter the event type, you must either; open a Transform window, or add an event of the desired type and then delete the original event.

Altering the Values of Several Events

If a parameter of a selected event is altered, it will affect the same parameter in all selected events.

Relative Value Alteration

When you alter parameter values in a group of selected events, the relative differences between parameter values remain unchanged. This means that parameter values can only be altered until the (same) parameter value of one of the selected events has reached its maximum or minimum value.

Flexible Relative Value Alteration

If you want to continue altering a parameter value in a multiple selection (even if one of the values in the selection has reached its maximum or minimum value), hold down Option while moving the mouse, or press Return to confirm a numerical input.

Absolute Value Alteration

If you want to set a parameter to the same value for all selected events, hold down Shift-Option, while using the mouse as a slider, or press Return to confirm a numerical input.

Numerical Value Input

If you want to directly input a number, double-click the relevant parameter.

There are a few special points concerning numerical editing of events in the Event List:

- When entering event time positions and lengths, press Tab to jump from part to part within the value you're entering.
- New events can be created by using the ASCII keyboard. When you're numerically editing events, you can duplicate them by simply pressing Esc.
- The *Duplicate Event and Numerical Edit* key command also allows you to create new events.

Muting

The Event List features a Mute tool, allowing you to mute specific notes in a MIDI Region.

Clicking on a note with the Mute tool will mute/un-mute it. Muted notes appear grayed out.

The *Edit > Select Muted Regions/Events* command is available in the Event List. It allows the selection of all muted notes in a MIDI Region.

Event List Structure ... on the Event Level

Position	Status	Cha	Num	Val	Length/Info
----------	--------	-----	-----	-----	-------------

The individual columns in the list have the following meanings:

Position

The position of events in the song; for note events this means the beginning of the note. The units represent bars, beats, divisions, and ticks (see "Position Display" on page 89).

Counting begins at 1 for each unit (first bar, first beat, first division, first tick: 1 1 1 1), and continues until it is carried over to the next largest unit.

Numerical input starts from the left (which means you can simply enter the bar number if you want). The units can be separated by either spaces, dots, or commas.

Position within the MIDI Region

If you select *View > Local Position*, the event positions don't refer to their absolute location within the song, but to their relative positions within the MIDI Region.

Position and Length in SMPTE Units

If you select *View > Position & Length in SMPTE units*, the position and length columns switch to SMPTE units.

Status

This is where you can see the event type, as specified by the status byte of a MIDI message. You cannot directly edit this parameter.

Cha

The MIDI channel used to record an event.

Remember that this MIDI channel will be replaced by the *Channel* parameter of the playback instrument, during playback. The event is only output to the recorded MIDI channel when the *Channel* parameter is set to *All*.

You should also note that the recorded MIDI channel is used to assign a polyphonic voice to the note in Score Styles.

Num, Val

These columns contain event data bytes. Their meaning depends on the event type:

Status	Num	Val
Note	Pitch	Velocity
Control	Controller number	Value
Pitch	LSB	MSB
C-Press	(not used)	Value
P-Press	Pitch	Value
Program	Bank Select	Program number

Length/Info

With controller events, this column shows the controller name.

With SysEx events, the manufacturer's name.

With pitch bend events, a 14-bit value is displayed here; comprised of the first (Num) and second (Val) Data bytes, combined. This value can be edited directly here.

With notes or Regions, the length is displayed here.

Here too, the units are bars, beats, divisions, and ticks. For the sake of clarity, when the length begins with one or more zeros, the “_” symbol is used. The minimum length is 1 tick (_ _ _ 1) not 0 ticks, as simultaneously switching a note on and off wouldn't make sense!

Numerical input starts on the right, working to the left—you can enter ticks if desired. The units can be separated by either spaces, dots, or commas.

End instead of Length

If you select *View > Length as absolute Position*, you can make the length display show the absolute position of the note off event, rather than its length from the note on.

... on Arrange Level

When you click on the UDL button, or double-click the background area above or below the list entries (if visible), you move up one level in the Folder/Region hierarchy.



This allows you to see all Regions in the current song (or folder). On the Arrange level, the list has the following columns:

Position

The start of the Region.

Name

Name of the Region. Double-clicking on the Folder name switches you to the display of its contents. Double-clicking on an audio Region opens the Region in the Sample Editor. A click on a MIDI Region returns you to event-level editing.

You can edit the name with the Text tool.

Track

Displays the track number. You cannot edit this value here (you could totally destroy your arrangement if you did). If you want to move Regions to other tracks, do it graphically in the Arrange window.

Length

The length of the Region.

Event Type Structure

Note Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	Note	1 C3 80 . . 1 0
----- End of List -----					

Num

MIDI note number (note #). The range is from C-2 (note #: 0) to G8 (note #: 127). Middle C is note # 60. It's known as C3 in MIDI terminology.

On some keyboards/synth modules (notably those made by Korg and Roland), the note range is C-1 (#0) to G9 (#127). In these cases middle C is called C4.

In the *Preferences > Display Preferences* page, you can reference the display to the description that is most frequently used by your devices (*Display middle C as...*).

Val

Velocity of a note from 1 to 127. The zero value (0) carries the note off message, and cannot be used here.

Length/Info

Length of the note. Although MIDI can only transfer *note on* or *note off* messages, Logic actually stores the position and length of all notes, which makes them easier to access musically. The *note off* message is generated automatically during playback.

Mapped Instrument Notes

If the edited MIDI Region is played through a mapped instrument, the defined names of the individual notes appear in the Status line. For the sake of clarity, there is a small note symbol to the left of each name.

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
1	1	1	1	♪Open HH	80 . . 1 0
1	1	1	1	♪KICK 1	80 . . 1 0
1	1	3	1	♪SD 1	80 . . 1 0
1	1	3	1	♪Closed HH	80 . . 1 0
1	2	1	1	♪KICK 1	80 . . 1 0
1	2	1	1	♪Closed HH	80 . . 1 0
1	2	3	1	♪SD 1	80 . . 1 0
1	2	3	1	♪Closed HH	80 . . 1 0
----- End of List -----					

Program Change Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	Program 1	- 0 Grand Piano
----- End of List -----					

Program change events can be transmitted to connected MIDI devices for patch selection. These may be sounds in a synthesizer, programs in an effects unit, or snapshots in an automated mixing desk.



Val

A program number between 0 and 127.

Some manufacturers (such as Yamaha) number the programs in their devices from 1 to 128, not 0 to 127. In this situation, you need to subtract 1 from the program number shown on the device itself.

Other manufacturers use various methods of dividing internal memory locations into groups (or banks) and sounds. The most common is divisions into 8 groups of 8 sounds, each numbered 1 to 8. These devices respond to program numbers 0 to 63 by addressing storage locations 11 to 88. The instruction manuals for these devices should contain conversion tables to assist you.

Num

Bank select. Normally you will see this symbol (–), which means no bank select will be sent. If you assign a number between 0 and 126, a bank select event is sent before the program change event. This allows you to address different sound banks (preset, internal, card, and so on) inside your synthesizer. The synthesizer must be able to recognize controller 32 as bank select, but unfortunately this standard is not used by all manufacturers. If you have any problems with bank select, check your synthesizer's manual to see whether, and how, it responds to bank select commands. You can change the type of bank select message Logic sends for each Multi Instrument in your setup (see "Defining Custom Bank Selects" on page 218).

Pitchbend Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	PitchBd	1 0 64 = 0
----- End of List -----					

Pitch bend events are used to continuously vary the pitch. They are usually generated by a centered pitchbend wheel or joystick on your keyboard.



Num

Fine pitch bend division (LSB). Many keyboards transmit a value of 0. If the pitch bend wheel has an 8-bit resolution, you will see values of 0 or 64 here.

Val

The effective pitch value (MSB) of 0 to 127. A value of 64 corresponds to the mid-way setting of the wheel.

Length/Info

The 14-bit value is displayed in this column as a decimal figure ranging from -8192 to 8191. The value in this column may be edited in the usual way.

Control Change Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	Control	1 71 127 Resonance
2	1	1	1	Control	1 64 127 Sustain
2	1	1	1	Control	1 1 21 Modulation
2	1	1	1	Control	1 7 89 Volume
2	1	1	1	Control	1 10 64 Pan
----- End of List -----					

These event types are used to transfer MIDI controllers (modulation, sustain, volume, and pan, as examples).



Num

The number of the controller. All of the various MIDI controllers (such as the modulation wheel or sustain pedal) are assigned their own numbers (#1 or #64 respectively). Some other controllers are also defined, such as volume (#7) or pan (#10).

Controllers that are defined in the MIDI Standard are described in the *Length/Info* field.

Val

Value of the controller. Continuous controllers have a range of 0 to 127. Switch controllers (#64—#90), transfer only two states; *off* (val=0) and *on* (val anything between 1 and 127).

Aftertouch Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	C-Press	1 0
----- End of List -----					

Aftertouch (or channel pressure) events are generated by a mechanical pressure sensor beneath the keyboard. The resulting sound modulation affects all notes on that particular MIDI channel.



Num

This column is empty for aftertouch events, as they only have one data byte.

Val

Strength of the pressure on the keyboard (0 to 127).

Poly Pressure Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	P-Press	1 E3 0
----- End of List -----					

Poly pressure events are generated by mechanical pressure sensors beneath each individual key. The resulting sound modulation only affects that particular note. Only a few keyboards offer this capability.



Num

MIDI note.

Val

Strength of the pressure on the key.

SysEx Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	SysEx	4 0 Moog
----- End of List -----					

System Exclusive Data (SysEx) is exclusive to individual MIDI devices. You can record these events using the dump utilities of your synthesizers, allowing you to save patch information outside the MIDI device. The arrows in front and behind the word *EOX* are used to add or remove bytes.



Editing SysEx Events requires a thorough understanding of the data format used by the MIDI device in question. Incorrect edits can lead to the corruption or loss of sound data.

SysEx Data in Hex Format

You can select whether SysEx data is displayed in hexadecimal or decimal, in the Event List or the SysEx fader editors, with the *View > SysEx in Hex Format* command.

Hexadecimal digits are preceded by a \$ symbol in Logic.

For more information on manually programming a SysEx message, check out the Environment SysEx Fader section.

Meta Events

Position	Status	Cha	Num	Val	Length/Info
----- Start of List -----					
2	1	1	1	Meta	1 47 0 Send Byte \$00
2	1	1	1	Meta	1 48 0 Switch Fader
2	1	1	1	Meta	1 49 0 go Screenset
2	1	1	1	Meta	1 50 0 Song Select
2	1	1	1	Meta	1 51 0 goto Marker
2	1	1	1	Meta	1 52 0 Stop Playback
----- End of List -----					

Meta events are control messages that are specific to Logic. They are used to automate specific Logic functions, and organize notation objects which can't be represented by MIDI events.



To create a meta event, hold down Command and click on the Full Message button.

Release Velocity

Logic is able to edit the release velocity of a note Event in the Event editor.

To view release velocity data, enable the *001011* view filter button to the left of the event list.

Num and Val

Num determines the function of the Meta Events you create, and Val determines the value that is sent. You should only ever insert and edit the following Num values in the Event List window:

Num = 47

Send Byte to MIDI. This sends the track instrument any byte value (Val) between 0 and 255 (\$00-\$FF). As a usage example of this Meta Event; if you send 246 as the byte, this is equivalent to a MIDI tuning request message. The display will show "Send Byte \$F6". Only use this Meta Event if you know what you're doing—if you don't, your sound modules and synths may start to behave very oddly indeed.

Num = 48

Switch Fader. This will send MIDI events to a particular output number (Val) on a cable switcher. You first need to connect a cable between a track instrument and the cable switcher in question.

Num = 49

Goto Screenset. This event selects a Screenset (Val determines the number). The track instrument is irrelevant.

Num = 50

Song Select. This event will switch songs on a MIDI data filer/player (Val = the stored song number). The track used for this event is irrelevant.

Num = 51

Goto Marker. When this event is sent, playback will jump to another marker (Val determines the marker number). Once again, it doesn't matter which track this event appears on.

Num = 52

Stops playback.

Meta Events can also be generated by Fader Objects in the Environment window.

Tips for Numerical Input

Numerical input (by double-clicking) is always independent of the current display mode or event type, and can be used in many other areas of the program. Here are some of the possible methods. You can type in:

- *Decimals*: 1, 01, 2, 3, 4, 127, ...
- *Hexadecimals*: \$1, \$01, \$2, \$3, \$A, \$0A, \$7F
- *Notes*: "C3", "C#3", "Cb3", "C##2" (equivalent to D2), "Dbb2" (equivalent to C2)

If you double-click on the note "E3", you can enter a decimal value such as "64" or a hex value of "\$40" instead of the note itself.

In many parts of Logic, mathematical operations can also be used to change values. As examples:

- adding two existing values: "+5", "+\$10"
- subtracting from the existing value: "-5"
- summing two values: "38+17"
- subtracting two values: "38-17"
- multiplying two values: "7*8"
- dividing two values: "80/5"

Event Float Window



The event float window can be accessed from most other windows.

Select *Options > Event Float* (or the *Open Event Float* key command) to open an Event Float window. This provides information on the currently-selected object, and can be compared to a single line of the Event List. You can edit all parameters in this window.

The following parameters are displayed:

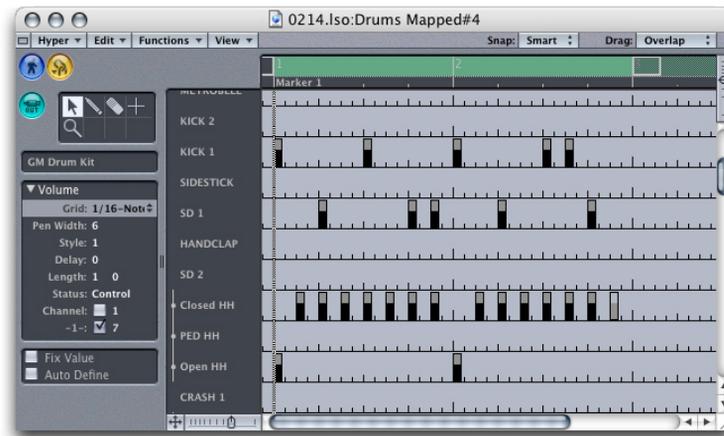
- the start point of the selected object in bars, beats, divisions, and ticks,
- the type or name of the selected object,
- the recorded MIDI channel and first data byte (if the selected object is an event), the name of notes, and the second data byte (if it exists);
- length of the selected object in bars, beats, divisions, and ticks.

Clicking on the film symbol (to the left) toggles the position and length display between SMPTE time and the normal display. Command-clicking on the SMPTE symbol turns the MIDI Out button on or off, affecting MIDI playback in the Event Float window.

The Hyper Editor is a graphical editor that can be used to create or edit MIDI note and controller data.

This editor is unique in that it makes some editing tasks—such as data scaling—much faster. The Hyper Editor is also ideal for “drawing” in drum and other parts.

Hyper Editor—Introduction



Usage

The Hyper Editor has many uses. The main ones are creating and editing drum MIDI Regions, and graphically editing controller data. Despite some similarities, don't confuse the Hyper Editor with the *HyperDraw* function.

Opening the Hyper Editor

To open a Hyper Editor window, select *Windows > Hyper Edit* (default Command-5). You will then be able to see the contents of the MIDI Region selected in the Arrange window.

Structure

The structure of the Hyper Editor window resembles that of the Arrange window: there is the horizontal Bar Ruler at the top, and the optional transport panel in the top left corner. On the left is the optional parameter area and the event name column, and to the right of that, the editing area, which can be likened to the arrangement area of the Arrange window.

The individual lines in the Hyper Editor are functionally similar to tracks in the Arrange window, in that each line has an event definition, which determines the event type displayed in this line (much as tracks in the Arrange window contain an instrument). When you select a line in the name column, its event definition is shown in the Parameter box.

The display of events takes the form of a horizontal row of vertical beams. The height of the beams indicates the value of the event. You can directly alter the value by grabbing the beam and moving the mouse up and down. It is possible to store a combination of simultaneously displayed event definitions as a hyper set.

Hyper Sets

A hyper set is a way of saving a combination of event definitions. When a hyper set is saved, the vertical zoom setting of the Hyper Editor is stored (this determines the number of event definitions that can be displayed simultaneously). You can save as many hyper sets as you need in each song.

Selecting a Hyper Set

Directly above the event definition parameter field is the hyper set selection field. Grabbing it opens a pull-down menu, which allows you to select from among the available hyper sets.



Creating a Hyper Set

To create a new hyper set, select *Hyper > Create Hyper Set*. The preset event definition in the new hyper set is the volume controller (#7). Any alterations that you make, such as adding or redefining event definitions, or adjusting the vertical zoom setting, are automatically stored in the current hyper set (as with screen sets).

Hyper > Create Hyper Set For Current Events creates a new hyper set, consisting of the currently selected event types. This is especially nice if you want to create a hyper set for all event types that you have created in a conventional Region HyperDraw. You can open the Event Editor, select everything, deselect the note events, open the Hyper Editor and use *Hyper > Create Hyper Set For Current Events*. All used event types can then be edited in the Hyper Editor.

Create GM Drum Set

General MIDI has an established keyboard assignment pattern for drum and percussion sounds. This is often even the case with sound modules, samplers, and professional synthesizers that don't carry a GM, GS, or XG emblem. As the Hyper Editor is ideally suited for drum track editing, you may wish to create a hyper set that is specifically tailored for GM Drum Sets, including the correct names and hi hat modes. Select *Hyper > Create GM Drum Set* to do so.

Naming the Hyper Set

To name the current hyper set, double-click on the hyper set selection button.

Clearing a Hyper Set

To clear the current hyper set (to delete its contents), select *Hyper > Clear Hyper Set*.

Event Definitions

The event definition of a hyper edit line determines the events it displays. This selection usually affects the status byte and the first data byte of the event. The second data byte then contains the adjustable value, which is represented by the height of the beam. As an example, the value of a controller or the velocity value of a note is shown as a beam in an event definition line. Don't worry if this seems a bit confusing at first: when setting up the hyper definition parameters, Logic helps you by providing pull-down menus containing written definitions of the status byte and (as far as possible) the first data byte. There is an even simpler way to set up hyper definitions: you can automatically create event definitions for selected events—see below.

There are many ways of altering the way the beams are displayed, and adjusting them to the particular event types. You can also use a grid to align the display of existing events, and add new events. This grid can be set separately for each event definition in a hyper set. The height of the lines in the hyper set is adjusted with the Hyper Edit window's vertical zoom function.

Selecting the Event Definition

As with tracks in the Arrange window, you can select an event definition by clicking on the name column. This allows you to view its parameters in the Event Definition Parameter box. You can also make multiple selections.

Creating Event Definitions

Creating an Event Definition

When you select *Hyper > Create Event Definition*, a new event definition is added, at the position of the currently selected event definition. Initially, it has the same parameters as the original. The event definitions beneath it are moved downwards.

Automatically Creating Event Definitions

If you select an event in another opened editor window, you can automatically create an equivalent event definition by checking the *Auto Define* checkbox. You can switch this function on/off with the *Auto Define Toggle* key command.

If the current hyper set already contains an event definition that corresponds to the type of the selected event, Logic does not create a superfluous double definition. The existing event definition is moved into the visible area in this situation.

Don't forget to switch off Auto Define immediately after completing your input.

Creating Several Event Definitions Automatically

You can also automatically create several event definitions. Just select the events that you want to base the event definitions on. You can use the same function to create event definitions for all event types in the selected MIDI Region.

It's a good idea to create a new hyper set before creating a group of new definitions.

Hyper > Create Hyper Set For Current Events creates a new hyper set with event types that match those of the selected events. This is especially nice if you want to quickly create a hyper set for all event types created in the conventional Region HyperDraw. You can open the Event Editor, select all, deselect the note events, open the Hyper Editor and use *Hyper > Create Hyper Set For Current Events*. All used event types can then be edited in the Hyper Editor.

If you select *Hyper > Multi Create Event Definition* a dialog box asks whether you want to create event definitions for all event types (select *All* or press Return), or just the selected events (*Selected*). Press *Cancel* to abort.

Deleting an Event Definition

Select *Hyper > Delete Event Definition* to remove the selected event definition.

Sorting Event Definitions

To change the vertical order of the various event definitions, just grab the event definition you want to move by its name column, and drag it to the desired position.

Copy/Convert Event Definitions

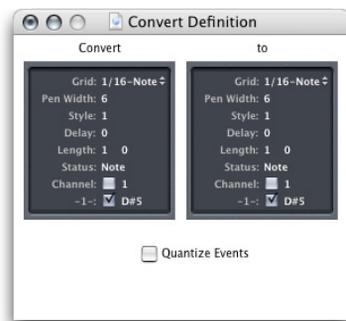
Hyper Sets: Copying Event Definitions

Select the event definition that you want to copy, and select *Hyper > Copy Event Definition*. Switch to the destination hyper set, and select *Hyper > Paste Event Definition*.

Converting Event Definitions

You can redefine an event definition (along with all events). The values of the events are retained, but the event type is changed to the new event definition. Select *Hyper > Convert Event Definition*, or double-click on the name column of the event definition that you want to convert.

The box shown below appears. On the left (convert), you can see the parameters of the selected event definition, and on the right you can define the parameters of the destination event type. The current settings are used as default values.



If you place an “x” in the *Quantize Events* checkbox, the event positions are quantized according to the *Grid* setting shown in the right-hand parameter field. If you make no further alterations, this allows you to quantize the positions of the events. If any *Delay* value is shown on the right, this is taken into account by the quantization.

Event Definition Parameter Box

The Event Definition Parameter box is where you make the settings for the currently selected event definition line. The most important parameters are *Status* and *-1-*.



Opening the Event Definition Parameter box.

You can show (or hide) the entire left parameter area by checking (or unchecking) *View > Parameters*. You can close or open the Parameter box by clicking the triangle in the top left corner.

Name of the Event Definition

Clicking the name next to the triangle determines what appears in the name column. If you define a named MIDI controller, or a note from a mapped instrument in the *Status* and *-I-* parameters, the relevant name will be offered as a preset. Altering a note name in the event definition also alters the corresponding note name in the mapped instrument.

You can also display, add, and edit Meta Events in the Hyper Editor's event definition.

Display and Editing Grid

The *Grid* parameter is set with the typical pull-down quantization menu. New events can then be added at the set grid positions. The positions of existing events are not affected.

If you want to quantize the positions of existing events, you can do so using event quantization, or more simply with event definition conversion.

The same quantization templates available for playback parameters, including Groove Templates you have defined, are accessible.

When editing complex drum rhythms, it can be useful to create several hyper definitions for one drum note, each with a different quantization grid. As an example, if there are two lines for a snare drum, one with a 1/16 and the other with a 1/96 grid, you can use the pencil to add individual hits in the coarser grid, and rolls in the finer grid.

Beam Width

You can set the width of the event beams from 1 to 16, using the *Pen-width* parameter. Regardless of the beam width, the exact event position is always marked by the left edge of the beam.

When set to the maximum value (*Penwidth* = 16), note events are displayed with their actual length.

Beam Display

The *Style* parameter allows you to select from four different color display variations, for the beams. Styles 5 to 8 are the same as 1 to 4, but the selected events flash when you highlight them.

Delay

The *Delay* parameter can be used to delay (with positive values), or advance (negative values) all of the events in an event definition line by an adjustable number of ticks. The change in position is visible immediately. Even new events are offset from the grid positions by the *Delay* value. If you click between the word *Delay* and the parameter value, you can use a pull-down menu to enter note values (1/16 and so on) directly.

Unlike the Region playback parameters' *Delay* option, this only affects individual event types or note numbers, which is very useful for drum programming (flams, for example).

In general, it is useful to transmit controller data slightly before or after the exact grid positions, to improve the timing of the notes lying on the grid positions.

Length of Notes to be Added

You can use the *Length* parameter to set the length of notes to be added, measured in divisions (the left number), and ticks (the right number).

To guarantee optimum timing when drum programming, you should ensure that note off events are never transmitted at the same time as note on events. Use note lengths that aren't close to straight note values, such as 100 ticks (1/48 note = 80 ticks, 1/32 note = 120 ticks). Very small tick values are also unsuitable, because note off events may sometimes be transmitted at the same time as note on events, at the same position.

Event Status

If you grab the right side of the *Status* line, a pull-down menu opens, enabling you to set the status for this event definition line.

MIDI Channel

Next to *Cha*, you'll see a checkbox, and to the right of this you can set a MIDI channel number. If you check this box, the display is restricted to events on the set channel. If the box is unchecked, the channel parameter is ignored, and matching events on all channels are displayed.

First Data Byte

The bottom line shows the *-1-* parameter, where you can determine the first data byte of the displayed event.

As an example, if *Note* is set as the event status, you can determine the pitch (note #) that should be displayed in this event definition line. If the edited MIDI Region is played by a mapped instrument, a pull-down menu that features the names of the input notes (drum sound names) appears here.

As with the MIDI channel, the checkbox determines whether (if checked) only events with the defined first data byte should be displayed, or whether (if unchecked) the setting should be ignored. In the case of note events, the velocity values of all notes (regardless of pitch) would be displayed in the relevant event definition line.

If *Control* is set as the event status, you can use a pull-down menu to determine the controller type (controller #).

With channel aftertouch (status *C-Press*), or program change events (status *Program*) the setting of the -1- parameter is always ignored, and the first data byte is displayed as a beam height. With pitch bend data (status *PitchBd*), the setting is also ignored, because both data bytes are used to display the beam height.

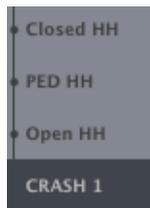
Making Different Definitions Simultaneously

Just as you can adjust the parameters for several MIDI Regions at once, you can set the parameters of several event definitions simultaneously. Select several event definitions in the name column, by holding down Shift and clicking on them. You can also use *Hyper > Select All Event Definitions* to select all event definitions, and then deselect some of them by Shift-clicking on them.

Any alterations made in the Event Definition Parameter box affect all selected event definitions.

Hi Hat Mode

In hi hat mode, event definitions can be grouped together. Only one event from each group can be played at any time position. A typical use is for preventing different hi hat notes (open, closed, pedal) from being inserted at the same position.



To define a hi hat group, click in any of the lines at the left edge of the name column. Click here once again to switch hi hat mode off for the line. All lines in a hi hat group must be vertically adjacent to each other.

If you add an event within a hi hat group, all existing events at this time position are deleted.

You can create as many hi hat groups as you want in a hyper set, but they must all be separated by at least one line in which hi hat mode is switched off.

Operation Grid

The grid defined by the *Grid* parameter in the Event Definition Parameter box is very important:

- During selection, all events within a grid section are selected
- When you change the values of existing events, all events within a grid section are altered, and
- New events are added at the grid positions, in accordance with the value set as the *Delay* parameter.

Selection Techniques

You can use any of the usual selection techniques (see “Selection Techniques” on page 36), with the following differences:

- To select individual events, hold down Shift, as you would when selecting several events that are scattered across the screen, and;
- When making a rubber band selection, hold down Shift (be careful not to click on any events).

Moving and Copying Events

When moving selected events, you also need to hold down Shift.

To copy events, use Option as per usual.

Both operations allow you to move events to other event definition lines. The events will be converted automatically.

Altering Event Values

You can alter individual values by grabbing the event beam (with the pointer or pencil). As you change the event value, the current value is shown in a help tag.

Altering Several Events

If several events are selected, you can alter all of their values relatively, by grabbing one of the event beams. The absolute differences between the event values remain constant. If one of the beams reaches the top or bottom value, you will not be able to go any further in that direction.

If you hold down Option while doing so, you can keep raising or lowering the values of the selected event group, until the grabbed event beam reaches the top or bottom.

Setting Up a Manual Series

Existing Events

Draw the events with the mouse pointer, while holding down the mouse button.

Creating New Events

Draw the events with the pencil, while holding down the mouse button. The pencil is preset as the second tool (Command key).

Setting Up a Linear Series

- Select the crosshair tool.
- Click anywhere in the beam display area, and hold down the mouse button.
- Keep an eye on the help tag (showing the exact position and event value in the top line). Move the mouse to the start point of the line you want.
- Release the mouse button.
- Move the mouse to the desired end point of the line (to the right or left). You can also keep an eye on the position and event value in the help tag.
- Click at the desired end point to align the event beams along the line.

If events existed in the area between the start and end points, they are aligned along the line.

If there were no events in the region, new events are created at the grid positions (in accordance with the *Grid* parameter), aligned along the line.

If you definitely want to create new events, hold down Option when you click for the last time.

This creates one event at every grid value. With very flat slopes, or very fine grids, the individual grid positions remain unoccupied if the value to be added is the same as the value of the previous event. This reduces the data-flow along the MIDI bus, without reducing the resolution of the controller.

When defining the *Grid* parameter to add a succession of controllers use the motto, “as coarse as possible and as fine as necessary” to minimize data output. Logic can deal with very large amounts of data, but unfortunately the same cannot be said of MIDI itself.

Linear Series in Sections

If you also hold down Shift, you can immediately draw another line from the end point of the original line.

Adding Individual Events

Use the pencil to add individual events. You can alter the value before you release the mouse button. The pencil is preset as the second tool (Command key).

Fix Value

If you place a check in the *Fix Value* checkbox, you can prevent the height of any event beam being altered with the mouse pointer or pencil.

When adding events with the pencil, all added events are assigned the value of the previously-selected event. This allows you to draw a succession of events with the same value.

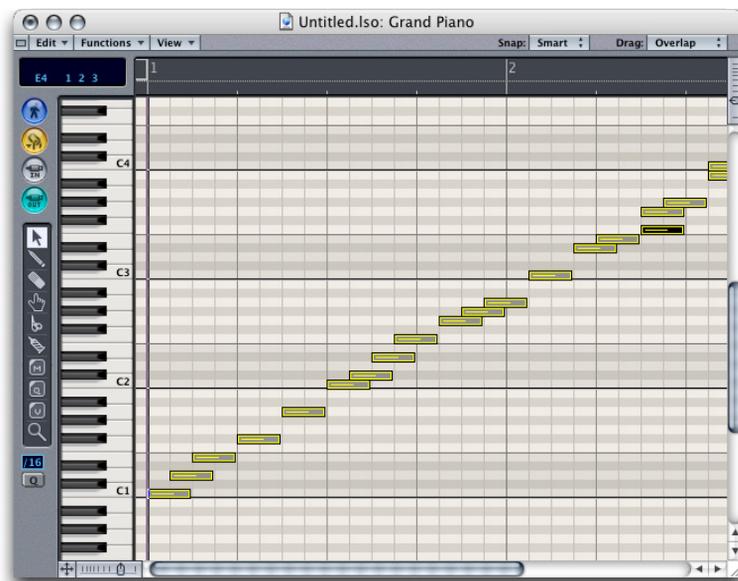
You can adopt the value of an event (with a fixed value) as a preset, by selecting it with the pencil. In fix value mode, it is impossible to alter the value by clicking on it.

When adding events with the crosshair tool, the preset value is always used as the start point of the line.

The Matrix Editor allows MIDI note events to be handled in much the same fashion as Regions in the Arrange window.

This editor is often called the “piano roll” editor as it represents note events as beams that resemble the holes cut in the paper of pianola piano rolls. It is an exceptionally easy to use tool for the creation and editing of MIDI note data.

Matrix Editor—Introduction



The Matrix Editor is used to graphically edit note events. Its advantage over the other editors is its ability to provide a more precise display of the length, position, and velocity of the notes. The Matrix Editor is designed for fine-tuning the positions and lengths of notes.

Opening the Matrix Editor

To open a Matrix Editor window that shows the contents of the selected MIDI Region, select *Windows > Open Matrix Edit* (Command-6) or a user-defined key command (*Open Matrix Editor*).

The optional parameter field to the left contains the standard buttons and the Toolbox. A Bar Ruler is shown at the top edge, much like the Arrange window (and the Hyper and Score Editors). Below the Toolbox, you'll find a field that allows you to define the sub-division of the grid. The vertical screen keyboard indicates the pitch of notes, which are displayed as horizontal beams. In the upper left corner, a display panel shows various types of information, depending on the situation.

Display

Notes are the only events shown in the Matrix Editor. The beams (and the way they can be edited) are very similar to the MIDI Regions in the Arrange window.

Pitch/Note Names

The pitch is indicated by the vertical keyboard on the left side. To help you with positioning, there are horizontal lines running across the screen between notes B and C, and notes E and F.

If a mapped instrument MIDI Region is being displayed, the names of the notes being played will appear on the vertical keyboard, in place of notes "C" and "F".

When a mapped instrument note is being moved, its name is displayed in the help tag.

Position

You can read the position of a note in the Bar Ruler. The background is marked by vertical lines to assist with positioning—the default values are:

- A black line at every bar,
- A lighter gray line at every beat, and
- A very light gray line at every division (you can alter the division value in the Transport window, or in the parameter area).

Velocity

The velocity of a note is portrayed by a horizontal line in the note. The length of the line in relation to the total length of the note corresponds to the velocity value of the note (in relation to the maximum value of 127).

If *View > Region Colors* is disabled, the Matrix Editor shows the velocity of notes by using different colors.

This makes it very easy to see at a glance what range of velocities are contained in a MIDI Region.

If you change the velocity of MIDI notes with the V tool, you will notice that the color of selected notes changes in real time.

MIDI Region Colors

When *View > Region Colors* is activated, the notes will be displayed in the color of the MIDI Regions that contain them. This makes notes easier to identify when viewing the notes of multiple Regions.

Matrix Color Setup

The Matrix Editor features a grid that follows the pattern of the black and white keys of the keyboard on the left hand side.

To enhance visibility, particularly when working at high resolutions, select *View > Matrix Color Setup*.

The colors of the Matrix window grid, background, lines, and so on can be adjusted for both the “White,” and “Black” Background views.

Chord Recognition

When selecting multiple overlapping notes in the Matrix editor, the information section in the upper left corner displays the chord name.

Editing Notes

You can use the same intuitive editing functions available for Regions in the Arrange window.

There are also some editing options (see “Edit Operations” on page 34) that are available in all editor windows.

Selection Techniques

In addition to the usual selection options, you can select all notes of the same pitch in the MIDI Region by clicking the corresponding onscreen keyboard key.

You can also rubber band select a pitch range of the onscreen keyboard, and select all notes within it.

Quick Opening of Event or Score Editor

A double-click on any event (without any modifier) opens the Event editor. An Option-double-click opens the Score editor.

Creating Notes

To create a note, click at the desired point on the background with the pencil tool.

Duplicating Notes

To copy an existing note to another position or pitch, first click the original note with the pencil (near the middle).

Any notes now created by clicking the background will have exactly the same length and velocity as the original note.

Deleting Notes

You can delete selected notes by pressing Backspace, or clicking on them with the eraser.

Moving Notes

You can move selected notes by grabbing them (near the middle) and dragging them. If you move notes vertically, they will be transposed, and if you move them horizontally, they will be moved in time. The target position and pitch are shown in the help tag while the mouse button is held down.

When you move notes horizontally, they snap to the division set in the Snap menu (you can alter this setting at any time).

You can limit movement to one direction, to avoid accidentally transposing notes when moving them vertically (and vice versa). (*Options > Settings > Global Preferences: Limit Dragging to one direction in Matrix and Score*).

Setting a Finer Grid

When moving notes in the Matrix window, you can make fine adjustments at a high resolution, by holding down Control as you drag. The exact resolution will depend on the current Snap menu setting used in the window.

If you hold down Control-Shift, you can move the notes in tick steps, completely independently of the Snap menu setting and the time grid.

Copying Notes

Hold down Option as you move the notes.

This allows you to copy or move notes between two Matrix Editor windows, even if the windows belong to different songs.

You can, of course, also copy (*Edit > Copy* or Command-C) or move (*Edit > Cut* or Command-X) the notes onto the Clipboard, and then paste them at the current song position, at their original pitch (choose *Edit > Paste* or Command-V).

Altering length

To alter the length of a note, grab it by its bottom right-hand corner, and drag it to the required length. While you are altering the length, the help tag will keep you informed about the precise length of the note.

Note start edit

The head of a note (startpoint) can be changed, while retaining the original endpoint. This is done by grabbing and dragging a note at the bottom left corner. This function is similar to adjusting the startpoint of a MIDI Region in the Arrange Window.

Altering the Lengths of Several Notes Simultaneously

You can adjust the lengths of several selected notes at once (a chord, for example), by simply altering the length of one of them. The relative differences between the (selected) note lengths will be maintained.

Making Notes End Simultaneously

Hold Shift while altering the length of a note, to make all selected notes end at the same position.

Making Notes the Same Length

If you want to make several selected notes the same length, hold down Option-Shift (as in the Event List, when making several parameters the same value).

What Tools to Use

You can use either the mouse pointer or the pencil when altering note lengths. It's advisable to use the pointer, as this avoids the accidental creation of new notes, possible with the pencil.

It can sometimes be difficult to grab the bottom right corner of very short notes. In this situation, you should use the index finger tool, which allows you to grab notes anywhere, in order to alter their length.

Altering velocity

To alter the velocity value, click-hold, and vertically drag on the note with the V tool. The help tag will indicate the velocity value of the note you have clicked on.

If the MIDI Out function is switched on, the note will be output when you alter the velocity.

Altering the Velocity of Several Notes

All selected notes can be altered simultaneously; the differences in their respective velocity values will be retained. If the velocity value of one of the selected notes reaches an extreme value (0 or 127), none of the selected notes can be adjusted further.

You can override this behavior by holding Option while doing so. This allows you to continue altering the velocity values until the selected (clicked) note reaches an extreme value.

Hold down Option-Shift while dragging, to assign the same velocity value to all notes.

Muting

The Matrix editor features a Mute tool that allows the muting of specific notes in a MIDI Region.

To mute a note, click on it with the Mute tool. This will mute/un-mute it. Muted notes are grayed out (shown without color).

Clicking on a piano key to the left of the Matrix Editor with the Mute tool will mute/un-mute all notes of that particular pitch.

Click and drag on the background with the Mute tool to perform a rubber band selection of multiple notes. (Hold down Shift to create non-consecutive selections). Clicking on one of the selected notes will mute/un-mute all selected notes.

The *Select Muted Regions/Events* key command is also available in the Matrix Editor. It allows the selection of all muted notes in a MIDI Region.

Multiple MIDI Region Edit

The Matrix Editor can display all MIDI Regions from a folder, or those for an entire song, simultaneously.

Display of all MIDI Regions

Double-clicking on the background of the Matrix Editor shows all MIDI Regions. The beginning of each MIDI Region is indicated by a vertical line of the same color as the MIDI Region itself.

A Matrix Editor window with an activated (same level) link function (single click on the chain link button) shows all MIDI Regions in the folder displayed in the Arrange window, or songs.

Hide Notes of Non-Selected MIDI Regions

Selecting *View > Show Selected Regions Only* limits the display to only show notes in selected MIDI Regions.

Display of Individual MIDI Regions

Double-clicking on a note changes the display level to only show the contents of the (parent) MIDI Region that contains the note.

A further double-click on a note opens an Event List window (or with Option held: the Score Editor).

A Matrix Editor window in Show Contents link mode (double-click on the chain link button), shows the contents of a single MIDI Region selected in the Arrange window.

The following text assumes that all MIDI Regions are displayed.

Selection

You can create a selection over multiple MIDI Regions and move or lengthen events, or use functions as required.

Selecting a note in the Matrix window chooses the parent MIDI Region.

Info-Bars/Help Tags

When an individual MIDI Region is represented, the Info-Bar will show the number of selected Notes.

When all MIDI Regions from a folder or song are displayed, the help tag shows the number of "parent" MIDI Regions. As examples:

8/2

8 notes are selected from 2 MIDI Regions.

When notes from only one MIDI Region are selected, the MIDI Region name is shown beside the number of selected notes.

3/Piano

3 notes are selected from a MIDI Region called “Piano”.

When no notes are selected, the Info-Bar shows the name of the most recently selected MIDI Region. Using the Pencil will insert Notes into this MIDI Region.

Piano

No notes have been selected. Use of the pencil will insert notes into this MIDI Region.

Hyper Draw in the Matrix Window

In both the Matrix and Score Editors you can use the *View > HyperDraw* command to open a Hyper Draw (see “HyperDraw” on page 323) display. This allows quick and easy editing of controller data while viewing note data.

Once you have opened the HyperDraw display, you can select the type of event you want to view by using the arrow menu to the left.

You can adjust the size of the HyperDraw display by grabbing, and vertically moving the dividing line that separates it from the main Matrix editing window.

Logic's Score Edit window basically serves two purposes:

- As a MIDI editor for users who prefer to use traditional music notation as an interface for MIDI sequencing. Input, editing, copying, or deleting of MIDI events and changing their musical position can be done directly in the Score window. One can also change between different display levels (that is, view single or multiple parts at once).
- To prepare and produce printed music. The number of staves in a score is only limited by the paper size. Also, each staff can contain up to 16 independent ("polyphonic") voices.

In addition to the notes (which always represent MIDI events), numerous musical symbols can be inserted. Text (and thereby any symbol which is part of a text font) can also be integrated into the music.

Single pages, or parts thereof, can be exported to graphic or text based programs, using the camera tool. The selected area can be saved as a graphic file, or copied to the Clipboard, and then imported or pasted as a picture in another program. This is especially useful for preparing teaching material.

MIDI sequencing and preparing music for printout are closely related in Logic. Recorded MIDI notes are immediately displayed in the score. On the other hand, notes which are inserted with the mouse on the screen, or changes to existing notes are immediately reflected in the MIDI playback.

Opening the Score Edit Window

There are several ways to open the Score window:

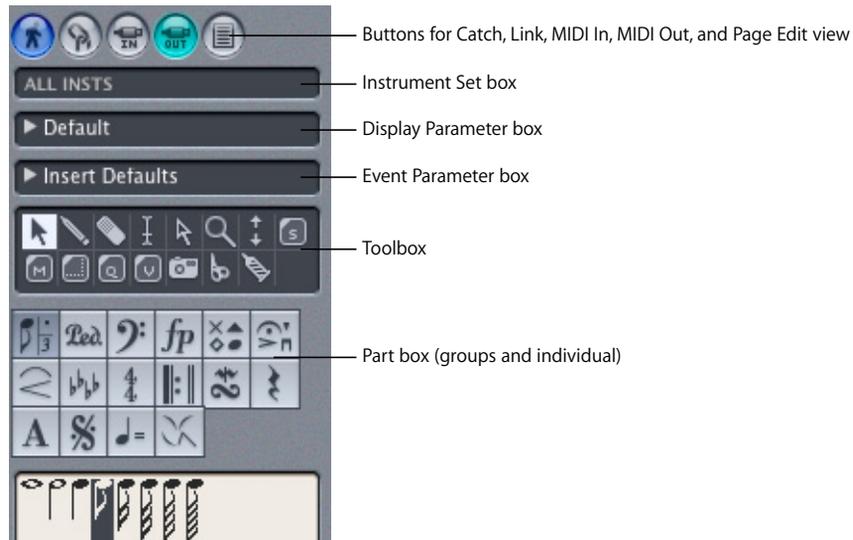
- Main menu *Windows > Open Score*
- Key command *Open Score Window* (Default: Command-3).
- double-click on a MIDI Region in the Arrange window, if *Double-clicking a MIDI Region Opens Score Editor* is selected in *Logic > Preferences > Global > Editing*.
- To recall an already opened window (which is hidden by other windows), select that window's name in the main *Windows* menu, where all currently opened windows are listed.

Several Score windows can be open at once. This can be used for example, to display different groups of instruments, by using different Instrument Sets.

Elements of the Score Edit Window

Here's an overview of the Score Edit window's elements and their names, as used in this help book.

Along the left-hand side:



Along the top margin:

- Bar Ruler (linear view only)
- Zoom symbols
- Menus

The main working area:



optionally with:

- Instrument name display column on the left side
- Hyper Draw area at the bottom (only possible in single MIDI Region view and with linear display)
- Page Rulers (only in page view)

The various options for changing the display of these elements are described in the section General Appearance of the Score Edit Window (see "View Menu" on page 482).

Positioning the SPL Directly in the Score

The Song Position Line can be set directly in the Score window by clicking into a staff at the desired position, while pressing Option. This function is only available when the sequencer is stopped. It is especially helpful in Page view, where no Bar Ruler is displayed. The selected position is displayed in the help tag as long as the mouse button is pressed.

Notation Concept

MIDI sequencing and score display are closely related within Logic. Every note in the score represents a MIDI note event. MIDI Regions are interpreted for display by Logic, using methods that can be influenced by the user to a great extent. The goal is to retain the feel of real time recordings, while still rendering a readable score.

If notes are put into the score using the mouse or step input, they are also played back via MIDI, since they represent MIDI events.

Basics

Recorded MIDI Regions are automatically displayed in the Score window. If you like the sound of the playback, but not the score display, you can usually get the desired result by changing some of the settings in the *Display Parameter box*, in the different *Song Settings* dialog windows, or *Note Attributes*. You can control the display even further by selecting or creating *Score Styles*, *Instrument Sets*, and *Text Styles*, which best fit your music.

If you generally prefer mouse input, you first need to create one or more empty MIDI Regions in the Arrange window, using the Pencil tool. These will then be displayed as empty staves in the Score window. Rests are usually displayed automatically in Logic, and don't need to be inserted.

If you want to use the mouse to insert new notes into a previously recorded MIDI Region, you can select a rhythmic note value from the Part box, and drag it to the desired bar and pitch position, in any of the visible staves.

No matter which input method you decide to use, the selected display settings will always be applied to the inserted MIDI events. This means for example, that a thirty-second note can only be displayed if the *Qua* parameter in the *Display Parameter box* of the corresponding MIDI Region is 1/32, or shorter. If that value is set to 1/8, an inserted 32nd note will be displayed as an eighth note (but will still play back as a 32nd). The display is also affected by the *Interpretation* setting in the MIDI Region's Display Parameter box. These settings can be different for each MIDI Region, even for MIDI Regions on the same track. To use different display parameter settings in the same staff, just cut the MIDI Region with the Scissors tool. Now you can assign different display settings to the resulting shorter MIDI Regions, although they will still be displayed as one uninterrupted staff. MIDI playback will not be affected by this procedure.

The Part box contains many symbols which can be inserted into the score, in the same way as notes, by dragging them into position with the mouse.

The printed result always corresponds to what you see in the selected Score window (Page Edit view must be activated). Layout work should be done in page and print view, after all of the notes, and most of the symbols, have been recorded or inserted.

Staff Display...

...in Relation to Position and Length of MIDI Regions in the Arrange Window

MIDI Regions in the Arrange (see “MIDI Regions” on page 128) window represent parts played by certain instruments (symbolized by the tracks), and are displayed as staves in the Score window. However, depending on which Score Style (see “Basics” on page 529) is used, an instrument’s notes can also be displayed in a staff system containing two or more staves (such as a two staff system for a piano part).

Each of these staves or (in the Arrange window) tracks, can contain an (almost) unlimited number of MIDI Regions. If the MIDI Regions on one track directly follow one another in the Arrange window (with no gaps between them), they are displayed as one continuous staff in the score, unless you have limited the view to a single MIDI Region, by engaging *content linked mode*. In linear view, you will still see clefs, time, and key signatures at the beginning of each MIDI Region, but these disappear as soon as you change to Page Edit view.

The Display Parameters (see “The Display Parameter Box” on page 522) for each of these MIDI Regions can be set independently. This allows you to influence the visual display of MIDI Regions recorded in real time in a very flexible way, especially concerning the display of rhythmic values. If necessary, MIDI Regions can be divided into several pieces with the Scissors tool (available directly in the Score window), allowing you to assign different display parameters to each resulting part, because each is now an independent MIDI Region.

It is always very obvious which MIDI Regions are selected: Selected MIDI Regions are displayed with blue staff lines (unless this option is deactivated in the Score Preferences (see “Score Preferences” on page 574)).

Aliases in the Score Display

Alias (see “Aliases” on page 155) is a term used for MIDI Regions and Folders in the Arrange Window which are not independent, but only “mirror” other MIDI Regions and Folders at different positions and/or tracks. Wherever an Alias exists, its original MIDI Region or Folder is played back.

Aliases are also displayed in the Score Edit Window and will also be printed. Alias Display can be switched on or off via *Layout > Global Format > Show Alias*.

An Alias can be assigned a different Score Style than its original Region. As an example, a melody played in unison by several instruments can be handled as a regular MIDI Region and several Aliases of that MIDI Region. Different Score Styles can be used for the different instruments, also transposing Score Styles. If you decide to change something in the melody, you don't need to edit all copies of it. Just make the change in one MIDI Region, which will automatically be reflected in all Aliases of the original MIDI Region.

Alias Editing

If *Layout > Global Format > Allow Alias Editing* is switched on, you can directly edit the notes and symbols in the displayed alias. Please beware: you are thereby editing the original MIDI Region and all aliases created from it, because only the original MIDI Region can actually contain MIDI data.

If *Allow Alias Editing* is switched off and you try to edit an alia, you will get a dialog that will offer you the following options:

- *Cancel*: the aliases and the original MIDI Region remain untouched.
- *Enables Alias Editing*: Alias Editing is enabled; when editing you are actually editing the original MIDI Region.
- *Copy Region*: A true copy of the original MIDI Region is created. You can now edit the notes independently from the original MIDI Region, because the alias is turned into a real MIDI Region.

Basic Elements for Score Display

The following elements and their parameters form the basic concept for the score display in Logic.

Instrument Sets



Instrument Sets (see “Instrument Sets and Score Display Levels” on page 552) allow you to control which instruments will be displayed (and printed) in a score. You can include as many (or few) of the existing track instruments into a score as you like. The order of the instruments can be arranged independently of their order in the Arrange window. You can assign names and abbreviated names to each track instrument independently from the actual track instrument names in the Arrange window. These will then be displayed in the score. You can also define which staves in the score will be connected with brackets and bar lines, to form groups of instruments in the score.

Any single instrument can quickly be extracted from the score, by selecting it from the pull-down menu which appears when you click on the Instrument Set Box, while holding down Option. This way, you don't need to create an Instrument Set for every single instrument in order to produce parts. The automatic line breaks and the individual staff margins can be changed for each Instrument Set individually. For details please see the section Instrument Sets.

When you open a new Score window with several MIDI Regions selected in the Arrange window, an Instrument Set will automatically be created and displayed in that Score window, which only contains the instruments belonging to the selected MIDI Regions.

Score Styles

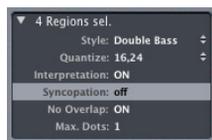
Each Score Style (see "Basics" on page 529) contains a collection of score settings. Their function could be compared to that of text formats in word processors and layout programs. Instead of text settings however, Score Styles contain the staff size, display transposition, stave distance, number of independent voices and so on. So, instead of having to define all of these settings each time a new MIDI Region is created or recorded, any desired Score Style can be assigned to that MIDI Region. Any number of Score Styles may be created and assigned to individual MIDI Regions. There are also a lot of Score Styles already included in the template files that come with Logic, and in Logic's default song. For details please see the section Score Styles.

Text Styles

These are user-definable text formats for all types of displayed text.

Display Parameter Box

The parameters in the Display Parameter box (see "The Display Parameter Box" on page 522) mainly affect the rhythmic display of the selected MIDI Regions. They can be different for each MIDI Region. Some of these parameters can be overridden for individual notes, using Note Attributes.



Song Settings

In the Song Settings (see "Song Settings for Score Display" on page 560) window you can set general display options, which affect the whole song. These include spacing between notes, page margins, line thickness, display of instrument names, bar, and page numbers, and a lot more.

Note Attributes

The Note Attributes (see “Note Attributes” on page 548) affect single notes or—when assigning them to a group of notes—all selected notes at once. For each note, the following parameters can be defined individually:

- Enharmonic changes.
- Settings for Interpretation and Syncopation, independent from the settings in the Display Parameter box.
- Stem direction, tie direction, and beaming, independent from the settings in the used Score Style.
- Display as an *Independent Note*, which excludes the note from the measure’s overall rhythmic calculation.
- Horizontal graphic offset from the default position.
- Change of accidental distance.
- Change of note size, and form of the note head.

General Appearance

View Menu

Here you can activate and deactivate the following display options by selecting the corresponding menu entries. Activation is indicated by a check mark:

Colors

The entries in this menu set the color mode for the active score window. These settings here always have priority over all other color settings.

- *Normal* or *Individual* means that colors are assigned according to the color settings in Score Styles and Note Attributes. As long as those haven’t been changed in new songs, this will result in a regular black and white printout and black notes on yellow background on the screen.
- *Show Pitch* applies colors according to the pitch of notes. The colors for that can be edited in a special window that open via the menu *Layout > Colors*. There you can also determine whether notes with accidentals will have the same color as without accidentals, or if each note in the chromatic scale will have its own color.
- *Show Velocity* applies eight different colors according to MIDI velocity. Also these colors can be edited in *Layout > Colors*.
- *Show Voice Assignment* assigns different colors to different Voices. This only makes sense in Score Styles that contain more than one Voice. This mode employs the colors of the user palette, which can also be found and edited in *Layout > Colors*.
- *Force Black & White* does exactly that. This mode is useful when color options have been used in Score Styles or colors have been assigned to notes using Note Attributes, but one wants to print a regular black and white score and then return to the colored display.

Page Edit

Note: A quicker way of changing between Linear and Page Edit view is to click on the button in the upper left corner, or use the corresponding key command.



For editing, you should use linear view, as screen redraws are much faster, especially on slower computers. Page view should only be used for layout work in preparation for the actual printout.

When you work in Page view mode, you can jump directly to any page, using the *Go to Page* key command. The Song Position Line will be automatically set to the beginning of the selected page, unless the sequencer is running when you execute this command. In this case, *Catch* mode will be turned off.

In Page View mode, Logic will automatically display as many pages next to each other as possible, according to the size of the Score Edit window and the current zoom level.

Print View

Print view will also show the page margins on the screen (only if Page view is activated). Note: the yellow area on the screen represents the printable area (which also depends on the printer used), not the actual sheet of paper.

Explode Folders

Displays the contents (MIDI Regions) of all lower display levels (folders), together with MIDI Regions of the current level.

If this option is not activated, folders are displayed as gray beams in linear view. In Page view, they are not visible at all. As with the other windows, the contents of a folder will appear when you double-click the gray beam that represents it.

Explode Polyphony

Displays every voice of a polyphonic Score Style on a separate staff. In general, this is not intended for printout, but for convenient editing of polyphonic voices.

Scroll in Play

Changes Logic's scrolling behavior when *Catch* is activated: the current song position is always kept in the middle of the window, so instead of the Song Position Line, the score display itself is moved around the SPL, which stays in the center of the screen.

Part box

- *Show All Groups*: If this is deactivated, only the Part box Group currently selected in the top section of the Part box appears below it.

- *Lock Group Positions*: This allows you to lock the order of the Part box Groups. Otherwise, the group of the most recently selected object is always moved up to the top of the lower section of the Part box.

Toolbox

Hides/Shows the Toolbox on the left side of the Score window. As in all Logic windows, the Toolbox also pops up at the current cursor position any time you use the corresponding key command (default: Esc). After selecting a tool, or pressing Esc once more, it will disappear again.

SMPTE Time Ruler

Displays SMPTE timecode positions in the Bar Ruler (only in linear view). If there is enough vertical space, it will show both bar and timecode positions.

Parameters

Hides/Shows the left column of the Score window (Display Parameter box, Event Parameter box, Part box and so on).

Instrument Names

Hides/Shows the names of the used track instruments, to the left of the score display.

Page Rulers

Hides/Shows rulers in Page Edit view. Measurement units can be centimeters or inches.

White Background

Switches between a white and colored background.

Hyper Draw

If you activate one of these options, a Hyper Draw area appears at the bottom of the main working area allowing you to easily insert control data. You can change this area's height, by dragging the borderline vertically with the mouse. Note that Hyper Draw in the score is only available when single MIDI Regions are displayed in linear view.

Other Options

Adjusting the Borders between the Different Areas

You can move the left and upper borders of the main working area, by positioning the cursor on one of the border lines, and click-dragging it. During these operations the cursor becomes a tool with two or four arrows. There are three possibilities:

- On the left side, you can alter the width of the columns containing the parameters, (mainly changing the appearance of the Part box Groups), and the instrument names.
- Along the upper border, you can create vertical headroom. This is useful for working on parts containing very high notes, or symbols above high notes (like slurs), which might not be visible otherwise, and therefore could not be edited.

- In the upper left corner of the main working area, you can change the width of the parameter column, and the height of the bar or page ruler. If *View > Instrument Names* is activated, the width of the instrument name column can also be changed.

Parameter Boxes

Both the Display Parameter box and the Event Parameter box can be reduced to display just their title lines, by clicking on the triangle in the upper left corner of each Parameter box.

The Main Working Area

The appearance of the score display depends on:

- The settings of the Link and Catch buttons (see “Display Levels” on page 552)
- The selected Instrument Set (see “Instrument Sets and Score Display Levels” on page 552)
- Page or Linear view (menu View, and/or button to the right of the MIDI Out button)
- Zoom level
- Explode Folders (see “View Menu” on page 482) on or off
- Explode Polyphony (see “View Menu” on page 482) on or off
- Hyper Draw (see “Hyper Draw in the Score Edit Window” on page 494) on or off

Input Methods in the Score Window

There are several ways to input notes and symbols in the Score window:

- Real time MIDI recording (notes and sustain pedal markings only)
- MIDI step input (notes only)
- Mouse input from the Part box (notes, text, and all symbols)
- Insertion of copied events (all, except global events)
- Fast input of symbols by assignment to selected notes with key commands. These are available for some symbols which are attached to notes (accents, Jazz symbols and so on), and slurs or crescendi.
- With Hyper Draw (see “Hyper Draw in the Score Edit Window” on page 494), you can also insert and edit MIDI events which are not normally displayed in the Score window at all, like continuous controller data (i.e. volume, pitchbend, and so on).

The various input and insertion methods can be combined. With all input methods, however, you should always keep in mind that MIDI playback is also influenced by the settings in the Region Parameter box (see “MIDI Region Playback Parameters” on page 141) and Instrument Parameter box (see “The Instrument Parameters” on page 123) in the Arrange window. Settings in the Environment may also affect MIDI playback, if you have configured it to do so.

Score Display Options—a Survey

With a few exceptions a printed score (see “Printout” on page 487) is always identical to the Page Edit view display in the currently active Score window.

The display, again, depends not only on what was recorded or inserted, but to a great extent on the chosen display settings. Since there are a quite a few, each affecting only certain aspects of a song’s display, here is an overview of the various settings. These are organized into groups, according to how much they influence the overall display. Detailed explanations of the following terms are given on the indicated pages.

Settings which affect all song files:

- The Score Preferences (see “Score Preferences” on page 574)

Settings which affect the score display of one song file:

- Page format, and printer driver

Song Settings (see “Song Settings for Score Display” on page 560) (menu Layout):

- Global Format
- Clefs & Signatures
- Extended Layout Parameters
- Numbers & Names
- Guitar Tablature...
- Text Styles...
- Score Styles... (see “Basics” on page 529)

Settings which can be assigned differently for each Score window, and therefore allow different score displays within the same song file:

- Display levels: Content Linked, Linked, or Not Linked
- Explode Folders
- Instrument Set (see “Instrument Sets and Score Display Levels” on page 552): selection and order of the displayed instruments
- Explode Polyphony
- Linear view or Page Edit view (printout can only be started from Page Edit view)
- Zoom levels (does not affect the printout)

Settings which affect the score display of a particular MIDI Region:

The parameters in the Display Parameter box:

- Score Styles...—selection
- Display quantization (“Qua”)
- Interpretation
- Syncopation
- No Overlap
- Max. Dots

Special case:

- *Score Off* in the Extended Region Parameters

Settings which can be changed for each note individually, regardless of the default settings:

- Accidentals: Enharmonic Shift
- Accidental Position (distance to note)
- Beaming of notes
- Stem Direction
- Interpretation
- Syncopation
- Tie Direction
- Note head appearance (Head)
- Treating a note as Independent Note or Independent Grace Note
- Note size (Size)
- Horizontal Position: Graphic positioning
- N-Tuplet settings (Tuplets)

Printout

For printing, it is important that you first choose the appropriate paper size and format in the menu *File > Page Setup...* The Score window with the intended print view has to be the active window. You start printing by selecting *File > Print...*, or use the corresponding key command (default setting Command-P). There will be a dialog box, which will vary slightly from printer to printer. Depending on the printer, there may be some additional options, such as which pages you would like to print, or the number of copies.

The printout is always identical to the Page Edit view display in the Score window. The following items however are not printed, but are only visible on the screen:

- The dashed lines which represent page and header margins, and borders between staff systems
- Cursor, Song Position Line
- Colors (page margins, stave lines of selected MIDI Regions)
- Hidden time signature changes
- Hidden note heads (displayed grey on the screen), and their ties
- Hidden bar lines (displayed as dashed lines on the screen)
- Hidden N-Tuplet numbers

Printers work with higher resolution than monitors. Therefore, you should work in high zoom levels when doing layout work that requires precision, such as positioning symbols and text elements.

It is very easy to change back and forth between a normal and extremely enlarged view of the display, by using the Magnifying Glass tool (shortcut: rubber band selection while holding down Control, to enlarge the selected area).

Using external Symbol Fonts for Display and Printout of Notes and Symbols

You can use the Sonata font by Adobe, the Jazzfont (<http://www.jazzfont.com>) and the Swingfont (not included with Logic), instead of Logic's internal score font, for display and printout of notes and symbols. The external font must be properly installed in your system. Activate *Options > Score Preferences > Use external Symbol Font (if available)* and choose the font you wish to use in the corresponding pull-down menu.

Since screen display with some of these fonts is rather hard to read (especially at smaller zoom levels), there is also an option to use the external font just for the printout. Select *only for Printout* in the applicable Score Preferences option.

Graphic Export

You can save a part of a Logic score page (or a whole page) as an image (PICT format), and paste it into documents created with other programs (like word processing and DTP software). Use the *Camera tool* to select the desired score section, using the "rubber band" selection technique. As soon as you release the mouse button, Logic creates a PICT file, (or copies the selection to the Clipboard—see option below) encompassing the area you dragged the *Camera tool* over. This function is available only in Page Edit view.

There are some related settings in *Logic > Preferences > Score Preferences*:

Graphic Export Resolution

Determines the resolution of the exported image file. This can be set between 72 and 600 dpi.

- If the image is intended for use on a computer screen only, use the low resolution (72 dpi).
- If the image is intended for a document that will be printed, select your printer's resolution.

Graphic Export to (pull-down menu)...

- *Clipboard*: The image is copied to the Clipboard and can be pasted directly into other documents, without saving it as a separate file.
- *PICT File*: The image will be saved as a PICT file. You'll be given a file selector box, to assign a file name and path.

Realtime MIDI Recording

Although real time MIDI recording is usually done in the Arrange window, you can also start recording directly while working in the Score window. You must first select the destination track in the Arrange window's track column. In the Score window, this can be done by clicking on a staff which belongs to that track. If there are no MIDI Regions on the track to be recorded, you will need to switch to the Arrange window for the recording, since the track is not yet displayed in the Score.

If you want your recording to become part of a previously existing MIDI Region (i.e. because you use score template files), select the global menu *Song Settings > Recording Options...* and activate *Merge New Recording With Selected Regions*, before starting to record. Also, make sure that the destination MIDI Region is selected, otherwise Logic will create a new MIDI Region on the same track, which will probably overlap the existing one.

The display of the recorded notes depends on:

- The score display settings, especially those in the Display Parameter box (see “The Display Parameter Box” on page 522) and the Note Attributes (see “Note Attributes” on page 548). Please read the corresponding sections in this chapter.
- The *Quantize* and *Transpose* settings in the Arrange window's Region Parameter box (see “MIDI Region Playback Parameters” on page 141):

Logic creates a score display based on the MIDI data, including any changes caused by these two playback parameters.

An example: if *Transpose* in the Region Parameter box is set to +2, a note that initially (when recorded) was a C will be played back and displayed as a D. The same applies to playback quantization with the exception of notes that were “dequantized” using the Quantize tool, or the corresponding key command.

Step Input

Step Input (see “Step Input” on page 52) in the Score window works the same way as in the other editor windows.



The Score Editor window, however, is the only editor (besides the Matrix editor) where the content of several Regions can be displayed and edited at once. This is why there are some differences concerning Step Input in the Score window:

- The MIDI Region into which you intend to insert notes has to be selected (click on the staff). If there is no staff yet, you must first create an empty MIDI Region in the Arrange window.

- Simultaneous step input into several Regions is not possible. If more than one MIDI Region is selected, the notes will be inserted into only one MIDI Region.
- If several Regions on the same track in the Arrange window follow one another, even with gaps in-between, you can insert notes using step input from one MIDI Region to the next. As soon as the Song Position Line reaches the beginning of the next MIDI Region, Logic will insert the notes into that MIDI Region automatically.

Mouse Input

In order to insert notes, symbols, and text elements (called *objects* in the following sections) with the mouse, there has to be a staff into which these objects can be inserted. Each staff (even an empty one) is the direct representation of one or more Regions. Empty Regions can be created with the Pencil tool in the Arrange window, where their length and position can also be changed.

These empty Regions are displayed in the Score window as empty staves, with automatically displayed rests (unless the automatic rest display is deactivated in the assigned Score Style).

Input

For mouse input, you first need to select an object in the Part box, and then drag it to the desired position in the main working area. As a positioning aid, you will see a help tag, instead of the local window menus, as long as you are “holding” the object with the mouse. Now move the mouse with the button pressed, until the desired position is shown in the help tag. Release the mouse button. At smaller zoom levels, it’s especially important to use the help tag to find the correct position.

When you are working in full score view, and insert objects between the staves (such as dynamic symbols), you should make sure that these symbols have been inserted into the desired MIDI Region/staff. Immediately after inserting an object, the MIDI Region into which you inserted the object will be selected, and therefore be displayed with blue staff lines. You can also see its name in the top line of the Display Parameter box.

In general, it is better to change to single staff display (double-click on the staff), for inserting objects which are positioned between staves (especially lyrics). Although in full score mode it does not matter to which MIDI Region an object belongs, since they stay where you put them, such objects can be displayed with the wrong instrument, when single instrument parts are displayed and printed later.

All Part box objects and their particular features are described in detail in the section The Part box (see “The Part Box” on page 495).

In the Event List, notes and sustain pedal markings are listed as MIDI events, most other symbols and text objects as Meta events. Global symbols, global text elements, time, and key signature changes are not listed in the Event List. Symbols which are attached to notes (accents, note heads and so on), are not listed as events in the Event List, but are saved with the notes they belong to.

MIDI Channel and Velocity of Inserted Objects

The MIDI channel and velocity of objects inserted with the mouse, are determined by the *Insert Defaults* settings in the Event Parameter box. These *Insert Defaults* are visible (and can be edited), when no object is selected. Click anywhere in the background of the working area to display this status.



Make sure that “Insert Defaults” is displayed in the top line of the Event Parameter box.

When inserting events into a staff which uses a Polyphonic Score Style (see “Editing Single-Staff Polyphonic Styles” on page 541), only MIDI channels corresponding to one of the voices can be used.

Many symbols besides notes (all Meta Events), have a MIDI channel in the Event List. Some of them even have a velocity parameter. These parameters vary in the Event Parameter box: for most objects, the MIDI channel results in a Staff parameter, which for Polyphonic Score Styles determines to which staff (theoretically up to 16), the symbol belongs. BE CAREFUL: if this parameter is set to a number higher than the number of staves in the Score Style, the symbol will become invisible.

Insert Quantization

To make positioning of notes and symbols easier, objects can only be inserted at certain bar positions:

- There is an invisible grid for positioning of notes. You can imagine its resolution as if the whole bar—beginning at beat one—were filled with notes of the chosen value. An example: in an empty 4/4 measure, half notes can only be inserted on one and three, eighth note triplets only on the first, second, or third eighth note triplet of every beat.
- In addition, all binary and dotted values can be inserted at any position of an automatically displayed rest. This means that if there is an eighth note on one, you can insert a quarter or a dotted quarter note at the second eighth’s position. (In this case *Interpretation* has to be turned off in the Display Parameter box, to allow the eighth note rest on the “and” of beat one to be displayed). The *Syncopation* setting will determine how the inserted note in this example is displayed.

- Symbols (except those directly attached to notes) can be inserted at any position which corresponds to the grid defined by the *Qua* parameter. For hybrid quantizations (i.e. 8,12), the insert quantization is determined by the binary value (in this example 1/8).

However, you can move any note, and most symbols, to any desired position, by editing its numeric bar position in the Event List, or the Event Float Window (see “Event Float Window” on page 453). As an example, if you want to insert a half note on “two” in 4/4 time, place it on “one” or “three”, and change the position to “two” in the Event Float.

Simultaneous Input of Objects into Several Sequences

If you hold down Shift while inserting an object from the Part box, the object is inserted at the same position into all currently selected Regions. The help tag will display *Insert Multi* during this process. With this technique, you can insert notes, symbols, and even text elements into several Regions at once. (Text elements will not appear until you have finished the text input procedure).

You may make the multiple MIDI Region selection in either the Arrange or the Score window. Shift-click all desired Regions/staves, or use the rubber band selection technique with the mouse. In the Score window, you don’t need to select events, just drag the cursor vertically across the staves that you wish to select.



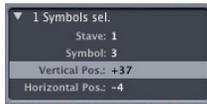
After selection, the Display Parameter box will indicate how many staves (Regions) are selected, in its top line.

Key changes, signature changes and global signs automatically are inserted into all staves of a song, and cannot be inserted into selected staves only.

Exact Graphic Position of Symbols

When you insert a symbol which is not automatically attached to a note, you should pay attention to the following details:

All symbols are inserted at the bar position which is indicated in the help tag, when you release the mouse button at the end of the input process. This will also be the position indicated in the corresponding Event List line. Apart from the bar position, there are also parameters that affect the graphic offset from the inserted bar position.



These are shown in the Event Parameter box, where they also can be edited (*vert. pos.*, *hor. pos.*). The measurement unit of these two parameters is one sixteenth of the distance between two lines in a staff, so these distances will be scaled accordingly when the Size of the staff (defined in the selected Score Style) is changed.

When you insert symbols, make sure that the bar position really is identical with the graphic display position. If, for example, you work with small *Spacing* parameters (in *Layout > Global Format*), a "Forte" symbol which you put under a note on one, may be interpreted as being on two, with a negative *hor. pos* value, because you placed it a little bit too far to the right. This does not make any difference as long as you stay on that particular display level.

However, if you switch to a different display level (i.e. for extracting the single instruments' parts), this can result in an undesired display, since those graphic position values stand for an absolute distance (defined by vertical staff size). If later, you change the Score Style, the line breaks, or some other layout parameter, a different number of bars may be displayed in one line. Since the horizontal offset (*hor.pos*) is calculated as an absolute distance from the new (relative) graphic display of the bar position, the Forte symbol might now be displayed at a position closer to the second beat than to the first.

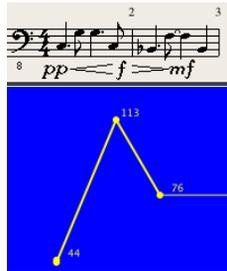
The following key commands can be used to move any score symbol that can be positioned independent of notes or staves, as well as text events and chord symbols:

- *Nudge Position Up*
- *Nudge Position Down*
- *Nudge Position Left*
- *Nudge Position Right*

These functions do not alter the bar position of the affected symbols and text events, but their *hor.pos.* and *vert.pos.* parameters by ± 1 .

Hyper Draw in the Score Edit Window

If you activate *View > HyperDraw*, you can insert and edit MIDI events which otherwise are not displayed in the Score window at all, like continuous controller data (i.e. volume, pitchbend, and so on). The type and channel of the MIDI data which are displayed in the HyperDraw area can be selected and changed from the *View* menu.



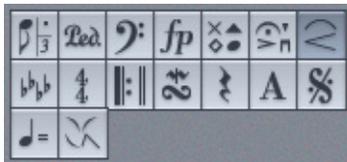
HyperDraw (see “HyperDraw” on page 323) in the Score window operates in the same way as in the Arrange window.

In the Score window, HyperDraw can only be activated in Linear view, and if only one MIDI Region is displayed. If you switch to another mode (Page Edit view, or full score), the Hyper Draw area disappears. However, the settings are stored, so when you return to single MIDI Region and Linear view, the previous HyperDraw setting is recalled.

In the Score window, the HyperDraw display is horizontally scaled in relation to the score display above it. Its height can be changed, by dragging the horizontal borderline with the mouse. A corresponding value scale will be displayed in the instrument name column if *View > Instrument Names* is activated. As in the Arrange window, you may select and/or change the event type and MIDI channel displayed in the HyperDraw area, from the menu *View > Hyper Draw*.

Hint: with HyperDraw set to Note Velocity, note velocities can be displayed and edited graphically.

The Part Box



The objects available in the Part box (notes, symbols, text objects) are organized in groups. Its top section contains small squares, each one a representation of a group. Below that, there are all of the groups with all available symbols. The arrangement of groups can change. If you click on one of the squares in the top section, the corresponding group is brought up right below it, for easy access to its symbols.

However, every displayed symbol can be selected and inserted anytime. The described function only makes it easier to work with the Part box, especially on smaller screens, or in small sized Score windows.

Selecting and Inserting Part Box Objects

There are various ways to select and insert objects:

- Selecting an object with the mouse from one of the object groups, and dragging it from there to the desired position in the Score display. If a particular object group is not visible, click on its symbol in the top section of the Part box. This places the selected object group above all other groups.



Note: To select an object, you can also click-hold on one of the squares representing the Part box groups: a pull-down menu containing all of that group's symbols will appear.

- Direct Insertion of an already selected symbol: if the desired symbol is already selected (indicated by its inverted display in the Part box), there is a shortcut. Click into the staff with the Pencil tool. If you click-hold the mouse button, you will be holding the previously selected symbol. Drag it to the destination position, watching the help tag for positioning information.

Using Floating Palettes

A double-click on one of the squares in the Part box' top section opens a small floating window, containing all objects of the corresponding group. This palette can be moved to any place on the screen. Objects can be taken directly from these palettes, and dragged into position in the Score.

Note: Unlike in the regular Part box, the object selection is not visible in the palettes.



The palettes can have different shapes, depending on which modifier key is pressed while you open a floating palette with a double-click:

- Normal (with Control)
- Vertical (with Option)
- Horizontal (with Command)

If you don't use a modifier key when you open a palette, the shape depends on the corresponding setting in the Score Preferences.

As many palettes as needed can be simultaneously opened, and positioned around the screen.

Object Selection by key commands

The following (user definable) key commands (see "Key Commands" on page 44) will select the corresponding note values inside the Part box. These can then be inserted quickly, using the pencil tool:

- *Part box 1/1 Note*
- *Part box 1/2 Note*
- *Part box 1/4 Note*
- *Part box 1/8 Note*
- *Part box 1/16 Note*
- *Part box 1/32 Note*

If you execute any one of these twice in succession, the corresponding triplet value is selected, three times brings you to the dotted value, and four times back to the original value.

There are also other key commands which change the selection inside the Part box:

- *Next Part box Symbol*
- *Previous Part box Symbol*

Next moves the selection (similar to a text cursor) to the right, *Previous* to the left. After reaching a group's last object, the selection cycles back to the beginning of the group.

- *Next Part box Group*
- *Previous Part box Group*

Here *Next* moves the selection down to the object group below the current one, *Previous* up, as determined by the current order of the groups. When changing to another group, the selection within will always be the object which was most recently selected in that particular group.

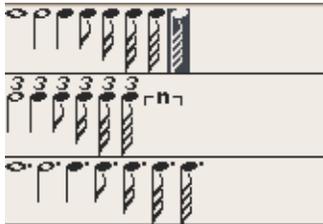
Display Size of Inserted Objects

The size of inserted objects (except text and chord symbols) always corresponds to the size of the staff into which they are inserted (see *Score Styles*), and changes correspondingly if that staff's size is changed with the *Score Style* (see "Basics" on page 529).

Most objects can be made larger or smaller after having been inserted, using the *Sizing* tool (as can text elements, except for chord symbols). Just grab the object with the tool and move the mouse up or down. The changes will be immediately visible.



Notes



The square representing the notes, in the top section of the Part box, is divided into three parts, since the note values are organized into three sub-groups. Each of these can be brought to the top by clicking on its corresponding symbol (note, dot, or 3).



Inserting any of those symbols creates a MIDI note event, with exactly the length of that value. For display purposes, however, all of these MIDI notes are interpreted by Logic as if they had been recorded in real time. Therefore, the Display Parameter box settings need to be set in a way that allows the inserted notes to be displayed correctly.

If you only want to enter notes with the mouse, without using real time recording at all, switch off Interpretation (see “Interpretation” on page 526) and No Overlap (see “No Overlap” on page 528) in the Display Parameter box, and choose a very high *Qua* value (i.e. 128,384). Syncopation (see “Syncopation” on page 527) can be set depending on style, and personal preference.

Allowing Diatonic Input only

Select *Options > Diatonic Insert* to limit input to notes that are diatonically correct for the current key. Notes can be altered chromatically, once they have been inserted.

Please note: if you protect (“lock”) your Screensets (see “Screensets” on page 32), this function’s setting will also be “locked”.

Ties

Notes in Logic which are displayed as several graphical notes, connected with ties, always represent only one MIDI note. To insert such notes, you first insert a shorter note value, and change its length afterwards in the Event Parameter box (see “Other Options” on page 484), the Event List (see “Using the Event List” on page 439), or the Event Float (see “Event Float Window” on page 453) window.

Ties cannot be inserted in Logic, but are created and displayed automatically, according to the length of the MIDI note. The up/down direction of each tie can be set with *Attributes > Ties*.

Changing the Way Notes with Ties Are Displayed

If you don’t like the way particular tied notes are displayed, you can change the display by inserting a user rest from the Part box, at the position where you want to see a graphic note. The rest’s length is not really important, preferably a shorter one like an eighth note rest should be used. Watch the help tag, for exact positioning. As soon as the rest is inserted, it will no longer be visible in the score display, however the note display will have changed accordingly. If you want to change the position of such a rest, or delete it, you may do so from the Event List.

N-Tuplets

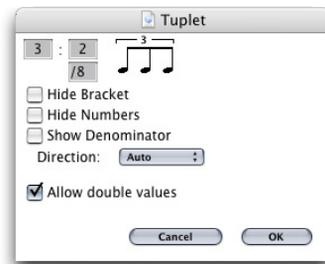
Inside the triplet group there is the symbol for N-tuplets.



Depending on the display quantization selected, and the particular situation, Logic usually recognizes and notates regular triplets correctly. This requires a corresponding Qua (see “Qua (Display Quantization)” on page 524) value in the Display Parameter box). For the display of other N-tuplets, it is necessary to use the N-tuplet object.

Definition of Previously Recorded Notes as N-Tuplets

For notes that already exist (as part of a MIDI recording), but are not displayed correctly, the N-tuplet symbol has to be dragged on top of the first note. This note has to be indicated in the help tag, before you release the mouse button. A dialog box will open, where you can define the N-tuplet’s attributes:



In the score, the above would correspond to:



The dialog box can be explained most easily by using the example above: five tuplet eighth notes should be displayed in the place of four regular eighth notes. In addition, there are the following options:

Hide Bracket: the bracket is not displayed.

Hide Numbers: the N-tuplet’s number will not be printed. On the screen, it will be displayed in parenthesis. This is necessary to be able to edit the N-tuplet further.

Show Denominator: the N-tuplet display also contains the denominator (the second number in the dialog box). In the example above this would be 5:4.

Direction: the direction of bracket and number. *Auto* refers to the setting in the used Score Style.

Allow Double Values: if this option is activated (which is the default setting), N-tuplets can contain note values which are twice as long as the “regular” tuplet value.

N-Tuplet Input with the Mouse

If you want to insert a tuplet, including all of its notes using only the mouse, insert the first note at the desired position, then drag the N-tuplet symbol on top of it. In the automatically opened dialog box, define the settings.

Initially, the display will be of a series of rests, their number corresponding to the N-tuplet value. You may now insert the other notes at those rests’ positions. Select a note value which approximately matches the length of the desired N-tuplet notes. In this example, this would be dotted sixteenth notes.

If you want to hear these notes played back with legato phrasing, and the notes are still too long or too short, you will need to change their (MIDI) lengths. The fastest way to do this is to select all notes, and then *Functions > Note Events > Note Force Legato (Selected/Any)*, or use the corresponding key command.

With the method described above, you can also create N-tuplets which contain rests or syncopated note values (double length).

If you want an N-tuplet to begin with a rest, you first need to insert a user rest from the Part box, then drag the N-tuplet symbol on top of that rest. Automatically displayed rests cannot function as starting points for N-tuplets.

Changing or Deleting Existing Tuplets

A double-click on the N-tuplet number opens its configuration box, where you can make changes, or use the *Delete* button to erase the tuplet. N-tuplets also can be deleted by clicking on the tuplet number with the Eraser tool.

Fast Input of Several Identical N-Tuplets

If you hold down Option as you insert the N-tuplet symbol, the last inserted N-tuplet’s settings will be applied to it, without the usual dialog.

Editing Automatically Displayed Triplets

Triplets are usually displayed automatically (depending on the *Qua* parameter in the Display Parameter box). If you want to change the way these triplets are displayed, you can simply double-click the “3”, which opens the N-tuplet dialog box (where you can change the settings), and converts the automatic triplet to an N-tuplet. This also useful for hiding the numbers and brackets of “normal” triplets.

“Artificial” N-Tuplets to Bypass Display Quantization

You can bypass the display quantization value (Qua) by using hidden, “artificial” N-tuplets. As an example, if there is a single 32nd note run in a MIDI Region that otherwise only contains eighth note or longer values, you can set *Qua* to 1/8, and drag the N-tuplet symbol onto the first note of that 32nd figure. In the resulting dialog box, use the setting: 8:8/32 with *Hide Brackets* and *Hide Numbers checked*. The number (8) will be visible on screen, but not in printout.

Although this is not usually what you would use tuplets for, it can be a handy tool for forcing the display of runs of shorter notes in a MIDI Region (1/32nd notes in this case) whose display quantize value is set for longer note values (1/8 notes in this case).

Grace Notes, Independent Notes

Independent Notes are notes which are not included in the automatic rhythmic and graphic display calculation of a measure, but are still played back via MIDI at the position where they were inserted. There are two types:



- *Independent*: these are displayed with their original length, as long as they are binary or dotted note values which can be displayed as a single (not tied) note. After insertion, you can change the stem direction, enharmonic interpretation, accidental distance, and note head, using the other Note Attributes (see “Note Attributes” on page 548) functions.
- *Independent Grace*: these always are displayed as miniature eighth notes, with a slash across the stem, and with a tie. Tie direction, stem direction, enharmonic interpretation, accidental distance, and note head can be changed.

Both types of Independent Notes can only appear as single notes, without any beams to other notes.

Creating Independent Notes:

- Existing regular notes can be converted to Independent Notes with *Attributes > Independent > Independent or Independent Grace*. There are also corresponding key commands. *Attributes > Independent > Not Independent* converts notes back into regular notes.
- If you want to insert an *Independent Note* directly, select a note with the mouse from the Part box while holding down Option and drag it to the desired position. *Independent Grace Notes* cannot be inserted directly, but need to be created by converting regular or Independent notes.

In most situations, you will need to create additional graphic distance between the Grace Note and the note it is associated with. The best way to do this is to use the Layout tool (see “Editing Using Tools” on page 519) to move the main note away from the grace note.

Hint: if you want to create beamed grace notes, try using a polyphonic Score Style (see “Editing Single-Staff Polyphonic Styles” on page 541) (no rests displayed for second voice). Assign these notes to the second voice, and change their size with the Sizing tool.

Sustain Pedal Symbols



These two symbols are the only score symbols—except for the notes themselves—which directly represent MIDI events (MIDI controller #64, sustain pedal on and off), and thus affect MIDI playback. Logic intelligently inserts the On or Off version of the symbol, depending on which type preceded it (i.e., a Sustain Off always follows a Sustain On and vice versa).



Clefs



The clefs in the Part box generally are intended for clef changes in the middle of a part, for a short section of the music. An example would be cello or bassoon parts, when the part changes to a higher register. Inserted clefs change the score display, starting at the precise insertion position (which can even be in the middle of a bar).



For changing the clef of a whole MIDI Region, you should not use the Part box clefs, but choose an appropriate Score Style (see “Basics” on page 529) for that MIDI Region.

When you insert a “C-clef”, please watch the help tag carefully, since this clef can be positioned at five different heights, depending on the register (alto, tenor clef and so on).

If you want to change an already inserted clef, double-click on it. This opens the following selection box. (The same applies to the “basic” clef of a MIDI Region, however, changing this clef affects the Score Style itself, as well as all Regions that use the same Score Style.)

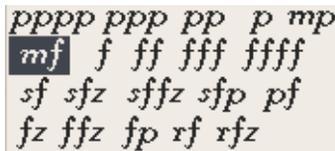


The option *Smaller Clef Changes* in *Layout > Clefs & Signatures* also affects clef changes. All clefs, except the first one in every staff, will be reduced in size, depending on the value set here. This will happen, regardless of whether the clef changes are caused by using a different Score Style in the same staff, or by inserting clefs from the Part box.

Octave settings

The four symbols on the right hand side do exactly what you expect them to: they mark a section to be played either one or two octaves higher resp. lower. The length of the section can be edited after insertion by grabbing the end of the line and moving it horizontally.

Dynamic Symbols



These symbols can be inserted at any position in the score. They are graphic symbols only, and thus have no effect on the playback of the Regions they are placed in.



Note Heads



If you drag one of these symbols onto a note (watch the help tag: the destination note must be indicated there), the form of its note head changes to that of the selected symbol. If multiple notes are selected first, dragging the notehead onto any one of the notes will cause it to be attached to all notes in the selection. These note heads do not affect MIDI playback.



If you want an altered note to have a standard note head again, use the same method, this time using the black round note head.

Invisible Note Heads

Using the grey note head will make a note's head and associated ties invisible. On the screen this note is displayed with a grey notehead, so that it can still be edited. In the printout however, nothing will be visible, except the stem.

If you combine this with *Attributes > Stem > Hide*, you can hide notes in the printout altogether.

Symbols attached to Notes



(Fermatas, accents, phrasing symbols, mute, and bow markings, and so on)

This group contains symbols which usually refer to only one note at a time (Trills, however, are in a separate group). These symbols are positioned automatically, as soon as they are assigned to a note. You do this by dragging the symbol onto the note head (watch the help tag to ensure accurate placement). These symbols always move along with the notes they belong to, whether they are transposed or otherwise graphically altered.



MIDI Meaning

The symbols of this Part box group can affect the MIDI playback of the notes to which they are assigned. The effect can be on their velocity and playback length. If you want these symbols to affect the playback, you need to define the effect for each symbol separately in the MIDI Meaning dialog box. This can be opened from the menu *Layout* > MIDI Meaning (see “MIDI Meaning” on page 572).

Quick Assignment with key commands

For some of these symbols there are user definable key commands (see “Key Commands” on page 44), which automatically assign the corresponding symbol to all currently selected notes:

Hint: working with these key commands can be even faster when you also use the *Select Next Event/Select Previous Event*, and *Toggle next/previous Object (Event)* key commands. The two latter commands include the following or previous event in the current selection, or reverse that inclusion.

Inserting independent Symbols

If you want to insert one of these symbols so that it remains independent of any note, you can do so by holding Option as you insert it with the mouse. This way you can place a fermata above an automatically created rest.

Jazz Symbols



Jazz Symbol input is similar to the input of accents and so on: if you drag a Jazz Symbol onto a note head, it will be assigned to that note, and positioned automatically. Additional space will be created automatically, to avoid overlaps with other notes or symbols. These symbols always move together with the notes they belong to, whether they are transposed or otherwise graphically altered.



Jazz Symbols can also be inserted using the *Attach Symbol: Jazz 1—6* key commands. The numbers 1 to 6 indicate the positions of the symbols in the Part box. In the Part box display, black dots are used to indicate the position of each symbol in relation to the note head (compare the two illustrations above).

Jazz symbols may also be inserted independently from notes as graphic objects, by inserting them with the mouse while holding Option. These unattached symbols can be moved freely; and unlike normally inserted Jazz Symbols, they do not affect the spacing of notes.

Slurs, Crescendi



Input

Insert these objects at the intended left starting point. They can then be edited to their desired shape. After insertion, the object remains selected and small black square “handles” are visible at its end points, or, in the case of slurs, along its length as well. You can drag these “handles” with the mouse, to change the object’s shape.



Fast Slur and Crescendo Input with key commands

For slurs, crescendo, and decrescendo symbols, there are also user definable key commands (see “Key Commands” on page 44) for fast input:

- *Insert Slur Up*
- *Insert Slur Down*
- *Insert Crescendo*
- *Insert Decrescendo*

These commands place the corresponding object below or above (*Slur Up*) the currently selected notes. The start point is determined by the first selected note, the length of the object by the most recently selected note. The shape and vertical position of each object is determined by the settings of the last edited object of the same type used.

Altering the Shape

To edit the shape of these symbols, grab and drag the black square “handles” at any time, even if they are not visible. To make them visible, select the object by clicking on one of its ends, or by rubber band selection.

Changing the Position

All but the last six objects can be moved by simply click-dragging the mouse from the object’s left hand starting point. The last six objects in the group are moved by click-dragging each of their corners (“handles”) separately.

Change of Length

All these symbols can be as long as you like, and can therefore be displayed across line and page breaks in several parts.

- If, for example, you want to extend a slur to a position which is not visible in the Score window any more (in Linear view), you can grab it by its right end, and pull the cursor to the right border of the Score window: the score will scroll automatically. As soon as the desired end position for the slur appears in the window, move the mouse a little bit to the left to stop the scrolling. Now position the end of the slur. It is important that you do not release the mouse button during the entire process.
- In Page Edit view, you can simply drag the right end to its destination in one of the lower staves. The slur will be displayed in several sections. The same principle applies to the other symbols in this group.
- The length of these objects can also be changed in the Event List or Event Float, by changing the numerical length parameter. The end point is moved horizontally by this procedure. Slanted objects like arrows will be displayed at a correspondingly varied angle.
- The length can exceed the end of the MIDI Region, i.e. it is possible to drag the right end of a crescendo with the mouse to a position in the next MIDI Region on the same track.

Particular Attributes of Certain Symbols

Crescendo: the tip determines the general position. At the upper right end, length and opening angle can be adjusted. At the lower right, length and overall angle can be altered.

Decrescendo: at the upper left end you can alter the bar position, and opening angle. At the lower left end, bar position and overall angle can be set. At the tip (right end), vertical position and length are adjusted.

Lines and arrows can be moved in their entirety by dragging their starting point. At the other end, length and overall angle can be altered. The slanted line symbol stands for a line that can be altered freely. The other two line objects (vertical and horizontal) can only be extended in the corresponding direction.

Slurs: slurs have five editing points (the black square “handles” are visible when the object is selected) to change their shape. The last two slur symbols in the slur group are mainly intended for slurs across staves (that is in piano parts).

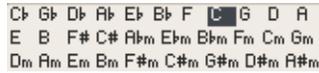
Reminder: these are Slurs, not Ties (see “Ties” on page 498). Ties cannot be inserted manually, but are displayed automatically if a MIDI note’s length requires it.

These symbols are graphic only, and have no impact on MIDI playback.

Precise Positioning

It is very helpful to work in high zoom levels when positioning slurs. You can quickly switch to an extremely zoomed display by holding down Control while rubber band selecting a certain area of the score. In this case, the mouse becomes the magnifying tool, and the selected area is displayed as large as possible. Do all your positioning and layout work at this zoom level. Return to regular view by clicking on any free spot while holding Control again.

Key Signatures



Key signature changes can be inserted at any point in a song, by dragging one of the key symbols from the Part box, as shown above, onto any staff. Be sure to watch the help tag, to ensure accurate placement. Remember that key signatures and key signature changes are effective globally, for all instruments, on all display levels.



Natural symbols are displayed automatically with a new key signature when necessary (e.g. when changing from A flat major to F major or A major).

Display transposition of the key signature (for notation of non C instrument parts) is achieved by selecting an appropriate Score Style (see “Basics” on page 529). For atonal music, there is the option to deactivate Automatic Key Transposition for transposing Score Styles, in *Layout > Clefs & Signatures* (see “Clefs & Signatures” on page 567). This is effective for the whole song. If it is deactivated, all sharps and flats are displayed directly with their notes. There is a similar option in the Score Style window (parameter *Key*) which allows you to switch off the key signature for that particular Score Style, or even for individual staves in multi-staff Score Styles.

The basic key signature of a piece should, however, be set by double-clicking on the first staff, between clef and time signature. This opens a dialog box where you can set any major or minor key. This window also allows you to disable the use of double flats and sharps.



This method applies not only to the first staff, but for all staves. However, if the piece already contains other key signature changes, any newly inserted key signature only changes the key from the insertion point up until the next key signature change. As with the starting key signature, inserted key signatures affect all Regions, on all levels.

Deleting a Key Signature Change

This is done by either clicking directly on the key signature change with the Eraser tool, or by selecting it and pressing Backspace.

Moving and Copying Key Signature Changes

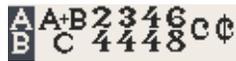
Since key signatures are global symbols, they cannot be moved or copied as easily as other objects.

Further editing of time signatures is possible with the help of the Time/Key Change List Editor (see “Time and Key Signature Editor” on page 165).

It is also possible to copy all time and key signatures from one song to another. This is described in the section Copying Time Signatures between Songs (see “Time Signature and Division” on page 91).

The display of key signatures and key signature changes also depends on the settings in *Layout* > Clefs & Signatures (see “Clefs & Signatures” on page 567), and on the Key parameter in the Score Style window for each Score Style.

Time Signatures

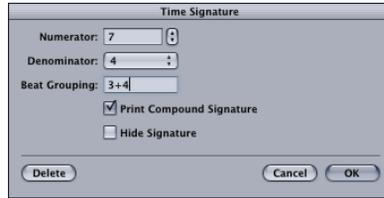


Time signature changes can be inserted at the beginning of any bar, either by inserting signatures from the Part box, or by changing the time signature setting in the Transport window. In the latter case, the signature change will be inserted at the beginning of the measure containing the current song position.



Time signatures and time signature changes are effective globally for all instruments, on all display levels. It is not possible to insert different time signatures for different instruments, or tracks. Time signature changes affect only the display, not the playback. The tempo indication in the Transport window always relates to quarter notes, even if eighth notes are chosen as the denominator for the Time signature. You can find more information about this in the section Time Signature and Division (see “Time Signature and Division” on page 91).

Compound Time Signatures



Apart from 2/4, 3/4, 4/4, 6/8 and the alternative display options for 4/4 and 2/2, there are also Part box objects for freely definable time signatures (A/B), and compound time signatures (A+B/C). When you insert one of these, a dialog box opens:

- The *Nominator* can be anything between 1 and 32, the *Denominator* can be 1, 2, 4, 8, 16, or 32.
- The *Beat Grouping* entry field will open when you select A+B/C: here the grouping of the beats in compound time signatures can be determined. It is sufficient to just enter the numbers, i.e. "223". As soon as the entry field is closed, this becomes "2+2+3" automatically. The total number of beats in the bar is calculated automatically by the sum in this field.
- *Print Compound Signature* actually displays the defined grouping as the nominator. If this is not activated, only the total sum will be displayed as the nominator. Beat Grouping however, in both cases, affects the way the notes are beamed together.

With this, you can also change the automatic beaming in "normal" time signatures. In 4/4-time "1+1+1+1" produces four beamed groups (one for every beat), instead of the two groups displayed as a default.

Invisible Time Signatures

With *Hide Signature*, the corresponding time signature change will be hidden in the printout. The signature will still be displayed on the screen, but it will be "crossed out", and will not be included in the calculation of the spacing between notes and symbols. Because of this, the signatures may overlap notes on the screen, but not in the printout, since they are invisible there.

This function can be used for notating cadenza-like passages, that contain more notes than would normally fit in accordance with the time signature.

Editing Time Signatures

All time signatures can be edited by double-clicking on them. The same dialog box as above opens, where you can insert the desired changes. There is also a Delete option to delete the corresponding time signature change. Another way to delete them is by using the Eraser tool or selecting them and pressing Backspace.

Further editing of time signatures is possible with the help of the Time/Key Change List Editor (see "Time and Key Signature Editor" on page 165).

The display of time signatures and time signature changes also depends on the settings in *Layout > Clefs & Signatures* (see “*Clefs & Signatures*” on page 567).

All time and key signatures from one song can be copied into another song (see “*Time Signature and Division*” on page 91).

Repeat Signs and Bar Lines



These objects can be inserted at any “visible” bar position (at the position of any graphically displayed note or rest). Usually, however, these objects are used at the beginning or end of bars. In this case, they replace the regular bar line (except first and second ending symbols). They are global symbols, so they always are displayed in all staves, on all display levels.



Moving, Deleting

Repeat signs and bar lines cannot be moved with the mouse. To delete them, you need to use the Eraser tool. These symbols can be moved, together with time and key signatures to a certain extent, in the Arrange window (see the two preceding sections).

The “double repeat sign” automatically is displayed as two “back to back” repeat signs, if it is positioned at a line break.

Invisible Bar Lines

The dotted bar line becomes invisible in the printout. In conjunction with hidden time signature changes, this enables you to create bars and musical passages which seemingly do not have a fixed meter. Another use for the invisible bar line is to force a graphic split of a note into two notes connected with ties, in all staves of a score simultaneously, if it is inserted in the middle of a bar.

To hide all automatically displayed barlines of a song, there is the option *Hide All Barlines* in *Layout > Clefs & Signatures*. However, manually inserted barlines, double barlines and so on will still be displayed and printed.

1st and 2nd Endings

After inserting one of the repeat endings, text entry mode is automatically activated. The default text is “1.” and “2.”. If you don’t need anything else, confirm with Enter. However, it is possible to enter any text into these brackets. The bracket which defaults to “2.” is open—without a vertical end line, like the “1.” ending. Since the text can be changed, you also can create a 2nd ending with a vertical line, for example. Font, text size and style for these numbers or text elements are set in the Text Style window (see “Text Styles” on page 575) (Text Style *Repeat Endings*). To edit the text, double-click directly on it, which activates the text entry mode, indicated by a flashing text cursor.

A 1st or 2nd ending can be moved by dragging its upper left corner. The length can be changed by dragging the right end. If a repeat ending is selected, it can be deleted with Backspace.

Between the staves in scores, or multi-staff Score Styles, repeat signs and the various special bar lines are connected across the staves, according to the settings in the Instrument Set and/or Score Style windows. First and second endings are only displayed above staves whose bar lines are not connected to the next higher staff.

For the display of repeat signs, there is an option *Alternate Repeat Symbols* (for the whole song) in *Layout > Global Settings*. This activates a “Real Book Style” display of repeat signs.

Note: These symbols have no impact on MIDI playback.

Trills, Tremolo, and so on



The symbols in this group can be positioned anywhere, and are not attached to notes. The trill line and the arpeggio lines can be set to any length, by dragging their end points. The trill line also can go across line breaks. The accidental symbols in this Part box group are purely graphic, and do not affect MIDI playback of notes. They are intended mainly as a supplement to trill symbols.

Rests, Bar Repeat Signs



Automatic Rest Display

Rests are displayed automatically in Logic, in such a way that existing notes and automatic rests together always add up to complete bars, according to the given time signature. The only exception to this is, when a Score Style with deactivated rest display (*hide Rest*) or with Beat Slashes instead of rests is used.

Manually Inserted Rests

In certain situations, you might want to insert rests manually. These replace the automatic rests, but unlike automatic rests, are listed as events in the Event List. These events have a MIDI channel and a velocity value.



The velocity value determines their vertical position in the staff (normal middle position is 64).

Manually inserted rests, unlike automatic rests, can be moved higher or lower. Their size can be changed with the Sizing tool.

You can also use manually inserted rests (also called “User Rests”), if you don’t like the way a particular rest is displayed automatically, for example to avoid dotted rests, or for syncopated display of rests despite a Syncopation off (see “Syncopation” on page 527) setting. In terms of rhythmic display, user rests behave like notes, with the attributes Syncopation ON and Interpretation off (see “Interpretation” on page 526). Remember that user rests are interpreted according to the display quantize setting (Qua (see “Qua (Display Quantization)” on page 524)), just as notes are.

Multi Bar Rests

Rests with a duration of several bars, can be indicated with these two symbols. These are suitable mainly for single instrument parts. In the full score, they are visible only when all staves contain multi bar rests at the same position.



“Church rests” (the older form of display) default to a length value of 2 bars. The default length of “normal” multi bar rests is *Auto* (which in the Event List corresponds to value 0). This means that the rest’s duration is calculated automatically according to the position of the next note, user rest or global symbol (i.e. repeat signs, double bar lines and so on).



Changes can be made in the dialog box, which opens when you double-click the symbol: Here you can select the shape (“modern” or “church”), activate or deactivate the automatic length function, and determine the length, if *Auto length* is switched off.



Note: “Church rests” cannot be longer than nine bars. If this is exceeded, the “modern” symbol is used automatically.

Moving Multi Bar Rests

These rests cannot be moved with the mouse. However, since they are displayed in the Event List, you can change their bar position there, or in the Event Float window. You can also alter the length of the rest (*VAL*) in this manner.

Bar Repeat Signs

The symbols for one or two bar repeats replace all notes and rests in the corresponding measures. All other symbols remain visible. This does not affect MIDI playback, so the hidden notes can still be heard. These signs can only be moved in the Event List or Event Float.

Text Objects, Chord Symbols



Since the description of text objects and chord symbols is quite extensive, you will find it in the section Text: Input and Display (see “Text Input” on page 577) and the section Chord Symbols (see “Inserting Chord Symbols” on page 582).



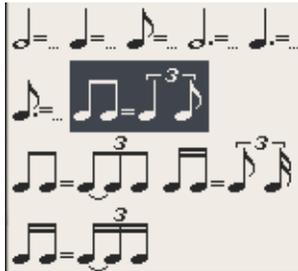
D.S., D.C., Segno, Coda Signs



These symbols can be inserted at any position in the score. They are graphic symbols, and do not affect MIDI playback. Their size can be changed with the Sizing tool.



Tempo and Swing Symbols



These symbols can be inserted at any position. The font, size, and style of the tempo indication itself is determined in the Text Style (see “Text Styles” on page 575) window (Text Style *Tempo Symbols*). The tempo indication is derived automatically from the playback tempo at the corresponding bar position. Note that the tempo indications in the Transport window (see “The Transport Window” on page 85) and in the Tempo List (see “Tempo List Editor” on page 598) always refer to quarter notes, even if a time signature with another denominator is used. So, the displayed tempo is different depending which symbol you use.



Move, Copy, and Paste

Moving or copying of complete Regions, or major parts of a MIDI Region should generally be done in the Arrange window.

Still, most of the following described functions in the Score window work similarly to Logic's other editor windows. However, it is not possible to copy, or move the following symbols:

- Global symbols, like repeat signs, time, and key signature changes—except in the Arrange window here (see “Key Signatures” on page 508)—and global text elements (headers and so on)
- Symbols directly attached to notes, like accents, fermatas, note heads, and so on

Moving/Copying with the Mouse

You can move/copy by dragging the selected objects (with Option for copying). This allows you to move or copy any number of notes and symbols to other bar positions and/or pitches. If you want to restrict the movement to just one direction (vertical or horizontal), hold down Shift during this process. There is also a general preference for this: *Preferences > Global Preferences... > Limit Dragging to one direction in Matrix and Score*.

It is important to watch the help tag during this process. It shows the status (Drag or Copy), the current difference from the original position (Transpose and Time Shift), and the current cursor position (bar position and—for notes—pitch).

Positioning Grid

Movement along the time axis occurs along a quantization grid, corresponding to the particular MIDI Region's assigned display quantization (*Qua*) in the Display Parameter box. If a hybrid quantize value is selected (i.e. 16,24), the grid corresponds to the binary value (16 in this example). If note positions are not aligned with this time grid (for example, because they were recorded in real time), their relative offset is still kept when moving or copying them. This allows you to move or copy unquantized passages within the Score Editor, without losing the original feel of the performance.

Please note: copying and moving notes with the mouse is only possible within the same MIDI Region.

Moving and Copying Several Objects at Once

To move or copy (with Option) several objects at once (notes and symbols), just select all desired objects and drag one of them (preferably the first one, or one positioned at exactly the beginning of a measure) to its destination position. Again, watch the help tag for exact positioning. The other selected objects will be moved or copied in exact relation to the first one.

It is also possible to simultaneously move or copy objects which are in different Regions/staves. Each event will be moved/copied to its new position, within its original MIDI Region.

Via the Clipboard

These functions work the same way as in many other software programs, and in the other Logic windows.

Paste inserts the Clipboard's contents (i.e. a note) into the selected MIDI Region at the current song position (as indicated in the Transport Window (see "The Transport Window" on page 85)). So, before pasting, you need to set the Song Position Line to the desired destination position.

When you copy and paste several objects at once, the first object is pasted at the indicated bar position, the others in relation to it.

Note: If you copy the contents of a whole bar which starts with a rest on the first beat, the first object is not on one, since automatically displayed rests are not objects, and therefore cannot be copied. In this case, you need to set the paste position accordingly. (The exception is when there is an object such as a dynamic symbol at the beginning of the selection, say at beat one, which is also copied.)

Paste Multiple

The Clipboard's contents can be pasted into several Regions at once, at the original position. Select all desired Regions, and use either *Edit > Paste Multiple*, or the *Paste Multiple* key command.

The multiple selection of Regions can be done either in the Arrange, or directly in the Score window: Shift-click all desired staves, or "rubber band" the adjacent Regions. Note: the Display Parameter box (see "The Display Parameter Box" on page 522) title line always indicates how many Regions are currently selected.

Automatic Insert Quantization

When you *Paste* (or *Paste Multiple*) objects from the Clipboard, the position of the first inserted event is automatically quantized according to the current global display format (in the Transport window). If, for example, the current bar position is 4.1.1.37, and the global display format is set to 1/16, the pasted object will be inserted at position 4.1.1.1, whether it's a note or a symbol. When the Clipboard contains more than one object, the other objects' positions are not quantized, but their exact relative position from the first object is kept.

If you don't want this (i.e. because you want to keep the unquantized timing of the original preserved), it is better to use one of the other methods of copying.

Paste at Original Position/Paste Multiple at Original Position

These two commands (Edit menu, or key commands (see “Key Commands” on page 44) allow you to quickly copy passages from one MIDI Region to another, at exactly the same time position. Here, you do not need to think about the insert position at all, and the automatic insert quantization will not be applied.

This is the ideal method for copying a whole musical phrase, including all symbols, to the staves of other instruments. Remember that for *Paste Multiple...*, all destination staves need to be selected.

These commands can be very useful when used in combination with *Select Similar*, for example when copying all dynamic symbols from one staff into other staves/instruments.

Repeat Objects

This dialog box is already covered (see “Copying Regions” on page 132). It can be opened from the local *Edit* menu, or with a key command. In the Score window, it is especially useful for copying complete bars (or multiple copies), without having to set any bar positions. As an example, in the case described above, where a bar begins with a rest on one. In that situation, select all notes and symbols from that bar (rubber band selection), open *Repeat Objects*, insert the number of desired copies, set *Adjustment* to *Bar*, and press Enter.

Copy MIDI Events

This dialog box is already covered (see “Copying Events Selectively” on page 168). It can be opened with a key command, and provides many options, such as merely moving, rather than copying events. In the Score Editor, these operations affect all selected Regions.

Nudge key commands

Under the name *Nudge Event Position by...*, there is a whole group of key commands, which move all selected objects by various steps along the time axis. For Score work, the following *Nudge* commands are the most useful:

- *Nudge Event Position by Bar +1/-1*: move events forward/back one bar
- *Nudge Event Position by Beat +1/-1*: move events forward/back one beat
- *Nudge Event Position by Format +1/-1*: move events forward/back one Format step (as set in the Transport window)

The following key commands can be used to move any score symbol that can be positioned independent of notes or staves, as well as text events and chord symbols:

- *Nudge Position Up*
- *Nudge Position Down*
- *Nudge Position Left*
- *Nudge Position Right*

These functions do not alter the bar position of the affected symbols and text events, but their *hor.pos.* and *vert.pos.* parameters by ± 1 .

Editing or Deleting Notes and Symbols

Editing Using Tools

Velocity Tool

If you grab one or several notes with the Velocity tool, and move the mouse up or down, you change the notes' velocity values.



The value change can be seen in the help tag, and can also be heard if the MIDI Out button is activated.

You don't need to go to the Toolbox to get the Velocity tool: when you grab a note while holding down Option-Control, the cursor becomes the Velocity tool. Once you release these modifier keys, the cursor takes on its previous shape and function again.

Quantize Tool

For Quantizing and De-Quantizing (see "Event and Note Quantization" on page 43) the MIDI playback of selected notes.



Layout Tool

With the Layout tool, you can change the horizontal graphic position of a note in relation to its bar position.



Pulling the note to the right or left with that tool changes the displayed distance from the adjacent notes or rests. The bar position (and the playback) will remain unaltered. This is used, for example, to create space for a grace note, or for an arpeggio line. Also, when symbols are moved with the Layout tool, their bar position will not be altered. Instead, the *hor.pos* and *vert.pos* parameters are changed, which is indicated in the help tag during this process.

There is a shortcut for grabbing this tool: pressing Control while grabbing the note converts the cursor into the Layout tool.

Sizing Tool

With the Sizing tool, you can change the size of any note, and of most symbols.



If you want to reset the object to its original size, double-click on it with the Sizing tool. A dialog will appear asking if you want to reset the size of the object.

Changes in the Event Parameter Box

In the Event Parameter box, you can edit the following parameters:

Notes

MIDI channel, pitch, velocity, and note length.

Note: To change pitch, length, and MIDI channel of selected notes, there are also some key commands:

- *Event Transpose +1/-1*: half step up/down
- *Nudge Event length by Format +1/-1*: lengthens/shortens the note by the current global display format value
- *Nudge Event Channel +1/-1*: changes the note's MIDI channel accordingly

Symbols

Staff:

Staff number: this parameter is only important when you are using a polyphonic Score Style with multiple staves (i.e. for Piano). It determines which staff a symbol belongs to. Note: if this value is higher than the number of staves in the Score Style, the symbol disappears!

Symbol

The internal number of a symbol in its Part box Group: once you know these numbers, you can edit the symbol by changing this number, instead of deleting a symbol and inserting a new one. This is especially useful for dynamic symbols: 0 = *ppp*, 1 = *pp*, 2 = *p*, 3 = *mp*, 4 = *mf*, 5 = *f*, 6 = *ff*, 7 = *fff* and so on

Vert.pos/hor.pos

- *vert.pos* determines the height/vertical position. Zero in most cases means a position exactly on the top line of the staff, positive values are above it, negative values below it.
- *hor.pos* determines the horizontal graphical offset of the object's bar position. Zero here corresponds to the left edge of a note at that particular position.

Additional Parameters for Text Objects

- Text Style (see “Text Styles” on page 575)
- *Size* of the used font
- *Align*: horizontal alignment

Most parameters in the Event Parameter box can be edited using the mouse as a fader (hold down the mouse button while moving it up or down). Or, you can double-click on a parameter (except Text Styles and alignment), which opens an entry field. Here, you insert the desired value as a number, or in case of notes, also as a pitch, like “D#4”. You can also insert relative changes into this field, such as +4 to raise all selected notes’ pitches by 4 half steps, or to increase a numerical value of another parameter by 4.

Changing Several Selected Objects Simultaneously

If several objects are selected, this is indicated in the Event Parameter box’ title line by *X Notes/Symbols/Events/Texts/Chords selected*. “X” stands for the number of selected objects. The terms *Notes*, *Texts*, and *Chords* are used only if the current selection contains only objects of that particular type.

If—as in most cases—parameter fields are visible while multiple events are selected, all corresponding values can be edited at once. “*” as a value means that the selected objects have different values for that particular parameter. There are various options for changing these values:

Relative Change (Preserving Differences)

Grab the “*” with the mouse and use the mouse as a slider. The value shown during this process belongs to the first of the selected objects. The other objects are altered by the same amount. You can also double-click the value and insert the desired change (a number with a plus or minus in front of it) into the resulting entry field (see above).

Absolute Change (All Values Set Equal)

Press Option during the above described procedure: as soon as you move the mouse while holding the modifier key, the parameter is set to the same value for all selected objects. This way you can set all notes of a chord to the same length or velocity, or set all selected objects to the same height (*vert.pos*).

There are also key commands that set the *vert.pos* and *hor.pos* parameters of all selected objects to the same value:

- *Align Object Positions Vertically*
- *Align Object Positions Horizontally*
- *Align Object Positions* (affects both parameters)

These key commands set all objects to the value of the first selected object.

If only one object is selected when you use one of these key commands, a dialog appears where you can decide if the parameters of all similar objects should be set to the same value. (Note: this affects all displayed Regions and instruments.)

Hint: This is very useful for aligning lyrics and chord symbols.

Deleting Objects in the Score Editor

Here is a short survey of the methods for deleting objects in the Score Editor:

- With the Eraser tool (works for all objects)



- With Backspace or *Edit > Clear*, while the corresponding objects are selected (flashing). Exception: repeat signs and special barlines cannot be selected, so they can only be deleted with the Eraser tool.

You can only delete events in the Score Editor which are displayed there. If, for example, you erase notes from a real time recording in the Score window, MIDI controller events or pitchbend data which were recorded together with those notes, will not be deleted.

The Display Parameter Box

The settings in the Display Parameter box (with the exception of Style) form the basis for the rhythmic interpretation and display of the notes. These settings can be different for every MIDI Region. The displayed settings always refer to the currently selected MIDI Regions. These settings do not affect the MIDI playback of notes, only the score display.



Please keep in mind for all settings:

The Display Parameter box settings not only affect the display of notes recorded in real time, but also that of notes which were inserted with the mouse, or using step input. If you insert a short note, such as a 32nd note, it can only be displayed at its original length if Qua is set to 32 or shorter. If Qua is set to 8, the 32nd note will be displayed as an eighth note (although it will still be played back as a 32nd note). A note inserted with the mouse may also display as a longer value if Interpretation is ON for that MIDI Region

Settings

Different Settings within the Same Staff

If you cannot seem to find the appropriate display parameters for a particular MIDI Region, keep in mind that you can divide a MIDI Region, using the Scissors tool (directly in the Score window). This will leave the MIDI playback unaltered, but provides the option to assign different display parameters (e.g. display quantization) for the resulting shorter Regions. Since these divided Regions still connect to each other, they will be displayed as a continuous staff.

Default Settings for New Sequences

If a new MIDI Region is created with either the Pencil tool in the Arrange window, or through MIDI recording, Logic always applies the Default parameters (see “MIDI Region Playback Parameters” on page 141) to that MIDI Region. These can be seen and edited in the Display Parameter box, when no MIDI Region is selected (The title line says *Insert Defaults* to indicate this status). These settings will remain as you set them until you quit Logic, but can be changed any time.

Click on any empty spot in the main working area (below or above the score), to display the *Insert Defaults*. You can now edit any of the parameters. (for example, to set *Qua* to the display quantize setting that you will use for most Regions in that song) From this point on, all new Regions will get these settings as soon as they are created. If *Qua* is set to default here, the *Qua* setting of newly recorded or created Regions will depend on the *Global Format Value* in the Transport window.

The default setting for Score Styles (Style) is not defined here, but separately for each Track Instrument, in the bottom line of the Instrument Parameter box, in the Arrange window.

Changing the Settings for Several Sequences Simultaneously

This is possible, if all desired Regions are selected. In the top line of the Display Parameter box, you will see an indication of how many Regions or objects (if the selection includes folders) are currently selected (for example 3 Sequences sel.), instead of the MIDI Region name. If these Regions have differing values for any of the parameters, a “*” will be displayed in the corresponding line. If you change this value, all selected Regions will now have the same value for that particular parameter.

There are two special functions for multiple selection of Regions in the Score window:

- Clicking on the title line in the Event Parameter box selects all Regions that are included in the current display.
- Clicking on an instrument name in the column between the parameters and score, selects all Regions for that particular Track Instrument (even Regions spread across different tracks assigned to that instrument), at the current display level. Remember, the instrument name column is only displayed, if *View > Instrument Names* is activated.

Rhythmic Interpretation of Sequences

Traditional music notation is only an approximate description of the musical content in a piece. The actual performance depends heavily on the interpretation of the notes by the performing musicians. Quarter notes for example, hardly ever are held exactly for the duration of one beat.

The rhythmic interpretation of MIDI Regions recorded in real time to a click presents a similar problem, especially if one considers that Logic records MIDI events with a resolution of 960 ticks per quarter note. Nobody will play a downbeat at the exact time of the click.

So, it is important that you have some idea of what your printed music should look like. This idea will help you to determine Display Parameter box settings which will fit your music. The settings Display Quantization (see “Qua (Display Quantization)” on page 524), Interpretation (see “Interpretation” on page 526), Syncopation (see “Syncopation” on page 527), and No Overlaps (see “No Overlap” on page 528) all affect the way the recorded music is displayed.

Name and Style

Title Line: Name of the Sequence

The name displayed here is identical to the name of the same MIDI Region in the Arrange window. It can also be edited from here. A double-click on the name opens a text entry field. If more than one MIDI Region is selected, this line reads *X Sequences selected*, if nothing is selected, *Insert Defaults* (the default settings for new Regions).

Style

The Score Style (see “Basics” on page 529) used for the score display of the MIDI Region. This is selected from a pull-down menu, which contains all available Score Styles for the current song.

Qua (Display Quantization)

This parameter determines the shortest note value which can be displayed in the currently selected MIDI Region (exception: “artificial” N-tuplets, see the section “Artificial” N-Tuplets to Bypass Display Quantization (see “N-Tuplets” on page 499)).

The Qua value is selected from a pull-down menu, which contains the available display quantizations. Among these there are binary quantizations (displayed as one binary value like 16 or 128), and hybrid quantizations (two values combined, a binary and a ternary value, i.e. 16,24 or 32,96).

The binary values always correspond to the note value with the same denominator, i.e. 32 = thirty-second note and so on Ternary values refer to triplets. Here is a list of the ternary values, and their corresponding triplet values:

“Qua” Setting and corresponding Note Length:

3	1/2-note triplets
6	1/4-note triplets
12	1/8-note triplets
24	1/16-note triplets
48	1/32-note triplets
96	1/64-note triplets
192	1/128-note triplets
384	1/256-note triplets

Automatic Display of Triplets

When binary display quantizations are used, automatic triplets will not be displayed at all. (except for triplets which are inserted with the mouse, using an N-tuplet object). Therefore a “hybrid” quantization value must be assigned to the *Qua* parameter, to enable the automatic display of triplets.

Default Setting

The *Qua* parameter cannot be set to default in existing Regions, as it could in older versions of Logic. The default option can only be used with the *Insert Defaults*, which determine the default settings for newly recorded or created Regions. If default is chosen here, the *Qua* setting of any new MIDI Region will depend on the *Global Display Value* in the Transport window. In this case, the *Qua* value will always be the hybrid value which contains the global display value currently set in the Transport window plus—in case of a binary global value—the next higher ternary value, or—in case of a ternary global value—the binary value which is divisible by that particular ternary value.

A few examples: a global value of 1/8 will result in an 8,12 *Qua* setting for new Regions, global value 1/12 will become *Qua* = 4,12, global value 1/16 will result in *Qua* = 16,24, 1/24 in 8,24, and so on.

However, if a particular *Qua* value has already been set in the *Insert Defaults* (which are displayed in the *Display Parameter* box whenever no MIDI Region is selected), all new Regions will be assigned this value, regardless of the *Global Display Value* in the Transport window. Still, any of these values can be changed any time.

Swing Notation

For regular swing notation, 8,12 should be used as the display quantize parameter. This enables the display of eighth-note triplets, and also displays two uneven notes on one beat (dotted eighth and sixteenth), as regular eighth notes. For double-time passages with sixteenth notes, you either need to cut the MIDI Region in the Arrange window, and assign a higher quantize value to the new MIDI Region containing the double-time figure, or use hidden “artificial” N-tuplets for the sixteenth notes (see the section “Artificial” N-Tuplets to Bypass Display Quantization (see “N-Tuplets” on page 499)).

For swinging sixteenth notes (shuffle funk, hip hop and so on), the same principle applies. In this case, Qua would be set to 16,24.

Interpretation

If Interpretation is ON, notes are generally displayed with longer length values than their actual length, in order to avoid short rests. Short notes on a downbeat in 4/4 time for example, are displayed as quarter notes. The score becomes less precise, but easier to read.

If Interpretation is off, note lengths are displayed as close as possible to their “real” values, as determined by the *Qua* value. In the following example, the same MIDI Region is shown twice, the first time with Interpretation off, the second time ON:



The Interpretation function is intended to produce an easy-to-read score display of real time recordings. When you use step input or mouse input, you should generally switch it off.

Interpretation actually can be switched on and off for every single note, independent from the setting in the Display Parameter box. This can be done with a menu option, a key command, or using the Note Attributes (see “Note Attributes” on page 548) box.

Syncopation

If Syncopation is switched ON, each (MIDI) note will be notated as one graphic note (i.e., not displayed as several tied notes), regardless of its position—if this is possible. (This also depends on the *Max. Dots* setting, see below) If this is not possible, the note is (only graphically) divided into the minimum possible number of notes, connected by ties.

The usual application for this is the display of syncopated notes. The following example shows the same two bars displayed differently, first with Syncopation off, then ON:



Syncopation can also be switched on and off for every single note, independently from the setting in the Display Parameter box. This can be done with a menu option, a key command, or in the Note Attributes Window (see “Note Attributes” on page 548).

If an unwanted display of ties and notes results from the Syncopation function, it is possible to change the graphic display of notes connected with ties. Take a User Rest from the Part box (preferably a short one, but the length is not really important), and insert it at the bar position where you wish for the tie to be “subdivided”. Once the rest is inserted, it will disappear, but the note display will change. The inserted rest can only be seen and edited in the Event List.

This trick works not only for syncopated notes, but for all notes (see the section Changing the Way Notes with Ties Are Displayed (see “Ties” on page 498)). In polyphonic Score Styles, the MIDI channel of the rest, and the corresponding note has to be the same.

No Overlap

No Overlap ON prevents the overlapped display of notes in melodies that are played with an exaggerated legato. The effect can be seen in the following example, which shows the same MIDI Region, first without, then with *Overlap* correction:



No Overlap should only be deactivated in rare cases. If, for example, a piano player arpeggiates a chord and holds the notes, the score displays the following result with *No Overlap* ON:



Although you can't see here that all notes continue to sound, if you deactivate *No Overlap*, the result looks like this:



The solution typically is to switch *No Overlap* ON, and use sustain pedal markings. If the notes are recorded in real time with a MIDI keyboard, using a sustain pedal, Logic will display the pedal markings automatically.

Max. Dots

This parameter determines how many dots Logic will allow for the display of single notes. Unwanted dotted notes or rests can be changed by inserting User Rests (which will stay invisible in the case of notes, see the section *Changing the Way Notes with Ties Are Displayed* (see "Ties" on page 498)).

Score off

This parameter is not included in the Display Parameter box. You will find it in the Extended Sequence Parameters, which you open via the global menu *Options > Extended Sequence Parameters* (or key command). If *Score* is set to off here, the MIDI Region will not be displayed in the score at all. This is mainly used to prevent the score display of Regions containing only MIDI events which would not be displayed in the score anyway, like controller or SysEx data.

Score Styles Basics



The Concept of Score Styles

Score Styles could be compared to text formats in word processing and desktop publishing software. In this case however, it is score attributes that are stored, not font settings. This makes it very easy to assign multiple attributes; such as clef, staff size, vertical distance between staves, instrument transposition, and so on, to any existing or newly created MIDI Region. A Score Style includes the following parameters:

- Number of staves (for the display of one MIDI Region)
- For polyphonic, multi-staff Score Styles: configuration of brackets and bar lines connecting the staves.

For every staff:

- Staff size
- Distance to the next higher and lower staves
- Number of independent (polyphonic) voices in that staff
- Clef
- Display transposition
- Key signature on/off

For every independent (polyphonic) voice:

- Automatic rest display on/off
- Stem direction of notes
- Tie direction
- Direction of N-tuplet brackets and numbers
- Beaming
- MIDI channel assignment for that voice and/or definition of a split point pitch for separation of the different voices.
- Note Color

Logic contains various predefined Score Styles.

Score Styles do not affect the rhythmic display, unlike the other parameters in the Display Parameter box. Also, they do not affect the horizontal distance (spacing) of notes (apart from changes caused by different stave sizes). This is determined in *Layout > Global Format...*

Score Styles are saved together with the corresponding song file, so there can be different Score Styles in different songs. Hint: create some empty template songs with (among other things) the Score Styles and other score settings that you normally use as a basis for your work with Logic.

Assigning Score Styles

Each individual MIDI Region can be assigned a different Score Style in the Display Parameter box. This enables you (among other things) to quickly

- create parts for transposing instruments.
- display the same MIDI Region in different sizes, for example, for printout of a full score, and parts for the different instruments.
- change between different forms of display in one staff. This would be done by cutting a MIDI Region, and assigning different Score Styles to the resulting shorter Regions. (This might be used, for example, to alternate between passages that are completely written out, and improvised passages using only Beat Slashes and chord symbols.)

Predefined Styles

In Logic you will find various preset Score Styles. Here is a complete list, together with the parameters of those styles:

Score Style	Clef Type	Transposition
<i>Bass</i> 1 Stave(s)	Bass Clef	—
<i>Piano</i> 2 Stave(s)	Treble/Bass Clef	—
<i>Treble</i> 1 Stave(s)	Treble Clef	—
<i>Treble +8</i> 1 Stave(s)	Treble (+8) Clef	–1 octave
<i>Treble –8</i> 1 Stave(s)	Treble (–8) Clef	+1 octave
<i>Alto Sax</i> 1 Stave(s)	Treble Clef	E _b (+9)
<i>Guitar</i> Tablature Display		
<i>Guitar Mix</i> Tablature Display and 1 Stave	Treble (–8) Clef	
<i>Baritone Sax</i> 1 Stave(s)	Bass Clef	E _b (+21)
<i>Contrabass</i> 1 Stave(s)	Bass (–8) Clef	+1 octave
<i>Horn in E_b</i> 1 Stave(s)	Treble Clef	E _b (–3)
<i>Horn in F</i> 1 Stave(s)	Treble Clef	F (+7)
<i>Organ 1/1/5</i> 3 Stave(s)	Treble/Bass/Bass Clef	—
<i>Organ 1/3/5</i> 3 Stave(s)	Treble/Bass/Bass Clef	—
<i>Piano 1/3</i> 2 Stave(s)	Treble/Bass Clef	—
<i>Piccolo</i> 1 Stave(s)	Treble Clef	–1 octave
<i>Soprano Sax</i> 1 Stave(s)	Treble Clef	B _b (+2)
<i>Tenor Sax</i> 1 Stave(s)	Treble Clef	B _b (+14)
<i>Trumpet in A</i> 1 Stave(s)	Treble Clef	A (+3)

Score Style	Clef Type	Transposition
<i>Trumpet in Bb</i> 1 Stave(s)	Treble Clef	Bb (+2)
<i>Viola</i> 1 Stave(s)	Alto Clef	—
<i>Violoncello</i> 1 Stave(s)	Bass Clef	—
# <i>Drums</i> 1 Stave(s)	Percussion Clef	"mapped"

Working with Score Styles

Assigning Score Styles to Sequences

When you start Logic, the default song that appears already contains many Score Styles (see "Predefined Styles" on page 530) that you can use. You assign a Score Style to a MIDI Region by selecting the MIDI Region, then selecting the desired Score Style from the pull-down menu which appears when you click-hold on the *Style* Parameter line in the Display Parameter box.

You can also assign a Score Style to several selected Regions at once (see the section Changing the Settings for Several Sequences Simultaneously (see "Settings" on page 523)).

Score Style assignments can be changed anytime.

Reminder: Regions on the same track in the Arrange window which directly follow each other without gaps between them, are displayed as one continuous staff in Page Edit view, but still can use different Score Styles.

Automatic Score Style Assignment for New Sequences

When you create a new MIDI Region, either by making a real time recording, or with the Pencil tool in the Arrange window, the MIDI Region will be assigned the Score Style which is selected in the bottom line of the Instrument Parameter box of the active track instrument in the Arrange window.

When you create template songs, or when you begin to work on a new song, you may wish to change these settings for those instruments that are likely to always use the same Score Style. That way, those instruments will immediately be displayed with the correct Score Style.

Auto Style

If *Auto Style* is chosen in the bottom line of the Instrument Parameter box, every new MIDI Region will be automatically assigned a Score Style that fits the register of the recorded notes. *Auto Style* can only be chosen in the Instrument Parameter box, and does not appear in the list of Score Styles in the Score window's Display Parameter box.

The Score Style Window

There are several ways to open the Score Style window:

- double-click on the *Style* parameter in the Display Parameter box
- *Layout > Score Styles...*
- Key command *Open Score Style Window*
- Occasionally in the Arrange or Environment window: Double-click in the bottom line (*Default Style*) of the Instrument Parameter box.

Along the left side of the Score Style window there are some elements which also exist in other Logic windows:

Link Button

If the Link button is activated while the Score Style window is open, you can always see the parameters of the currently selected MIDI Region's Score Style. If you switch to a different MIDI Region, the Score Style window will show the new selection.



Toolbox

This Toolbox contains the Pointer tool (same as the regular mouse cursor), the Pencil tool (for creating new staves and Voices) and the Eraser tool (for deleting Score Styles, staves, or Voices).

Name Box/Style Selector

The field below the Toolbox shows the name of the currently selected Score Style. If you click and hold on it, a pull-down menu appears, listing all Styles that are available in the current song. With this, you can switch to another Score Style.

Parameter Groups

The Score Style Parameters are grouped horizontally in three main sections (top line): Staff, Voice and Assign.

Staff:

The Parameters for staves. Each line below the word Staff represents one staff in the score display.

Voice:

The Parameters for independent Voices. Each line below the word Voice represents one independent voice. The term Voice here only relates to the simultaneous display of rhythmically independent, polyphonic passages in the music, not how many notes can be displayed simultaneously. One Voice can still consist of as many simultaneous notes (chords) as desired. Only notes which should be displayed as rhythmically independent from the other notes in the same staff need to be assigned to separate Voices.

Assign:

The parameters for the assignment of notes to the different Voices. For details, see below.

Every Staff can contain several independent Voices (up to 16), however, one Voice can not be displayed across different staves. Therefore, a Score Style has to contain at least as many Voices as Staves.

List View

Besides the single Score Style view shown above, there is also a list view option in the Score Style window. The list view is mainly intended for copying Score Styles between songs (see below), or for deleting styles.

To change to the list view, double-click in the empty space below the parameters. Another double-click on one of the Score Styles in the list brings you back to the single display of that particular Style. Another way to change between single and list view is to click on the small button to the left of the menu line.

Handling Score Styles**Copying Score Styles between Songs**

At some point, you will probably want to use Score Styles that already exist in another song. There are two methods for copying Score Styles between songs:

Importing All Score Styles from another Song

In the Score window, select *Options > Import Settings*. In the resulting dialog box, activate *Score Styles only*, and click on *Import*. This imports all Score Styles from another song into the current one.

If another song file is already open during this procedure, that song's Score Styles will be imported. If no other song is open, a file selector box will appear, where you can select the song whose Score Styles you want to import into your current song.

Copying only Particular Score Styles from other Songs

One or several Score Styles can be selected in the Score Style window's list view, and copied between songs, using the usual copy/paste commands (*Edit* menu or key commands). To be able to do this, you need to open Score Style windows in both songs.

Automatic Score Style Copying

If you copy a MIDI Region from one song to another, and the Score Style used by the original MIDI Region does not yet exist in the other song file, it is automatically copied into that song, along with the MIDI Region.

Deleting Score Styles

Score Styles can be deleted in both the single view (*New > Delete Style*), and in list view (with Backspace or *Edit > Clear*). In list view, you can also select several Score Styles at once for this purpose. As an example, select *Edit > Select Unused* in list view, and press Backspace to delete all Score Styles that are currently not assigned to any Regions or Track Instruments in the song.

Creating New Score Styles

In single view, you can create new Score Styles using *New > Single Staff Style* or *New > Dual Staff Style*. The parameters in the Styles created this way are very basic, and in most cases need to be edited according to your individual requirements (see below).

The default name of Styles created in this way is *"*New Style"*. A double-click on the name box opens a text entry field, where any name can be typed in.

Creating New Score Styles Based on Existing ones

Often a new Score Style is needed which is almost identical to an existing one. In this situation, just make a copy of a Style and edit that copy. Copying can be done:

- in the Score Style window (single view) with *New > Duplicate Style*.
- with the Score Style window's pull-down menu (name box), by selecting the bottom entry (*"****DUPLICATE!****"*) in the list.
- Directly in the Score window, by using the Score Style pull-down menu in the Display Parameter box, again selecting *"****DUPLICATE!****"* at the bottom of the list. This is the fastest method, since the new Score Style automatically is assigned to the currently selected MIDI Region.

In any case, the new Style will get the name of the Score Style it is derived from, with *"*copied"* appended to its name. This text can be edited in the name box of the Score Style window.

If the only difference from the original Style is the staff distance or the Style's clef, creating a variation of the currently assigned Score Style can be done very quickly from inside the Score window: with the desired MIDI Region selected, select the *"****DUPLICATE!****"* command in the Score Style pull-down menu. This copies the current Score Style, and assigns the copy to the selected MIDI Region. Now, change the staff distance by dragging the clef with the mouse (as in the opposite illustration), or double-click on the clef to select a different clef from the resulting box.

Editing One-Staff Score Styles

These are the parameters that are relevant for One-Staff Score Styles. The other parameters are only relevant if the Score Style consists of more than one Voice, which does not refer to the display of chords and so on, but to rhythmically independent, polyphonic voices.

Name

The Name of a Score Style can be edited by double-clicking on the name box, which opens an entry field.

Space

These values determine the distance to the next higher and lower staves or, for the top and bottom staves of a full score, to the page margins.

This also creates additional space belonging to the staff above and below the actual staff. If, for example, symbols are inserted between staves in full score mode, it is important which staff an inserted symbol is assigned to. When parts are extracted from the full score, the symbols will go with whichever staff they were inserted to.

The vertical distance above the staff can also be changed directly in the score, by dragging the staff up or down at its clef.

The distance below the staff can be edited in the score as well, but only for the bottom staff in the score display, or if only one staff is displayed. Here, the bottom line of the score display area is dragged with the mouse, as shown in the opposite illustration.

These editing procedures change the settings of the corresponding Score Style itself. This means that all Regions which use the same Score Style will be affected, which is not always what you might want. To prevent this, use the fast method for creating new Styles, based on existing ones

Size

The size of the staff and the notes and symbols it contains. There are 16 available sizes (0—15). Here are some size recommendations: for regular instrument parts and lead sheets, use size 7 or 8. The staff size you should use in full scores depends on the number of staves in the score, and the size and format of the paper used. When using A4 or US letter paper: full orchestra: 2, big band: 3, wind quintet: 4.

However, the size of all staves in an Instrument Set can also be affected by the Scale parameter (see “Full Score and Part Layout” on page 557) in the Instrument Set window. Therefore it is possible to use the same sizes both for score and parts of a piece.

Clef

Here you select the clef which is used in the Score Style from a pull-down menu. Besides the usual clefs, this menu also offers some special options:

- *Drum.0* to *Drum.8*: staves with 0 to 8 lines and a “neutral” percussion clef. The relationship of MIDI note pitches to the top line of all staves corresponds to the top line in regular bass clef (A2). However, no accidentals will be displayed in these drum staves. *Drum.0* also omits any ledger lines. These clefs will often be used in Mapped Drum Styles (see “Drum Notation with Mapped Score Styles” on page 546), where the height of a note does not correspond to pitch, but is determined by different Drum Map parameters.
- *no clef.0* to *no clef.8*: like *Drum...*, but without any clef.
- *TAB Guitar...* and *TAB Bass...*: 12 different options for displaying notes as guitar or bass tablature. These tablature Tuning Sets are defined in the tablature window (*Layout > Guitar Tablature...*), where they also can be edited.

Trans

The display transposition, measured in half steps up or down. This parameter does not affect MIDI playback. If a staff contains chord symbols, these too will be transposed accordingly. If *Automatic Key Transposition* in *Layout > Clefs & Signatures* is activated (which is the default setting), the key signatures will also be transposed (exception see next paragraph).

Key

If this parameter is set to *Hide*, the corresponding staff is displayed without any key signature. Instead, all sharps and flats are indicated directly next to the notes. This parameter will usually be set to *Show* the key signature. *Hide* is an option mainly used for transposed french horn parts, which are sometimes written without any key signature.

Note: The above mentioned option *Automatic Key Transposition* has a similar effect on the whole song. There however, the non-transposed basic key signature is still indicated, whereas *Hide Key* suppresses any key signature.

Rest

The automatic rest display can be switched off here (*HIDE*), or set to display *Beat Slashes* instead of rests. This is useful for rhythm section parts and improvised solos. In this case, the number of slashes per bar will be determined by the nominator in the time signature (i.e. 4 slashes in 4/4-time, 6 slashes in 6/8-time and so on). Inserted notes and symbols will still be displayed, but automatic rests are only shown if they are shorter than one beat. You can insert *User Rests* manually, to replace the *Beat Slashes* at certain points.

Stem

This controls the direction of stems. The default setting is *Auto*. *Up* or *Down* forces all stems, regardless of pitch, into the corresponding direction. *Hide* makes all stems (and with them beams and flags) invisible.

Tie

The vertical direction of automatically displayed ties. The default setting is *Auto*. *Up* or *Down* forces all ties into the corresponding direction.

Tupl

Controls the direction of N-tuplet brackets and numbers. The default setting is *Auto*. *Up* or *Down* forces all N-tuplet brackets and numbers into the corresponding direction. *Hide* prevents the automatic display of triplet brackets and numbers. In this case, the numbers are still displayed in brackets on the screen, to allow editing of these triplets. On the printout however, these bracketed numbers will not appear.

If you set this parameter to *Hide*, you can still make particular triplets visible: double-click on the bracketed number (3) to open a tuplet dialog box. If you now close this box with OK, you convert the automatically displayed triplet into a “forced” triplet, which will be displayed according to the parameters set in the dialog box.

Beam

Controls the appearance of beams. The default setting *Slant* allows slanted beams. *Horiz* allows only horizontal beams. *Vocal* prevents any display of beams, as is typical in “classical” vocal parts, where notes are displayed with flags only.

Color

Sets the color of the voice’s notes. The color options are: Black (“---”), Pitch, Velocity, and the 16 colors of the user palette (see “Color” on page 573).

These settings only affect Regions which use an according Score Style. In addition, the active color mode in the Score Edit Window has to be Normal (Individual), which is the default setting.

Editing Two-Stave Score Styles

(2 staves with one Voice each)

The most obvious example for a multi-staff Score Style is a two-staff piano system.

When working with multiple staves and/or Voices in a Score Style, the following parameters also become relevant:

Number of Staves

In the first column each staff is represented by a number. These numbers are assigned automatically and cannot be changed. An additional staff can be created in two ways:

- *New > Insert Staff*. The new line is inserted at the position of the insert mark (>), which can be positioned with a mouse click in the narrow column to the left of the staff numbers.
- Click on the lower left portion of the empty space below the parameters (below the Staff parameters) with the Pencil tool.

Brackets and Bar Line Connections

In the second to fifth columns of the Score Style window, you can determine which staves are bracketed (two bracket types available) and/or connected by bar lines (either at the beginning of each staff line only, or at every bar line). For any of these connections, just click-drag the mouse in the corresponding column until you see the appropriate display. If a Score Style consists of more than two staves, these brackets and bar lines can be set to connect only certain parts of the whole system, i.e., they can be interrupted in between staves. If you want to delete any of these, grab the symbol at its end, and drag it up to the beginning, until it disappears.

The bar line connections can also be edited directly in the score. Just click on the upper end of a bar line to connect it to the next higher staff. To disconnect the bar lines, simply click on the same spot again.

The *Voice*-Parameters in the middle of the window (Space, Size, Clef, Rest, Stem, and so on) can be set individually for each Voice (which in this case is identical with staff). However, in a simple two-stave system, you probably will just select two different clefs and adjust the staff distances as needed. The Space parameters now also refer to the staff distances inside the Score Style itself.

Voice Separation Method

Additional staves are always treated as additional *Voices*. There are two different methods for assigning notes to the different voices. The parameters for these are to the far right side of the Score Style window, below the *Assign* header:

- A fixed split point (between two lines in the *Split* column). This is a defined pitch, which determines the absolute border between two Voices. Notes above it or exactly at that pitch are assigned to the upper Voice, notes below it are assigned to the lower Voice. This method is very simple, but there is the disadvantage that none of the Voices, even briefly, can ever cross that border. Quite often in “real life,” the border between voices needs to be flexible. A piano piece’s right hand part may dip below middle “C,” or the left hand may go above. It is not possible to notate this properly using a fixed split point.
- Voice assignment according to the notes’ MIDI channels (*Chan*): for each Voice, a different MIDI channel can be set in the *Chan* column.

Every note is now assigned to a Voice according to its MIDI channel. (The note’s MIDI channel can be seen and edited in the Event List, Event Float or in the Score window’s Event Parameter box, when that note is selected.) The different MIDI channels have no impact on MIDI playback, since the playback channel is determined by the setting in the Object Parameter box (Arrange window).

Since MIDI channels are used for voice assignment, notes that do not have one of the channels used for Voices are not going to be displayed at all. This can, however, be used to your advantage, as it allows you to exclude certain notes from the display (i.e. improvised parts, trill notes and so on)

There are two useful functions that can speed up the process of changing the MIDI channel settings of notes, in order to assign them to the desired Voices:

- In the Score Preferences (*Options > Score Preferences*) there is a parameter called Auto Split Notes at ... If this is activated, and the default Score Style in the Object Parameter Box for the selected instrument is a polyphonic Style, the played notes are automatically assigned MIDI channels according to the Score Style’s Voice assignments. Notes at and above the split point get the channel of the first Voice, those below get to the second Voice’s channel. (This feature only works for two Voices at a time) This creates a usable rough Voice assignment, which can be edited afterwards.
- For Regions that have already been recorded, use *Functions > Note Events > Split to Channels*, or the *Split to Channels* key command, to assign notes to Voices in the Score Style according to the Auto Split pitch in the Score Preferences.

In most cases, it will still be necessary to change the Voice assignment (the MIDI channel) for particular notes, or groups of notes. There are several methods for doing this:

- Editing the MIDI channel in the Event Parameter box, the Event List or the Event Float window (works also with multiple selection).
- Changing the MIDI channel using the *Nudge Event Channel +1* and *Nudge Event Channel -1* key commands.

- Hint: these can be especially useful when used in combination with the *Select Next/Previous Event* key commands, which allow you to move the selection from note to note.
- Using the *Voice Separation tool*: this tool allows you to draw a separation line between the notes, thereby assigning them to the different MIDI channels of the Voices. Place the tool between the staves, and draw a line where you want to separate the Voices, while holding down the mouse button. The following example shows the resulting separation line. If you make a mistake, just move the mouse back to the left a little bit (with the button still pressed). This erases the separation line to the right of the tool. Then try it again.



The result of the procedure will look like this:



Note: The Voice Separation tool can only be used if MIDI channels are defined for each of the Voices that you want to separate with it, since Logic has to know which MIDI channels to assign to the notes.

Voice Assignment when Using Mouse Input

If you insert notes with the mouse into a multiple staff Score Style, these are assigned automatically to the staff/Voice/channel into which they are placed. If that staff contains several Voices (see below), the MIDI channel corresponds to the channel setting in the *Insert Defaults* (but only if that particular channel is used by one of the Voices of that staff).

If you insert Symbols into multiple staff Score Styles, there is a *Staff* parameter in the Event Parameter box for most of them. It determines which staff the symbol belongs to. This is also relevant for the *vert.pos* setting of that symbol.

Editing Single-Staff Polyphonic Styles

(With Several Independent Voices)

Polyphonic Score Styles are needed when rhythmically different melodic lines should be displayed in the same staff. Theoretically, up to 16 independent Voices are possible.

There are two possible ways to add another Voice to a staff in the Score Style window:

- Menu *New > Insert Voice*. The new Voice will be inserted at the position of the insert mark (>), which can be set with the mouse in the narrow column to the left of the staff numbers. (This is important if you want to insert a new Voice between existing Voices)
- By clicking with the Pencil tool into the (empty) lower right portion of the Score Style window. In this case, the new Voice is simply added at the bottom.

In both cases, the newly inserted Voice will have the same parameters as the Voice above it, which can now be edited.

For every new Voice, a new line appears in the Score Style window. For additional Voices within the same staff, it is important that the staff field in the first column stays empty. If a number is displayed there, click on it. This will cause the number to disappear, and the corresponding staff to disappear from the Score display.

If there are two independent Voices throughout the piece, the parameters might be set as follows: Stem, Tie, and N-tuplet direction are set to *up* for the top Voice and *down* for the bottom Voice. Note that even with these general parameters, these Note Attributes (see “Note Attributes” on page 548) can be changed for each note. Both Voices are displayed with automatically displayed rests (Parameter *Rest: Show*).

For Voice Separation (see “Voice Separation Method” on page 538), the same methods as used in two-stave systems can also be applied. Either draw a line between the notes with the Separation tool, or edit the MIDI channels of the notes directly, according to the Voice assignment in the Score Style window.

While the Voice Separation tool is being used, the help tag shows which of the Voices are being separated in the current process. This is indicated by two horizontal arrows between the numbers of the Voices, and is only relevant if there are more than two Voices. To switch to the lower Voices, the arrows can be moved with Shift while the mouse button is pressed.

Input and Recording of Polyphonic Voices

Via MIDI

If you record polyphonic voices as separate passes in real time, you should set your keyboard or MIDI controller to the appropriate MIDI channel for each Voice. This way, you don't need to edit the channels afterwards. The same applies to step input.

Note: The original MIDI channel will not be recorded properly, if in the Environment window, the Sequencer Input Object's (see "Physical Input/Sequencer Input Objects" on page 236) Channelize function is activated.

Reminder: if you want to record an additional Voice into an existing MIDI Region, that MIDI Region has to be selected before the recording is started, and in the Song Settings > *Recording Options*, the option *Merge New Recording With Selected Sequence* has to be activated. You could also record two separate Regions, using different MIDI channels, and merge them afterwards.

Mouse Input

Mouse input into polyphonic Score Styles is very easy, if you activate *View > Explode Polyphony* (also available as a key command). This causes all Voices to be displayed in separate staves, no matter what the Score Style Staff settings are (the other Voice parameters remain valid). If you insert a note into one of these staves, it is automatically assigned the corresponding MIDI channel. After you finish input, turn off the *Explode Polyphony* option. Now the voices will be displayed correctly in one staff, according to the Score Style settings. This mode is generally useful for all editing in polyphonic staves.

Of course you can also insert notes directly into polyphonic staves without activating the Explode Polyphony option. In this case, an inserted note gets the MIDI channel which was set in *Insert Defaults* of the Event Parameter box (see "MIDI Channel and Velocity of Inserted Objects" on page 491).

Single-Staff Score Style with Optional Polyphony

Sometimes you need to add a second Voice to a staff that usually only requires one Voice, in order to properly notate a short rhythmically independent passage. This is not uncommon with orchestral scores, where the unison part for a group of instruments will temporarily separate.

One solution is to use a Score Style with a "Main Voice" and a "Secondary Voice". The parameters for the Main Voice should be set like in a non-polyphonic Style, the Secondary Voice is set to Channel 16 and is displayed without automatic rests:

- The stem, tie, and tuplet directions for the Main Voice are set to *Auto*, which is necessary for the proper notation of the unison parts. No MIDI channel is defined for the Main Voice, so all notes with a channel other than 16 will be assigned to the Main Voice. As long as no notes or rests with MIDI channel 16 are used, the score display looks the same as with a simple non-polyphonic Score Style.

- For the second Voice, the stem, tie, and tuplet direction parameters are set to down, and the automatic rest display is deactivated (*Hide*). Only notes with channel 16 will be assigned to this Voice.

To achieve such a score display, the following additional steps are necessary:

- Rests in the second Voice need to be inserted manually where needed. In the example, this was done on the fourth beat of the second measure. The rest's MIDI channel has to be the same as the second Voice's channel (in this case, 16). This can be edited in the Event List (see "Using the Event List" on page 439).
- In the polyphonic passages, the stems of the Main Voice need to be forced upwards by selecting the corresponding note's and changing their individual stem parameters (see "Note Attributes" on page 548).

An advantage of this approach is that you don't need to worry that much about MIDI channels during recording or input. Also, notes will not disappear unintentionally. There is, however, the disadvantage that the Voice Separation tool cannot be used in this case to assign notes to Voices.

Other applications for this method would include the display of beamed grace notes, occasional polyphony in a guitar part, or the indication of rhythmic accents above or below beat slashes in rhythm section parts.

Optionally, you can add still more Voices to a staff to be able to display more complex parts (up to 16).

Multi-Stave Polyphonic Score Styles

(With more Voices than staves)

These Score Styles are used mainly for notating keyboard music. If you start Logic without using an Autoload-Song or template song files, an empty song appears, which contains some polyphonic Score Styles (see "Predefined Styles" on page 530) for piano (*Piano 1+2/3+4*) and church organ (*Organ 1+2/3+4/5*, with three staves).

These Score Styles are simply a combination of the Score Style types covered in this section so far. To insert an additional Voice or staff, place the Insert Mark (>) at the desired position with the mouse (see opposite illustration), and select *New > Insert Voice* or *New > Insert Staff*.

In these complex Score Styles, it is often best to use the Explode Polyphony (see "Input and Recording of Polyphonic Voices" on page 542) mode when editing.

Cross Staff Beaming

Music for keyboard instruments or harp, which is notated in two staves, sometimes contains passages where notes in the upper and lower staff (played by left and right hand) are connected with a beam to emphasize the continuing musical phrase.

Required Settings

Cross-staff beaming is only possible between staves which belong to the same Score Style and therefore to the same MIDI Region. Apart from that, the Voices in this Score Style need to need to different MIDI channel assignments—it is not possible to achieve cross-staff beaming with a Score Style that only uses a split point pitch for Voice separation.

The Procedure in Detail

Since notes can only be connected with beams, if they belong to the same Voice, it is not possible to simply select notes in both staves and apply the usual beaming attribute functions to them. As an example, let's imagine a two-staff Score Style with one Voice per staff. Before beaming the notes, it is necessary to assign all notes which are to be connected by a beam to the same Voice, let's choose the Voice of the upper staff for that purpose.

To change the Voice assignments for the notes in the lower staff, you can either; use the Voice Separation Tool to draw a line below these notes or, select all notes, and change their MIDI channel in the Event Parameter box to the channel of the upper Voice.

Now all of these notes will be displayed in the upper staff, probably with a lot of ledger lines. The next step is to define the beaming connections as desired. This can be done with the regular note attribute functions (menu *Attributes > Beaming > Beam* selected or corresponding key command).

Now select those notes once more which should be displayed in the bottom staff and choose the menu function *Attributes > Voice/Staff Assignment > staff below Voice* or the corresponding key command. This moves all selected notes down to the lower staff, although they still remain part of the upper Voice.

You could also choose the opposite approach—first assigning all notes to the lower Voice, then moving part of the notes to the upper staff with *Attributes > Voice/Staff Assignment > staff above Voice*. To display all selected notes in their original staff, use *Attributes > Voice/Staff Assignment > default staff*.

Stem Direction

The default stem direction for notes that beamed across staves is towards the center. I.e. the beam is displayed between the two staves, stems in the lower staff point up, stems in the upper staff point down.

The vertical position and the inclination of that beam can be altered by applying the stem length change functions described above: To move the whole beam in parallel motion, select all beamed notes at once and choose *Attributes > Stems > Up* or *...Down*, to change the inclination of the beam, select the first or last note of that group and apply those functions.

However, you can also define the same stem direction for all notes with the regular note attribute functions, thereby placing the beam above the top staff or below the bottom staff. If you decide that you like the in-between beam better, you'll need to select all notes again and choose *attributes > Stems > Default*.

Rest Display

As always, rests are displayed automatically in Logic, according to the Rest settings in the used Score Style. However, since in the cross-staff beaming situation described above, most or even all notes belong to the Voice of the top staff, the lower staff will contain rests—even directly at the position of some of the notes. To avoid this, you should use a Score Style where the automatic rest display is deactivated for the Voice of the bottom staff. Wherever rest display is desired, those rests can be inserted with the mouse from the Part box.

Copying Voices or Staves

Copying Voices or Staves into other Score Styles

With the Copy and Paste-commands (*Edit* menu or key commands), you can transfer one or several voices and/or staves including their parameters, into other Score Styles. Select the Voices you want to copy, by dragging the mouse vertically in the margin column to the left of the staff numbers. The selection will be indicated by a dark grey vertical beam. Now, select *Edit > Copy (X)*. Switch to the Score Style into which you want to paste these voices (this also works between different songs). Finally, set the Insert mark (>) and select *Edit > Paste (X)*. Note that if a Voice is selected in the destination Score Style (indicated by a black beam in the left column), it will be replaced by the pasted voices.

Deleting Voices in a Score Style

To delete Voices or staves from a Score Style, select them (dark grey beam, see above) and press Backspace, or select *Edit > Clear*.

Drum Notation with Mapped Score Styles

Nowadays, most MIDI instruments contain a variety of drum and percussion sounds. Each MIDI note usually triggers a different sound. If a MIDI Region containing a drum part is displayed with a regular Score Style, you see notes with no apparent relation (except that these MIDI notes trigger the corresponding sounds) to the sounds represented by them.

If you wish to notate these musically meaningless pitches as a readable drum part which also uses special percussion note heads, then you will want to utilize Logic's *Mapped Instruments* and *Mapped Score Styles*.

The Basics of Drum Notation with Logic

For the purpose of drum notation, you need to use both a *Mapped Instrument* as a Track Instrument, and a *Mapped Score Style*, for the notation to be displayed properly. We'll start with the Mapped Instrument.

Open an Environment window, and create a new Mapped Instrument (see "Mapped Instrument" on page 219) and double-click its icon.

You will see the *Drum Map Editor* for the instrument. The default settings correspond to the General MIDI drum note assignments, but they can be edited.

In the column to the far right, there are three parameters which are relevant for notation:

Head

Determines the shape of the note head for notes triggered by this particular pitch. You can choose the shape from the pull-down menu, which appears when you click and hold on any of the note heads displayed here.

Group

Here, each MIDI note can be assigned to a *Drum Group*, using a pull-down menu. For the most commonly used drum sounds, there are already some groups defined in this menu (Kick, Snare, Hi hat, Toms, Cymbals, and so on). If you want to define a new *Drum Group* for another instrument sound (for example Tambourine), select one of the *New Groups* in the pull-down menu, and double-click on it. This opens an entry field, where you can determine a name for the new *Drum Group*.

The Drum Groups play an essential role in "Mapped Score Styles": a note has to be assigned to a Drum Group to be displayed with a Mapped Score Style. If it's not, it won't be visible.

Rel. Pos.

This parameter assigns the note to a line in the staff. It defines the note's position in relation to the top line of the staff. Integer values will make the note fall onto a line, fractional values result in a note position between two lines. (The measurement unit of this parameter is the distance of one staff line to the next)

This position parameter can be set individually for each MIDI note. In the Score Style window, the positions can also be influenced, but only for all notes of a particular Drum Group together.

These options allow you to have two different MIDI notes (i.e. different bass drum sounds) displayed in the same way in the score, or on the same line, but with different note heads.

Different Drum Maps within the same Song

If you are using various MIDI instruments with different drum assignments, you can create a separate *Drum Map* (in the *Drum Map Editor*) for each instrument. The list of Drum Groups however, is the same for all instruments in a song. This enables you to display different drum tracks with the same *Mapped Score Style*. All Snare Drums, for example, will be displayed in the same way. If you don't want this, just create additional drum groups like Kick2, Snare2, and so on and create a second *Mapped Score Style* for the display of these Drum Groups.

Mapped Score Styles

Take a look at the default Mapped Score Style in the Score Style window: You can select the default one via the pull-down menu on the left.

- To the left side (*Staff*), everything is identical to non-mapped Score Styles (with the exception of the missing *Transpose* and *Key* parameters, which wouldn't make sense here). Choose a drum clef in the *Clef* column.
- Below *Voice* (in the top header line), there is a separate Voice column, where the different Voices are numbered automatically. The Score Style in the example above contains one staff with two independent Voices.
- The hierarchy *Staves-Voices-Drum Groups*, goes from left to right, and is shown by horizontal lines, which indicate the borders between these elements: each Drum Group belongs to the Voice at the same horizontal position. The *Pos.* parameter affects the vertical positioning of all notes of the corresponding Drum Group. The value shown here is an offset, which is added/subtracted to the relative positions defined for the individual notes in the Drum-Map-Editor.

Creating and Editing Your Own Mapped Score Styles

This is very similar to creating non-mapped polyphonic Score Styles. Select *New > Mapped Score Style* in the Score Style window, and insert all desired staves, Voices, and Drum Groups using the menu functions (*New*) or the Pencil tool.

The copy, insert, and paste functions for single staves, Voices, and Drum Groups also work as described in the section *Copying Voices or Staves into other Score Styles* (see “Copying Voices or Staves” on page 545).

Before defining the details of a Mapped Score Style, you should define all Drum Groups, note head shapes, and relative note position parameters in the Drum Map Editor.

The best method for this is to use an already recorded drum MIDI Region, and open the Score window displaying that MIDI Region, the Drum Map Editor, and the Score Style window. This way, you can directly see how parameter changes affect the score display.

Using Mapped Score Styles for Non-Mapped Instruments

If you use a Mapped Score Style for the display of a regular (non-mapped) instrument, Logic will simply use the default settings for Mapped Instruments (which correspond to the General MIDI drum sound assignments), to determine the mapping of notes to Drum Groups. However, this is not recommended, since this method is less flexible (for example there will be only the default Drum Groups available).

Note Attributes

The term Note Attributes is used for all note display parameters that can be set individually per note, regardless of the settings in other windows and boxes.

The Note Attribute window opens when you double-click on a note’s head (presuming that in *Preferences > Score Preferences... > Double Click Note To Open: Note Attributes* is selected). The settings shown in this window always correspond to the note whose head was double-clicked.

Using the *Attributes* menu, the different settings are assigned to a note by selecting the corresponding submenu, with the note selected. This attribute assignment can also be made for a group of selected notes at once. The same applies to the assignment of Note Attributes using key commands.

Reset Note Attributes

With this command (*Attributes* menu or key command) you can reset all Note Attributes to their default settings. Note that this also affects symbols directly attached to notes (accents, fermatas, Jazz symbols, and so on), which will be erased by a reset of Note Attributes.

List of all Note Attributes

The following list shows all Note Attributes. Here you can see how to access a certain attribute and what the options are.

Special Note Heads (Default setting “normal” = round and black):

- Insertion from the Part box with the mouse
- In the Note Attributes window (*Head*)

Altering Note Size (Default: Size in the Score Style window)

- With the Sizing tool
- In the Note Attributes window (*Size*)

Horizontal Position Change (Default: as defined by the note’s bar position)

- With the Layout tool
- In the Note Attributes window (*Horizontal Position*)

Accidental Distance from the Note (Deviation from the default setting in the Extended Layout Parameters window)

- In the Note Attributes window (*Accidental Position*)

Display of Accidentals (Default: display according to key signature)

- In the Note Attributes window (*Enharmonic Shift/Accidental Type*)
- Menu *Attributes > Accidentals*
- With key commands

Options:

- *Default Accidentals*: according to the default setting
- *Enharmonic Shift: #*: converts for example G flat to F sharp, also F to E sharp
- *Enharmonic Shift: b*: converts for example D sharp to E flat, also B to C flat
- *Flats To Sharps*: similar to Enharmonic Shift #, but leaves notes without flats unaltered (useful for multiple selection)
- *Sharps To Flats*: similar to Enharmonic Shift b, but leaves notes without sharps unaltered (useful for multiple selection)
- *Force Accidental*: forces the display of accidentals (and naturals)
- *Hide Accidental*: displays the note without accidentals (MIDI playback is not affected)
- *Guide Accidental*: forces the display of the accidental (also naturals) in parenthesis.

Stem Direction and Length (Default setting in the Score Style window)

- In the Note Attributes window (*Stem Direction* only)
- Menu *Attributes > Stems*
- With key commands

Options:

- *Stems: default*: according to the default setting
- *Stems: up*

- *Stems: down*
- *Stems: hide*: hides a note's stem, and the corresponding beam or flag
- *Stem End: Default Length*: default setting
- *Stem End: Move Up*: moves the stem end upwards; depending on the direction shortens or lengthens the stem
- *Stem End: Move Down*: moves the stem end downwards

Beaming of Notes (Default depends on the chosen time signature, the "Beat Grouping" setting in the time signature dialog box, and on the Score Style Parameter "Beam")

- *Menu Attributes > Beaming*
- With key commands

Options:

- *Beam Selected Notes*: forces a beam to the following note
- *Unbeam Selected Notes*: interrupts the beam to the following note
- *Default Beams*: according to the default setting

Voice/Staff Assignment: For Cross Staff Beaming (see "Cross Staff Beaming" on page 544)

- *Menu Attributes > Ties*

Options (requires a polyphonic multi staff style):

- *Default Staff*: according to voice assignment
- *Staff Above Voice*: moves the selected notes to the staff above the assigned voice
- *Staff Below Voice*: moves the selected notes to the staff below the assigned voice

Tie Direction (Default setting in the Score Style window)

- In the Note Attributes window (*Tie Direction*)
- *Menu Attributes > Ties*
- With key commands

Options:

- *Ties: default*: According to the default setting
- *Ties: up*
- *Ties: down*

Syncopation (Default setting in the Display Parameter Box)

- In the Note Attributes window (*Syncopation*)
- *Menu Attributes > Syncopation*
- With key commands

Options:

- *Default Syncopation*: according to the default setting
- *Force Syncopation*: forces syncopated display
- *Defeat Syncopation*: defeats syncopated display

Interpretation (Default setting in the Display Parameter Box)

- In the Note Attributes window (*Interpretation*)
- Menu *Attributes > Interpretation*
- With key commands

Options:

- *Default Interpretation*: according to the default setting
- *Force Interpretation*: forces Interpretation mode
- *Defeat Interpretation*: defeats Interpretation mode

Independent: Display as Independent Note or Single Grace Note (Default setting “Not Independent”)

- Menu *Attributes > Independent*
- With key commands

Options:

- *Not Independent*: the note is displayed in the regular rhythmic context
- *Independent*: the note is displayed independent of the rhythmic context
- *Independent Grace*: the note is displayed as a single (independent) grace note

Color

Single notes can also be assigned colors individually, according to the three color palettes. The note has to be selected, then menu *Attributes > Colors >...* is used to assign the desired color (user palette 1 to 16) or color mode (pitch or velocity).

Being Note Attributes, these settings have priority over the Score Style settings. However, they only apply if the color mode in the Score Edit Window is set to *Normal (Individual)*.

Instrument Sets and Score Display Levels

In Logic's Score Edit window, there are basically two parallel systems determining which Regions are displayed, and which aren't (linear view versus page edit view does not play a role here). The hierarchical system which controls the Display Levels is basically the same in all Logic windows, but has a few special aspects in the Score Edit window.

Display Levels

In the Score Edit window you can work with the following Display Level settings:

Content Linked: activated by a double-click on the Link symbol. In this mode only the object currently selected in another window (which most of the time is a single MIDI Region, but can also be a folder) is displayed in the Score window.



Content Catch: similar to Content Linked, but Catch is also activated. Only one MIDI Region is displayed at a time, but during playback the display changes to the next MIDI Region on the same track, according to the current bar position.



Linked: (single click on the Link-symbol) The Score window displays the same display (folder) level as the Arrange window. This is most relevant if you work with Folders.



Not Linked (Link button deactivated): in this mode, Logic simply stays at the currently visible Display Level and doesn't react to MIDI Region selection in other windows. As an example, if you always want to see the full score in a particular Score window, choose this mode once the full score is displayed in that window.



Explode Folders

If the current display level allows the display of more than one MIDI Region at a time (Linked or Not Linked), the option *Explode Folders* in the *View* menu will affect how things are displayed: unlike the other editor windows, the Score window can display (or even print) the contents of different display (folder) levels at once. If the current Display Level contains folders, their contents will also be displayed in the score. (If this option is not activated, Folders will appear as grey beams in linear view. In page edit view, they won't be visible at all.)

Changing between Single Sequence and Full Score Display

At all Display Levels, a double-click on a MIDI Region or folder will take you to the next lower level (into the Folder or to the display of only that particular MIDI Region). A double-click in the empty space below or above the staves will bring you up to the next higher level (the next higher Folder, or in case of the highest level to the full score display of all Regions of that song). Basically, the same principle applies even if you don't use Folders at all: the highest of all levels (the complete song) could also be regarded as a folder, which contains all MIDI Regions.

Special Cases Concerning Score Display

In some cases, certain MIDI Regions will not be displayed in the Score window, no matter what the Display Level or Instrument Set settings are. These cases include:

- Muted MIDI Regions, if *Hide Muted Sequences* is activated in *Layout > Global Format*.
- MIDI Regions on muted tracks, if *Hide Muted Tracks* is activated in *Layout > Global Format*.
- MIDI Regions with Score set to "off" in their *Extended Sequence Parameters* (global menu *Options > Extended Sequence Parameters* or key command).

Instrument Sets

Apart from the system of display and folder levels, there is also the system of Instrument Sets in the Score window. This allows you to determine which (track) instruments should be included in the score display of a particular Instrument Set. Each song can contain as many Instrument Sets as you like. Instrument Sets allow you to:

- arrange the (vertical) order of instruments in the score, independently from the order of tracks in the Arrange window.
- assign a name and an abbreviated name to each track instrument, which will then be displayed and printed as instrument names in the score.
- determine which of the staves will be connected by brackets and/or bar lines.
- display or print only a certain part of the score, such as a particular group of instruments. This also allows faster editing in very large files, since screen redraws are much faster when less instruments are displayed.
- exclude tracks from display that are only relevant for playback, but not for the score (tracks containing only MIDI controller data, for example).

- Reduce or enlarge all staves which are part of that Instrument Set at once, using the Scale parameter. (This allows you to use the same Score Styles for printout of full scores and parts).
- Select from two different parameter sets (*Score* or *Part*) for page margins, header space height, vertical distance between staff systems, and the maximum number of bars per line.

An Instrument Set is selected in the *Instrument Set Box*, below the Catch and Link buttons. If Instrument Sets already exist in the current song, a pull-down menu with all available Instrument Sets will appear when you click-hold on the box. New songs will only show the entry *ALL INSTS.* which—depending on the display level—will display all instruments. Double-click this box to open the Instrument Set window.

The Instrument Set Window



The Instrument Set window can be opened with:

- Double-click on the Instrument Set Box
- Menu *Layout > Instrument Sets...*
- Key command *Open Instrument Set Window*

If you have opened the Instrument Set window while the default set “ALL INSTS.” was displayed, you will see a note saying that the “ALL INSTS.” Instrument Set cannot be edited. In the Instrument Set window, select *New > New Complete Set*. This will create an Instrument Set which contains all track instruments currently used in the Arrange window. Although for the moment this results in the same display as “ALL INSTS.,” you can now edit this Instrument Set. (In the “ALL INSTS.” Set you cannot define instrument names or change the order of instruments; and the bar lines are always connected throughout the whole score). On the yellow background you will see columns with the following parameters (from left to right):

Instrument

In this column, you determine which (track) instruments are included in the Instrument Set, and in which vertical order they will appear in the score. As in the Score Style window, there is a narrow column at the left margin, where you can set an insert mark (>) with a mouse click, or selection marks by dragging the mouse vertically. With these selection marks, instrument entries are selected. With the usual cut/copy/paste commands (*Edit* menu or key commands), you can move entries to change their order, delete them, or copy them into other Instrument Sets. If you Paste them, they will be pasted at the position of the insert mark, which you need to set to the desired position beforehand.

If you double-click below the instrument list, a new instrument entry is added at the bottom of the list. If you want to add an instrument somewhere in the middle of the list, set the insert mark accordingly, and select *New > Add Instrument Entry*.

Click-hold on the name of this new entry (*Instrument* column). A pull-down menu with all available track instruments will appear, that you can select from.

In most cases, it is convenient to create a new Instrument Set with *New > New Complete Set*, since all instruments currently used in the Arrange window will be included automatically. You can, however, also select *New > New Empty Set*, into which you then can insert the desired instruments one by one. Other options in this menu are *Duplicate Set*; which creates a copy of the currently visible Instrument Set, that you can use as a basis for another set, and *New Set of Selected Insts.*, which creates a new Instrument Set containing all currently selected instruments.

At the highest zoom level, the Track Instrument icons are also displayed in this column.

Please note: you will not see a new Instrument Set in the Score window until it was chosen from the pull-down menu in the Instrument Set Box.

Full Name

If you click in this column on any line, an entry field opens with the default entry “@(reference)”. If you don’t change this, the Track Instrument name will be used as the name for that instrument in the score. However, since the track instrument name often is identical with the corresponding synthesizer patch (i.e. Solostrings high), you will probably wish to assign another name here. This name will automatically be displayed in the score as the full name, for example “Violin 1”. The display parameters for the instrument names are set in *Layout > Numbers & Names* (see “Numbers & Names” on page 564).

Short Name

Here you can define an abbreviated name for each instrument, which is used if in the *Layout > Numbers & Names* dialog window *short names* is selected for the instrument name display.

Brackets and Bar Lines

You can define which staves in the Instrument Set will be connected by brackets (two bracket types available), and/or connected by bar lines (either at the beginning of each staff, or throughout) using the last four columns. For any of these connections, just drag the mouse vertically in the column until you see the appropriate display.

These brackets and bar lines can also be interrupted between staves, which allows you to form groups of connected instruments in a score. If you want to delete one of these lines or brackets, grab the corresponding symbol at its end point, and drag it up until it disappears. You can use the same method to shorten the lines.

The bar line connections can also be edited directly in the score. Just click on the upper end of a bar line to connect it to the next higher staff. The same procedure applied once more disconnects the bar lines again.

Name of Instrument Set

The Name of an Instrument Set can be edited by double-clicking on the name in the left column of the Instrument Set window, which opens a text entry field. If you click-hold on the name box, you can switch to another Instrument Set by selecting it from the resulting pull-down menu.

Scaling, Format

These two parameters below the Instrument Set's name make it possible to create both the full score and the parts (see "Full Score and Part Layout" on page 557) for all instruments from within the same song file, without having to change any settings.

Importing Instrument Sets from Other Songs

Select *Options > Import Settings*. In the resulting dialog box, activate *Instrument Sets* only, and click on *Import*. This imports all Instrument Sets from another song into the current song.

If another song file is already open during this procedure, that song's Instrument Sets will be imported. If no other song is open, a file selector box will appear, where you can select the song whose Instrument Sets you want to import into your current song.

Additional Information on Instrument Sets

Relation to Display Levels

An Instrument Set will only be displayed as defined, if an appropriate Display Level (see "Display Levels" on page 552) is chosen. Content Linked and Content Catch only allow the display of one MIDI Region at a time, so they are not suitable for working with Instrument Sets. It's usually best to deactivate Link once the desired Instrument Set is fully displayed. If only one MIDI Region is displayed, double-click below the staff, which will bring up the full score. After that, deactivate Link.

Please note: it is possible to work with several open Score windows showing different Display Levels and/or different Instrument Sets.

New Instrument Sets for Selected Instruments

In the Score window, *Layout > Create Instrument Set from Selection* (also key command) will immediately create and display a new Instrument Set, which consists of all instruments which are used by the currently selected MIDI Regions. For this function, it does not matter if the MIDI Regions are selected in the Score or in the Arrange window. As screen redraws are much faster if fewer instruments are displayed, this is a good way to speed up editing. Instrument Sets created this way are automatically named after the instruments they contain. If you want to delete the set after editing, select *New > Delete Set* in the Instrument Set window while the particular Instrument Set is shown there.

Automatic Display of Selected Instruments when Opening the Score Window

When you open a new Score window while several Regions are selected in the Arrange window, an Instrument Set will automatically be created and displayed in that Score window which only contains the instruments belonging to the selected Regions. In other words, the function *Create Instrument Set From Selection* is automatically performed whenever a Score window is opened and Regions on more than one track are selected in the Arrange window.

Instrument Sets created this way are saved with the song file, and are also available for later use.

Different Instruments Using the Same Sound

If several instruments or staves use the same MIDI sound for playback (with the same MIDI channel on the same MIDI instrument), and if you wish to be able to display those staves with different instrument names in the score, you need to create a separate track instrument for each staff in the Arrange or Environment window.

Full Score and Part Layout

Some functions in the Instrument Set window and some settings in the *Global Format* window (*Layout* menu) make it possible to produce both the full score and the individual parts for all instruments from within the same Logic song file, without having to adjust any settings.

Part Extraction (“Instrument Filter”)

Hold Option as you click and hold on the Instrument Set Box in the Score window. A pull-down menu will appear, which contains all Track Instruments currently used in the Arrange window. If you choose one of them, only this particular instrument will be displayed. This method allows you to quickly display (and print) instrument parts. However, in this special case, only the track instrument names will be used as instrument names in the score. So, if you use this method for printout of your parts, you need to be careful to use the “real” instrument names as names for the Track Instruments in the Arrange window.

Scaling Parameter for Instrument Sets

In the Instrument Set window, below the name of the Instrument Set, there is a *Scaling Parameter*, which can be set to any desired size between 50 and 200 percent of the original size. This scaling will affect all staves, the distance between staves, all symbols which are part of the staves (i.e. all notes, rests, and other symbols), and all local text including lyrics. All of these elements will be changed in size according to the scaling parameter of the currently displayed Instrument Set.

The scaling parameter does not affect Global Text objects (i.e. header text, text which was inserted outside the margins) and text like page numbers, and so on

The scaling is not applied to parts which are extracted using the Instrument Filter function described above. Therefore, you can use the same Score Styles for full scores and parts: in extracted parts, the staves will appear with their original size, in the full score their size will be diminished according to the scaling parameter.

Separate Layout Options for Parts and Score

In the *Global Format* dialog window (*Layout* menu) there are separate page layout parameters for score and parts. *Left, right, top, and bottom margins*, the (vertical) size of the *Header Space*, the *Line Distance* (additional vertical distance between stave systems), and the maximum number of bars per system (*Max.Bars/Line*) can be set separately for Score and Parts.

Which of these parameters are used for the display and printout of a particular Instrument Set, depends on the setting of the *Format* parameter in the Instrument Set window (below the *Scaling* parameter). You can switch this setting by clicking on it.

When you use the Instrument Filter method (see above) to extract and print the parts for single instruments, the Part settings are applied automatically.

For the default ALL INSTS set, the Score settings will always be used, unless only a single MIDI Region is displayed. In this case, the Part settings will be applied. Please note: the ALL INSTS set cannot be edited (and therefore not be scaled), so it will be necessary in most cases to create a dedicated Instrument Set for the full score.

The margin and header values can also be changed directly with the mouse by dragging the margin (green) and header lines (blue) in page view. This will only affect the *Format* setting which is currently in use for display (Score or Part).

Line Breaks

Line breaks and individual stave margins can be determined individually for each Instrument Set, and also for each of the extracted parts.

In Page Edit view, you can use the *Layout* tool to edit line breaks. The automatic line breaks are calculated based on the settings in *Layout > Global Format (Spacing and Max.bars/Line)*, but can be changed with the following procedure.

To move the last bar of a stave system down into the next staff, grab that bar with the Layout tool, drag it down until the resulting hand symbol points down with the thumb, then release the mouse button. The bar is moved to the next stave system, and the remaining bars in the line are distributed evenly over the entire width of the page. The same method works for several bars at once. If you grab the third to last bar of a staff, and drag it down, three bars will be moved to the next staff. You also can move the first bars of a staff upwards into the preceding staff, by dragging them upwards (symbol: hand pointing up).

Logic stores the line breaks for each Instrument Set individually. This also applies to all parts created with the above described Instrument Filter function. These are all stored together with the song file.

Restriction to Local Movement

When you move a bar with the Layout tool as described, all manually edited line breaks in subsequent lines are deleted, and the (automatic) line breaks are calculated again automatically from that line downwards. If you want to prevent this, perhaps because you only want to change one detail and want to keep the other staves as they were, hold Control while you move the bars with the Layout tool. Line breaks edited this way will only affect the two directly concerned stave systems. All other stave systems will remain unchanged.

Combining Max.Bars/Line and Line Breaks

In the *Layout > Global Format* dialog window, there is a parameter called Max.Bars/Line. It determines the maximum number of bars Logic will allow in one staff or stave system. With the Layout tool, you can override this setting. As an example, you can set *Max.Bars* to 6, and still move additional bars into a line with the Layout tool. The subsequent lines will again contain no more than six bars. The full number of bars set here will only be displayed, if the spacing settings are low enough to allow the proper display of that many bars.)

Please note: if you drag more bars into a line than would be displayed when employing the automatic line break function, this can result in overlapping notes and symbols!

Local Margins

The left and right margin of each individual stave system can be moved with the Layout tool (see “Editing Using Tools” on page 519), so that they do not align horizontally with the page margins anymore: just click and hold with the Layout tool a little bit inside the beginning or end of the staff, and pull the mouse to the left or right side (see illustration). During this process, the indication “Left/Right Stave Margin” will appear in the help tag.

In this case Logic also adapts the number of bars per line automatically (unless the line breaks have been adjusted manually beforehand): if the line is shortened, bars might be moved down to the next line, depending on the *Spacing* parameters in the Global Format window (see “Global Format” on page 561).

To reset such a changed staff margin to line up with the other staves again, double-click at its end (or beginning). A dialog will appear, asking *Reset Local Margin?* Confirming this dialog will reset the margin.

Hint: like the manual line breaks, these local margins are also saved as part of the current Instrument Set, so they can be set differently in every Instrument Set.

Deleting all Line Breaks and Local Margins

To delete all line breaks and all locally changed margins in the current Instrument Set, select *Layout > Reset Line Layout*.

Song Settings for Score Display

In the *Song Settings* dialog box, there are six pages with score settings. You can change between these and the other pages of the Song Settings dialog box directly using the pop-up menu on that page. In addition to the methods mentioned below for opening these pages, you can select these pages in the global menu *File > Song Settings > Score*.

The settings on these pages affect the whole song (in all Instrument Sets). They are saved with the song file, so they can be different in each song.

Please note: in most cases, values of “zero” are not displayed in these settings, the Parameter box is empty instead.

Importing All Score Settings

Select *Options > Import Settings* in the Score window. In the resulting dialog box, activate *Score Settings* only, and click on *Import*. This imports all Score Settings relevant to the score display (i.e. the settings on these six pages) of another song, into the current song.

If another song file is already open during this procedure, that song’s Song Settings (score only) will be imported. If no other song is open, a file selector box will appear, where you can select the song whose Score Settings you want to import into your current song.

Global Format

Here you can find the settings for page margins, spacing between notes, slanting of beams and format settings.

This window can be opened by:

- *Layout > Global Format...*
- Key command *Settings: Global Format*
- Double-click on the page margins in Page Edit view

Note: Distance values can be displayed in inches or centimeters. To change between these, just click on one of the depictions of the units being used.

Those settings, that affect the general page layout, e.g. the margins, can be set independently for a part or the full score. This is indicated by the two input boxes. This allows you to print out single voices with a different page layout than the full score.

The settings in detail:

Top/Bottom/Left/Right Margin

These values show the margin distances to the outer border of the printable area on the page. So “Top Margin 0.0 inches” will mean that printing will start as close to the top of the paper as the selected printer driver will allow. This means that, with different printers, the size of the printable area can be different, although the difference should be minimal.

The margins are visible only in Page Edit view, where they are displayed as green lines on the screen. These lines are not printed. It is also possible to change them directly, by dragging them with the mouse in the score.

Unlike the global page margins, the left and right borders of stave systems can also be edited individually. To change the left/right border of a staff system, simply use the Layout tool to click and drag the border to the desired position. The local margin (see “Local Margins” on page 559) can be reset by double-clicking the same position with the Layout tool.

Add Bracket Space

Creates additional space between the left margin line, and the beginning of the staves for braces and brackets. If this option is deactivated, staves will be aligned directly along the left margin line.

Alternating Margins

If activated, the left and right page margin settings will be swapped on every second page. This can be useful if a score is going to be bound as a book: Usually the inner margin has to be a bit bigger than the outer one. It is possible that the opposite might be preferable in cases where room is needed for remarks to be added later to the score.

Header Space

Defines the height reserved for headers, between the first page's top margin, and the first staff's top margin (as defined in its assigned Score Style).

Note: Text elements inserted directly into this area automatically become Global Text (see "Global Text" on page 579), and will be displayed as headers in all Instrument Sets (scores and parts).

This value can also be changed directly in the score, by dragging the dotted line above the first staff with the mouse.

Line Distance

Defines additional vertical distance between stave systems on the same page. It applies to full scores, as well as single staff parts.

Max. Bars/Line

This parameter can be useful, when using small spacing values (see below) to prevent too many bars from being displayed in one line. The number set here limits the number of bars that can be displayed per line.

Note: This setting can be overridden when using the Layout tool for changing the line breaks (see "Line Breaks" on page 558).

Constant/Proportional Spacing: Note distance

These parameters determine how much horizontal distance Logic leaves between notes. *Constant Spacing* affects the distance from note to note, regardless of rhythmic value. *Proportional Spacing* also takes the note durations into consideration. If you only use *Proportional Spacing* (and set *Constant* to 0), every bar more or less gets the same amount of (horizontal) space. A whole note uses as much space as four quarter notes. In the opposite situation (high constant value, proportional value = 0), the distance from one note to the next is always the same regardless of note duration. A half note takes the same amount of space as an eighth note. Other factors, like accidentals, ties, and so on are also considered for calculating the note distances.

Which settings you use, depends both on personal preference, and the style of the piece. Certainly, one should aim for a good balance between these two parameters. For best results, try different combinations when you work on the final layout of your score.

Slash Spacing: Spacing of Beat Slashes

This is the distance parameter for slashes used in Score Styles that display Beat Slashes instead of automatic rests. This is especially important if notes are inserted into staves displayed with slashes. As an example, for musical styles such as funk, which use a lot of sixteenth notes, you will likely choose a higher slash distance than for music that doesn't go beyond eighth notes. This way, the proper relation between notes and passages with only slashes and chord symbols can be kept.

Default Pedal Position

This determines the vertical position of pedal symbols which are created and displayed automatically when you use the MIDI sustain pedal during a real time recording. If this parameter is set to zero, the recorded MIDI sustain pedal controller events will be hidden in the score. Pedal marks inserted from the Part box are not affected by this parameter.

Beaming Slant Factor/Min. Slant/Max. Slant

These three parameters affect the slant angle of beams. As with the Spacing parameters, these parameters work together. Appropriate settings need to be found by trying different combinations. The final settings will vary, depending on the style of the music, and on personal preference.

Beaming Slant Factor: determines the general amount of beam slanting in relation to the intervals of the notes connected by beams.

Min. Slant: determines the minimum interval of notes that causes beams to be slanted.

Max. Slant: determines the maximum beaming slant angle.

These parameters always work relative to a particular score situation, which is why no absolute instructions on how to set them can be given. Again, it is essential to try different combinations when working on the final layout of a piece.

“Open” Single Staves

Displays single staves without vertical lines at their start point (left side of the clef).

Justify Last Staff

Lengthens the last line (in full scores the last staff system) to the right page margin.

Hide Muted Sequences/Tracks

Excludes muted Regions, or Regions on muted tracks, from the score display. If these options are not activated, muted tracks and Regions will be displayed in the score even though they won't be heard during MIDI playback.

Show Alias

Switches the display of alia (see “Aliases in the Score Display” on page 479) in the score on or off.

Allow Alias Editing

Switches Alias Editing (see “Aliases in the Score Display” on page 479) on or off.

Alternate Repeat Symbols

If this option is activated, all repeat signs in the song will be displayed with the so called “Real Book Style” brackets.

Chord Symbol Language

In the pull-down menu choose between

- International: default
- German1: B → "H", Bb → "B"
- German2: B → "H", Bb → "Bb"
- German3: C# → "Cis", Eb → "Es" etc. . .
- Roman: CDEFGAB → Do Re Mi Fa So La Ti

In all Chord Symbol Language formats, the current format is also accepted for the input of new chords. The "#","b","x" and "bb" characters are also active in the German3 mode, allowing for quick entry. In the Roman format, the second root string character can be omitted, e.g. typing "D7" or "Do7" in roman mode will both result in "Do 7". Changing the Chord Language will automatically affect all chord symbols in the song. It is not possible to mix chord languages.

Numbers & Names

These settings affect the automatic display of page numbers, bar numbers and instrument names in the score.

To open this window, select:

- *Layout > Numbers & Names...*
- Key command *Settings: Numbers & Names*
- Double-click on any bar or page number

Automatic page and bar number display, and automatic display of instrument names can be switched on and off for the whole song, by activating/deactivating the corresponding check boxes in this window.

For each of these three you can set Font, Size, and Face, (bold, underlined, italic, outlined, and circled). Each one is activated by clicking on the appropriate symbol. The "circled" attribute is similar to "boxed", but a circle is used instead of a rectangle. For wide text, an ellipse is used.

If you edit these settings, the corresponding Text Styles in the Text Style Window (see "Text Styles" on page 575) will automatically be updated.

Page Numbers

Hor.Position

The horizontal alignment on the page

alternating: alternating, beginning on the right side

left/right/centered

rev. alternating: alternating, beginning on the left side

Vert.Position

The vertical alignment on the page

top/bottom

Page Offset

This value is added to each actual page number for display purposes. This can be useful when you write a piece consisting of several parts, which you save as separate song files. To still have continuous page numbers throughout the score, you can set this parameter to the number of pages contained in all preceding parts.

Hor.Distance

The horizontal distance from the outmost possible printing position on the page. This is only relevant for page numbers with the Hor.Position parameter alternating or rev. alternating.

Vert.Distance

The vertical distance to the highest or lowest possible printing position on the page (depends whether Vert.Position is set to top or bottom).

Hide 1st Page Number

Prevents display and printout of the page number on the first page (all others will be displayed and printed).

Prefix

Here you can enter text which will be displayed with every page number.

Example: if you use the prefix "Page", the word "Page", then a space and the actual page number will be displayed on each page. This means that page three will display "Page 3". If you want the page number in the middle of the prefix, you need to use the "#" symbol as a variable for the page number. An example: "-pg.#-" on the second page prints as "-pg.2-".

You can also use the following text symbols to include automatically generated text in the prefix:

"\ i" for the Instrument Set name

"\ n" for the song (file) name

"\ s" for the name of the currently shown Display Level, which can be the MIDI Region or folder name (on the highest level even the song name)

"\ d" for the current date (at the time of the printout)

Bar Numbers

Bar numbers are placed above or below the barlines, and at the beginning of the line, above or below the clef (they are automatically moved to a position where they won't overlap the clef).

Vert. Position

The height above the staff. If a negative value is set here, the bar numbers are placed below the staff.

Step

This value controls the interval at which bar numbers are repeated. Value 4, for example, results in bar numbers at the first, fifth, ninth bar, and so on. If you want bar numbers to be displayed only at the beginning of each staff line, set this parameter to line (which appears instead of zero).

Bar Offset

This value is added to all actual bar numbers for display.

Start with

The automatic numbering will only be displayed starting at the bar indicated here.

Hide Bar Numbers in Linear View

Does exactly what it says. Linear View refers to non-Page View.

Top/Bottom Staff only

In full scores, the bar number is only displayed above the top staff if this option is activated (with a negative Vert.Pos. value the number will be below the bottom staff).

Count Mult. Rests

Displays the first and last bar number below multiple rests as shown in the opposite illustration. This makes sense if a negative Vert.Position value is chosen, causing the bar numbers to be shown below the staves.

Show at Double Bars

Displays bar numbers at every double bar line and repeat sign, independent from the chosen Step setting. As an example, *Step = "line"* and *Double Bars* activated will display bar numbers at the beginning of each staff line, and above or below all double bar lines and repeat signs.

Instrument Names

This determines the appearance of the instrument names that have been defined for the Track Instruments in the Instrument Set (see "Instrument Sets and Score Display Levels" on page 552) window, in the columns full name and short name. If nothing is defined here, or if ALL INSTR. is used as the current Instrument Set, the names of the Track Instruments (as displayed in the Arrange window) will be used in the score. (Short names do not exist in this case)

Position

above/beside staves

Align

left: at the left margin

right at the right margin (refers to the space in front of the staves)

1st Staff

no names/short names/full names

Other Staves

no names/short names/full names

Clefs & Signatures

These are the options for the general display of clefs, key signatures and time signatures. Concerning these topics please read the section Clefs (see “Clefs” on page 502), the section Key Signatures (see “Key Signatures” on page 508) and the section Time Signatures (see “Time Signatures” on page 509).

How to open this window:

- *Layout > Clefs & Signatures...*
- Option–double-click on any clef or time signature in the score.

The following display options are available for Clefs, Key Signatures, and Time Signatures as well:

- *Every Staff*
- *First Staff on Every Page*
- *First Staff on Page 1*
- *Hide All*
- *Display Warnings at Line Breaks:* this causes “warning” clefs, time signatures, or key signature changes to be displayed at the end a staff or stave system, if the actual change is at the beginning of the subsequent staff or stave system.

Apart from these, there are the following options:

For Clefs:

Smaller Clef Changes (pull-down menu): clef changes (whether caused by a change of Score Style, or by a new clef inserted from the Part box) can be displayed smaller than the clefs at the beginning of the staves, depending on this setting.

For Key Signatures:

Automatic Key Transposition

This enables the automatic transposition of key signatures in transposing Score Styles. Usually, this will be activated. An exception would be for the notation of atonal music. If it is deactivated, all sharps and flats are displayed directly with the notes. Note that there is a similar option in the Score Style window (parameter “Key”), which allows you to switch off the key signature for individual Score Styles, or even for individual staves in multi-stave Score Styles.

Minimize Transposed Accidentals

This enables the use of enharmonically changed key signatures, if this results in a signature with less accidentals. As an example, if a piece is written in B major (5 sharps), the Bb-instruments are notated in Db major (5 flats) instead of C# major (7 sharps).

Please note that Logic does not display any key signatures with more than seven flats or sharps, whether this option is activated or not.

Show Naturals

This displays naturals at key signature changes, where preceding accidentals are no longer valid, for example when changing from E major to G major, or to C minor).

Show Grace Accidentals

If this option is activated, courtesy accidentals will be displayed automatically. This means: wherever a diatonic note is altered by an accidental, another accidental (i.e. in many cases a natural symbol) will be displayed when that note appears again unaltered in a subsequent bar.

For Time Signatures/Barlines

Hide Barlines

This option allows you to hide all barlines, which can be useful for educational material, gregorian plain chant notation, and other special situations.

Only automatically displayed barlines will be hidden, so it is still possible to insert barlines from the Part box, including the “regular” bar line, which will then be displayed and printed.

Octave Symbols

These settings enable you to edit the text string and the text format of the different octave symbols.

Extended Layout Parameters

This is where you define certain display settings for the whole song, like staff line thickness, stem length, distance between notes and ties, or notes and dots, and so on

To open this window, select *Layout > Extended Layout Parameters*.

The first eight parameters determine the line thickness of the following objects: stave lines, stems, ledger lines, bar lines, repeat, and end lines, tuplet brackets, text boxes (for boxed Text Styles) and crescendo/decrescendo (this last parameter also affects line objects and arrows).

Bar Start Spacing/Bar End Spacing changes the relative distance between the first and last note of a bar and the preceding or subsequent bar line. Please note: To change the default settings of these parameters only makes sense if rather extreme settings have been chosen for the general *Spacing* parameters in the *Global Format* window.

Dot/Note Distance determines the distance between the note heads and dots for dotted notes. *Dot/Dot Distance* refers to double dotted notes.

Acc./Note Distance allows you to globally alter the horizontal distance of accidentals from the corresponding note heads. The default setting should only be changed if e.g., very small values are used for the spacing parameters, which results in a very small distance between notes. This global setting can also be combined with the local *Accidental Distance* parameter of individual notes, in the Note Attributes (see “Note Attributes” on page 548) window.

Acc./Acc. Distance allows you to globally alter the horizontal distance between several accidentals in chords.

Stem length is the default setting for stem length.

Hor. Tie Position and Vert. Tie Position determine the distances between note heads and related ties (which are displayed automatically). There is also a parameter for *Tie Thickness* as well as *Slur Thickness*.

Chord Symbol Alignment determines the general horizontal alignment of chord symbols (see “Handling Chord Symbols” on page 583) whose *Align* parameter is set to def (default) in relation to their bar position.

Chord Symbol Accidental Scale changes the accidental size in relation to the font size setting: Positive values result in an increased size, negative values in a diminished size of chord symbol accidentals.

Clicking on *Factory Defaults* resets all parameters to their default settings. However, if you have a printer with high resolution, you should try to use smaller line thickness settings (2, or maybe even 1). Smaller staves, in particular, look much better and more professional that way. The other parameters' settings are more a matter of personal preference.

On the screen these changes are only visible at the highest zoom levels. To really be able to judge the results, it is necessary to try some printouts with different settings.

Guitar Tablature

Guitar tablature is an alternative method of notating music for fretted string instruments, especially for guitar and electric bass, but also for other fretted instruments with four to six strings or courses of strings.

In this system, the horizontal lines represent the strings of the instrument. Notes are always written on the line/string at which they are to be played. Instead of regular note heads, the numbers of the frets are shown.

Logic converts notes automatically into tablature, if a Score Style is used whose Clef parameter is set to one of these Tuning Sets. The exact characteristics of these Tuning Sets are determined in the Guitar Tablature window.

How to open this window:

- *Layout > Guitar Tablature*
- Key command *Settings: Guitar Tablature*
- Double-click on the TAB clef, at the beginning of any staff that already uses tablature in the score.

Here, twelve different Tuning Sets can be defined. Each of them corresponds to one line in this window. The regular guitar and bass tunings are already included as defaults (first line and last five lines), as are some of the more often used special tunings for guitar.

For every Tuning Set, there are the following parameters (from left to right):

Name: can be changed in the text entry field that opens with a double-click on the name field.

Strings: number of strings (four, five, or six).

Assign: the method Logic uses for automatically assigning notes to strings. (see below)

1 to 6: the pitches that the "open" strings are tuned to.

Other common parameters:

Font, Size, and Face for the display of the fret numbers.

Alignment of the numbers to the stem: to the side, or centered (can be switched by clicking on this box).

Bass String: the display of the lowest string: may be the same as the other strings, or a bit thicker. (can be switched by clicking on this box)

1/1, 1/2 Notes: if this option is activated, half and whole notes will be displayed with a circle around the fret number. Since the note head is always a number, there would be no displayed difference between a half note and a quarter note otherwise.

Assign

Since most notes can be played at different positions (frets) on different strings, the *Assign* parameter plays an essential role in this system. In most cases the MIDI channels of the individual notes determine the string assignment. (Remember: the MIDI channel parameter of an individual note has no impact on MIDI playback. The playback channel is determined in the Object Parameter box (see “The Instrument Parameters” on page 123) in the Arrange window.) There are the following options for string assignment:

Pitch

Logic assigns each note to the string on which it is playable, at the lowest possible position. However, to still be able to influence the string assignment, there is the rule (in Pitch mode only) that a note’s fret position cannot be lower than its MIDI channel. This method is generally used when the notes are recorded from a MIDI keyboard:

An A3 with MIDI channel 1 is displayed at the second fret of the G string. If you want the note to be displayed at a higher position, to correctly display the proper fingering of a passage, you need to set its channel to 3 or higher. Now, the fret position cannot be lower than 3 any more, so the note will be displayed at the D string’s seventh fret. If the channel is between 8 and 12, the A3 is assigned to the A string on the 12th fret, with channel 13 to 16, to the low E string (17th fret). If you want to force even higher positions, you’ll need to use one of the other assignment modes...

Channel

In this mode, the number of the string (1 to 6, counted from the lowest string up) simply corresponds to the MIDI channel. Channels 7 to 16 are also assigned to the highest string.

Inv. Chan

Like *Channel*, but counted from the highest string (1) to the lowest (6 and above). This way of numbering the strings is generally used in traditional guitar literature.

Since most Guitar-To-MIDI-Converters send notes on different MIDI channels, according to the strings they are played on, the last two modes are very suitable if you use such an instrument for recording MIDI Regions. In this case, the tablature notation displays the exact way the music was played during the recording.

Inv.Ch-1, Inv.Ch-2

These modes have been created for the purpose of recording and notating electric bass parts with Guitar-To-MIDI-Converters. “-2” is designed for four-string bass, “-1” for five-string bass (with an additional high B string). The principle is the same as *Inv.Chan*, but the number of the MIDI channel is reduced by 1 or 2, in order to convert the channels properly for bass string assignment.

The string assignment for a four-string bass will be 3 to 6, for a five-string bass 2 to 6 (counted from highest to lowest string in both cases), just as with guitar strings that sound one octave higher. Notes on channel 1 will be assigned to the highest string.

In all of these assign modes, notes below the lowest string will not be displayed at all. Also, notes generally can only be assigned to strings on which they are actually playable. (An F2 can only be played on the lowest string of a guitar, so the channel assignment is completely ignored in this case.)

You can create a two-stave Score Style that displays the MIDI Region twice: once using regular music notation, and once as tablature. The indicated split point can be ignored in this case. There is a default style for this (named *Guitar Mix*), in the Logic default song.

Some more information concerning tablature notation in Logic:

- You cannot insert clef changes in staves using tablature. If you want to change between tablature and regular notation in the same staff, you need to cut the MIDI Region at that particular point, and assign the desired Score Styles (see “Basics” on page 529) to those Regions.
- Guitar tablature relates to regular treble clef. If you use the octave-transposing treble clef (Treble-8) for guitar notation (as it is done in most guitar music, and also in the above example), you need to set the tablature’s *Transpose* parameter in the Score Style window to +12.

MIDI Meaning

The settings in this window determine, if and to what extent, the insertion of the symbols listed here have an effect on the MIDI playback of the notes to which these symbols are attached. The window is opened from the menu *Layout > MIDI Meaning*.

For each symbol listed here, two parameters can be determined, which change the MIDI output of all notes to which these symbols are attached:

Velocity

This value is added to, or subtracted from the original velocity value of the corresponding note.

Length

The original note length is shortened according to the percentage chosen here. This only affects the playback of the note, not the score display. The note length change can for example be seen in the Event Parameter box or in the Event Editor window.

How it Works

The MIDI Meaning functions basically make most sense for users who insert notes using the mouse. This makes it possible to work as if writing music on paper. First you write/insert the notes. They will all have the same velocity, and identical rhythmic note values will have exactly the same length. Accents and phrasing marks are then attached to some of the notes, which changes the velocity and (playback) length of those notes. This makes the playback sound much more realistic and “alive”.

The default settings in this window (i.e. in new songs) are 0 for velocity and 100% (no change) for length. If you don't change these, the symbols will remain purely graphic and will not affect MIDI playback. If you record your Regions in realtime it's better to leave these settings at the defaults, since the notes probably already sound the way you want them to.

Important: If you do use MIDI Meaning, you need to adjust the settings before you begin to insert accents and so on, since the settings have no influence on already inserted accents and phrasing marks.

Once set, the velocity and length of notes will be changed as soon as you attach one of these symbols to a note. When you delete the symbol, note velocity and length are reset to their initial values.

Color

The menu *Layout > Colors* opens the color palette for the currently active song:

This is where all color palettes can be found which the different coloring modes refer to. Clicking on any color opens the standard color editing window, where this particular color can be changed.

These colors are saved with the song and can be different in each song. They can be imported from any other song as part of the score song settings using menu *Options > Import Settings > Score Settings*.

There are three palettes and some additional options for details in this window:

- *Pitch Colors*: Each note of the octave gets a color, they are arranged like piano keys. Diatonic/Chromatic determines whether there are twelve or seven different colors.
- *Velocity Colors*: These eight colors are applied according to the MIDI velocity of notes, from left (minimum) to right (maximum).

- *User Palette*: These colors not only can be edited freely, but also named, using the text entry boxes next to them. These names are displayed as color options in different color selection menus (Score Styles (see “Basics” on page 529), Note Attributes (see “Note Attributes” on page 548)).
- *Note Color Options*: These options determine whether accidentals, dots, stems, and beams are displayed colored (according to the notes they belong to) or black. Rests refers to user rests, which are mainly used in polyphonic Score Styles.

Score Preferences

The Score Preference settings are global settings, which are saved when you quit Logic, and are effective for all song files. They can, however, be changed anytime, with immediate effect on all open songs.

You can open the Score Preferences with:

- Local Score menu—*Options > Preferences > Score Preferences...*
- Global menu—Logic Menu > *Preferences > Score Preferences...*
- Key command *Score Preferences*
- Directly from one of the other pages in the Preferences window with the pull-down menu.

Dashed Song Position Line

Determines if the Song Position Line in the Score Editor window is displayed as a solid line, or as a dashed line.

Show Sequence Selection Colored

If this option is activated, the staff lines of the currently selected MIDI Region are displayed in color (blue), all other Regions will be displayed with black lines. This can be useful when changing the display parameters of Regions, since the parameters in the Display Parameter box (see “The Display Parameter Box” on page 522) always only refer to the currently selected MIDI Region/s. If it is not activated, all staves will be displayed black, whether selected or not.

Fast (Lower Resolution) Curves on Screen

This is mainly relevant for slower computers. The curves in slurs and score brackets will be displayed with a lower resolution on the screen, which speeds up screen redraws. This setting does not affect the printout.

Display All Distance Values in Inches

This relates to the measurement units in the Song Settings and in the page rulers (Page Edit view only), which can be inches or centimeters.

Use external Symbol Font (if Available)/Only for Printout

This option activates the use of the external fonts (see “Printout” on page 487) for display and printing of the whole score.

Open Floating Palettes

Default Setting for the shape of Part box Floating Palettes (see “Selecting and Inserting Part Box Objects” on page 495).

Double Click Note to Open...

This setting determines, which window will open when you double-click on a note head: Note Attributes, Event List, Hyper Editor, or Matrix Editor.

Graphic Export Resolution, Graphic Export to..., PICT File Creator ID

Parameters concerning the PICT-Export function with the Camera tool (see “Graphic Export” on page 488).

Auto Split Notes at...

This parameter is only relevant if the chosen default Score Style on the recording track is polyphonic, and is using MIDI channels for the Voice assignment. In this case, newly recorded notes automatically are saved with the different MIDI channels used in the corresponding Score Style. They are allocated according to the split point set here.

Text: Input and Display

Text Styles

All text elements appearing in Logic refer to user-definable default settings called *Text Styles*. When you insert text into the score, you can assign any of the predefined Text Styles to it. This way, you don't need to set all text attributes like font, size, style, and so on again, every time you insert a new text object.

Text Styles

All Text Styles which are used in a song are listed in the Text Style window. There, you can edit the existing Text Styles, or create new ones. You can open this window the following ways:

- Menu *Text* > *Text Styles...*
- Double-click on the Text Style name in the Event Parameter box (only visible if either text objects or no objects at all are selected)

The first eleven lines contain the *System Text Styles*, which exist in every song (but can be edited according to personal preference). Below these (separated by the horizontal line which is a bit thicker), there are the user-created Text Styles. Text Styles are saved with the song file, so they can be different for each song.

Each line first shows the Name of the Text Style, then the Font (selectable with the pull-down menu), its Size, and the different columns for the style attributes (activated with a click in the corresponding field): bold, underline, italic, outline, and circled. Circled draws a circle around the text, which with longer texts is stretched horizontally according to the text.

You can edit these settings for both the System Text Styles and the User Text Styles. Any text fonts which are installed on your system can be used.

The System Text Styles

Plain Text

The default setting for “regular” text

Page Numbers, Bar Numbers, Instrument Names

The Text Styles for automatic page and bar numbering, and display of instrument names. These functions are described in detail in the section Numbers & Names (see “Numbers & Names” on page 564).

These Styles can also be edited in the *Layout > Numbers & Names* window. Changes in one of the two windows automatically update the settings in the other window, and affect the whole song.

Tuplets

The Text Style for triplet and other tuplet numbers.

Repeat Endings

The Text Style for anything which is written into the repeat ending boxes (usually just numbers, but text can also be entered there).

Chord Root, Chord Extension

For the display of chord symbols. Root concerns the root and the (optional) extra bass note in chord symbols, Extension is anything else.

Multiple Rests

The Text Style for the number above multiple rests.

Tablature

For the display of the fret numbers in guitar tablature (see “Guitar Tablature” on page 570).

Tempo Symbols

For the display of the numbers in tempo symbols (see “Tempo and Swing Symbols” on page 515), which can be inserted from the Part box.

Creating Additional Text Styles

Select *New > New Text Style*: under the lowest Text Style entry, a new line will appear, where you can define the attributes of the new Text Style(s). The names of any new style can be edited in the text entry field which opens when you click on the name of the Text Style.

Changing the Same Font in Several Text Styles Simultaneously

If you change a Text Style's font (pull-down menu) in the Text Style window while you hold Option, this change affects all Text Styles which use the same font. This is a quick method, for example, to change the Logic default Text Styles to the fonts you prefer.

This method is also especially useful if you load a Logic song which was created on another computer, and uses text fonts that you don't have in your system (if this is the case, you will get a warning, message when you open the song). The names of unavailable fonts will be displayed in parentheses in the Text Style window.

Font References

When you activate *Options > Show Font References*, any Text Styles which were created by directly editing a text object's attributes in the Event Parameter box, or from the Text menu, are listed as Font References. *Delete Unused Font References* deletes any References which are not in use anymore. Editing the Font References in the Text Style window is not possible, except for changing the font. This display option mainly allows you to replace missing fonts in such Font References.

Music Fonts as Fonts for Text Styles

Musical Symbol Fonts do not contain letters, but musical symbols only. Text objects using these Text Styles can be used for free positioning of musical symbols anywhere in the score. (Such as special percussion symbols).

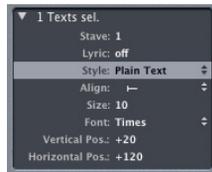
Text Input

TEXT	LYRIC	CHORD SEQ	INSTR
SONG	DATE		

To insert text in the score, you need to get a Text object from the Part box, and drag it to the desired position with the mouse. During this procedure, the mouse cursor becomes the Text tool. You can also grab the Text tool from the Toolbox, and use it directly for text input. Each Text object (except text in the Header, directly at the page margins, or outside the margins) is saved as a Meta Event within a particular MIDI Region, at a certain bar position. This position can be seen in the help tag, as you insert the text object. Text events are also visible in the Event Editor, where you can change their position, but not the text itself.



After you have inserted the text object at the desired position and released the mouse button, a flashing text cursor appears at that position. Now you can enter text with the computer keyboard. The basic functions for moving the cursor, deleting parts of the text and so on are the same as in most word processors.



As long as you are in text entry mode (indicated by the flashing text cursor), you can click on any position in the text to place the cursor there. You can also select parts of the text by dragging the mouse, and applying the usual cut/copy/paste commands. To leave text entry mode, press Enter, or click anywhere outside the text.

After this, the newly inserted or edited text object is selected (the entire text flashes), and you can see its parameters in the Event Parameter box:

Stave

is only relevant in multi-stave Score Styles. It determines which staff the Text object is assigned to. The `vert.pos` parameter measures the vertical distance to the top line of the staff, which is indicated here. `hor.pos` indicates the graphic horizontal deviation of the selected text object from its actual bar position (also in relation to the Align parameter).

Lyric On

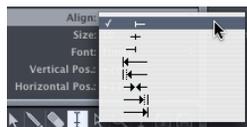
defines the text object as a Lyric Event (song text). If a Lyric Event is placed at the same bar position as a note (above or below it), the horizontal distance to the previous and subsequent notes or rests is automatically expanded, so that there is enough space for the text.

Style

The Text Style of the selected text object.

Align

Determines the horizontal alignment of the Text object. The first three settings relate to the bar position, the last three to the position on the page (each left, centered, or right).



Size, Font

Here you can change the size and font for each individual Text object, independent of the initially chosen Text Style, which serves as the default setting.

You can also change the settings for font, size, style, and alignment of Text objects with the sub-menus in the *Text* menu, while the desired Text objects are selected.

Generally, you should not make those changes here, but rather create new Text Styles in the Text Style window, which then are also available for other Text objects.

Simultaneous Text Input into Several Staves

This works the same way with Text objects as with other objects (see “Simultaneous Input of Objects into Several Sequences” on page 492).

Example: insertion of the text “*accelerando al fine*” into all instruments at once.

Editing Text

If a Text object is selected, its parameters can be edited in the Event Parameter Box. If you want to edit the text itself, either click on it with the Text tool or double-click on it with the Pointer tool, which will cause the flashing text cursor to appear again.

Deleting Text Objects

Like all other objects, Text objects (or selected text inside a Text object) can be deleted by pressing Backspace, as soon as they are selected.

Copying Text objects

Copying whole Text objects can be done with the usual methods:

- *Copy/Paste* also *Multiple Paste* and *Paste at original Position*
- Dragging with the mouse while holding Option. This, however, only works inside the same MIDI Region.

Global Text

Global Text objects appear in all Instrument Sets of a song (score, parts, and so on), although they are inserted just once. The position of Global Text does not relate to bar positions (unlike regular Text objects), but is defined as a graphic position on the page. Because of this, Global Text can only be inserted and seen in Page Edit view. The most obvious example of a Global Text object is a header line with the song’s name.

Input of Global Text

A Text object is automatically global if it is inserted into one of the following areas on the page:

- In the Header space (which is set in *Layout > Global Format*)
- Outside, or directly at one of the page margin lines

After you have inserted a Text object in one of these areas, and finished text entry, you will see an Event Parameter box with some additional parameters:

Pages

The pages on which the text will be displayed:

1 = first page,

2... = all pages except the first one, Odd = all pages with odd numbers, Even = all pages with even numbers, All =all pages.

Zone

The margin area which the text belongs to: Top, Header, Side, Footer.

Align

You'll find two additional alignment options in this pull-down menu: for right and left alignment, you may select between alignment at the set page margin, or at the outermost possible position. Although they are shown in the pull-down menu, the alignments relating to bar positions cannot be selected here.

Style, Size

These work the same way as for regular Text objects.

Positioning of Global Text

After having been inserted in one of the margin areas, Global Text can be moved anywhere on the page with the mouse. With the regular mouse cursor (the Pointer tool), you are only able to move a Global Text object vertically. To be able to also move it horizontally, hold down Option.

Automatic Text objects



TEXT	LYRIC	CHORD SEQ	INSTR
SONG	DATE		

In the Text group of the Part box, there are four objects which represent certain names that are automatically displayed, if these objects are inserted:

SEQ = Sequence/Folder: displays the name of the current Display Level. This can be a MIDI Region, a folder or (on the highest level) even the name of the song file.

INSTR: The name of the currently displayed Instrument Set (see "Instrument Sets and Score Display Levels" on page 552)

SONG: The name of the song file

DATE: The current date (at the time of the printout)

These automatic Text objects can be inserted both as Global Text (in the margin areas), or as Text objects relating to a bar position (in one of the staves/Regions). The settings for their appearance and exact positioning can be edited in the Event Parameter box.

Example of Automatic Text

Insert the *INSTR* object above the top margin (centered, Pages set to 2...). It will automatically be treated as a Global Text object. Now, create an Instrument Set (see “Instrument Sets and Score Display Levels” on page 552) named “Score” in the Instrument Set window. If you use this Instrument Set, there will be a line saying Score on the top of every page, except the first one. If you now extract parts for the individual instruments, each part will display the particular (track) instrument’s name on top of every page, except the first one.

Lyrics

For song lyrics, there is a Part box object named *LYRIC*. Before you start with lyric input, select the Text Style that you want to use for the lyrics, in the Event Parameter box, with no object selected (indicated by Default Inserts in the title line of that box). Just click on an empty spot, anywhere in the Score window, to deselect everything.

Now drag the *LYRIC* object below the first note of the melody, or just click the Text tool at that position. Watch the help tag: each *LYRIC* object has to be at the same bar position as the note it belongs to (taking into account display quantization). Now, enter the text for the first note. Now, don’t press Enter, but Tab, which moves the text cursor automatically to the beginning of the next MIDI note. If a MIDI note is displayed as several tied (graphic) notes, it is also possible to move the cursor only to the next graphic note with Shift-Tab, in order to be able to write several syllables below one longer note.

With this method, you can enter all lyrics in one process, although each syllable is saved as an independent *LYRIC* object.

Editing lyrics is the same as editing regular text. The Event Parameter box displays the same parameters (*LYRIC* is set to *ON* here).

Apart from the fast input mode using Tab, the only difference from regular Text objects is that Lyric objects affect the distance between the notes to which they are assigned. This is to create enough space for the text to be displayed properly, without overlap. If the text (or the Text Style) is changed later, the note distance will again be calculated accordingly.

Some Hints for Working with Lyrics

Setting all Words and Syllables to the Same Height

If you don’t enter the lyrics in one continuous process as described, the Lyric objects probably will not have the exact same vertical position. To quickly set all *LYRIC* objects to the same height (*vert.pos*), select *Edit > Select Similar Objects* after having selected one object, select the *Align Object Positions Vertically* key command. Note: you do not want to use this method if there are multiple lines of lyrics for different verses, since all of them would be set to the same height.

Several Verses Written below each other

There can be several *LYRIC* objects assigned to the same note, so you can insert several verses for a song, one below the other. Start with the first verse and make sure the vertical distance to the notes is correct. Then start with the input of the second verse. As long as you stay in fast lyric input mode, all Lyric objects for the second verse will stay at the same height as the object you started with, in this case the first word of the second verse.

Note: It is important that Lyric objects are assigned to the right MIDI Region, if you work in a full score display (Remember: selected staves are displayed with blue stave lines). Generally it is recommended that you insert lyrics in linear view, and single MIDI Region display mode, especially if you insert more than one verse. In linear view, it is also easier, for example, to rubber band select several Lyric objects, to change all of their positions.

Chord Symbols

Inserting Chord Symbols

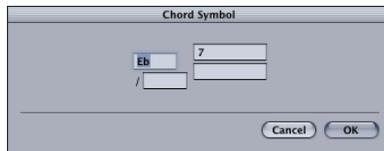
Chord symbols (text object *CHORD*) are inserted into the score like regular Text objects, with the mouse from the Part box, or directly with the Text tool, while holding Option. A text cursor will appear. First you enter the root of the chord, and then the additional information.

Important: When you insert chord symbols, be careful to insert them at the correct bar position. Watch the help tag as you insert the chord object.

A chord symbol can include a root note, a separate bass note and two lines of extensions. Try to insert a simple chord symbol first. Type *Eb7* and press Enter. The result will look like this:

E^b7

Now double-click on the root Eb. The following edit window will open:



There are four entry fields for the different parts: one for the root, one for an additional bass note and two for extensions, which are placed above each other. If you click on any of them, an entry field opens where you can edit the chord symbol, or enter the desired additional information.

As you enter the text for the chord in the Score window, you can influence the way the inserted text is distributed to the different fields of the Chord Symbol Edit Box:

- First, enter the root, then the extensions, then—after typing a slash—the (optional) additional bass note.
- As soon as you enter a number, everything following that number will be placed in the upper extension line. If you write “G7(b9/b13);” the whole “7(b9/b13)” will be placed in the upper line, the lower line remains blank.
- If you write letters before a number (for example FMAJ7/9), Logic puts the letters in the lower line, and everything after the first number in the upper line.
- You can influence this automatic placement with a comma in the text: everything before the comma will be put into the lower line, everything after it into the upper line. If you use more than one comma, only the first one is relevant, the others are ignored. Blanks can be entered to create additional horizontal space between the particular extension and the root.

If you want to change a chord symbol, you can either double-click on the root, and edit the chord symbol in the resulting edit window, or you can double-click directly on one of the extensions. A text cursor will appear in the extension line, and you can edit the extension like regular text.

The appearance of chord symbols can be edited in the Text Style window (see “Text Styles” on page 575), where you can choose different Text Styles for the root—*Chord Root*—and the extensions—*Chord Extensions*.

Handling Chord Symbols

Fast Input of Several Chord Symbols in One Process

If you insert several chord symbols into the same staff, there is a shortcut similar to the fast lyric input mode. After writing the first chord, don't press Enter, but Tab. The text cursor automatically moves to the position of the next displayed note or rest. Enter the next chord and repeat the process, or press Tab several times again, to move to the position where you want to place the next chord symbol.

Hint: if you want to insert exactly one chord per bar into a very busy part, it is much faster to create an empty MIDI Region, and enter the desired chords there (the cursor always moves to the next bar when you press Tab in empty Regions). Afterwards, you can either merge that MIDI Region with the original MIDI Region in the Arrange window, or copy and paste all chords at once.

Enharmonic Change of Chord Symbols

The roots of chord symbols can be enharmonically changed with the same commands as notes (*Attributes > Accidentals* or key commands). An example: “Gb7” becomes “F#7” by selecting *Attributes > Accidentals > Enharmonic Shift: #*. Only additional bass notes need to be edited directly in the Chord Edit window.

Transposition of Chord Symbols

Chord symbols in transposing Score Styles are transposed automatically, just like notes. Also, if the *Transpose* parameter (for playback transposition) in the *Region Parameter box* (Arrange window) is changed, all chord symbols in that MIDI Region will be affected accordingly.

German Chord Symbols: “H” instead of “B”

If the *German Chord Symbols* option is activated in the *Global Format* dialog window, the note *B* in chord symbols is globally displayed with its German name *H*. The english *B flat* is written as *B*, according to its German name. This option is activated automatically, as soon as the letter *HH* is used during chord symbol input.

Copying Chord Symbols

Chord symbols can be copied and pasted with the usual *Copy/Paste*, *Multiple Paste* and *Paste at original Position* commands, or (only inside the same MIDI Region) by dragging them with the mouse, while holding Option.

Precise Graphical Position of Chord Symbols

Horizontal Position: Bar Position, Align, Hor.Pos

Each chord symbol is stored as part of a MIDI Region at a certain bar position (Often there will also be a note at that same bar position). This is the main parameter for the horizontal placement in the staff.

The *Align* parameter determines which part of the chord symbol is aligned to that bar position: the left edge, center, or right edge of the letter representing the chord root. This is set with the pull-down menu in the Event Parameter box. The setting for newly inserted chord symbols is always *def.*: in this case the alignment depends on the global *Chord Symbol Alignment* setting in the *Extended Layout Parameters* window.

There you will find the same four alignment options: left, centered, right, and “| —”. The last option in this list should only be used when you load a song with chord symbols that have been inserted or modified with an older Logic version (2.6 or earlier). In these versions the alignment parameter was not available yet. To achieve identical positions as with the old version, set the global chord symbol alignment to “| —”. Since this setting is for backward compatibility only, it should not be used in new songs.

In addition to bar position and alignment, there is also the *hor.pos parameter*. It determines the additional graphical deviation of the chord symbol from the bar position

Be careful: if you move a chord symbol with the Arrow tool, it is easy to unintentionally change its bar position. To avoid this, press Control during this process: the cursor becomes the Layout tool, so only the graphical parameters *vert.pos* and *hor.pos* will be changed, but not the bar position itself.

Vertical Position: Vert.Pos, Stave

The *vert.pos* parameter determines the vertical position or height of the chord symbol above or below the staff. In Score Styles with more than one staff, the *Stave* parameter determines the staff which the *vert.pos* parameter refers to.

A hint: to adjust a number of chord symbols to the same height above (or below) the staff, select them and use the *Align Object Positions Vertically* key command.

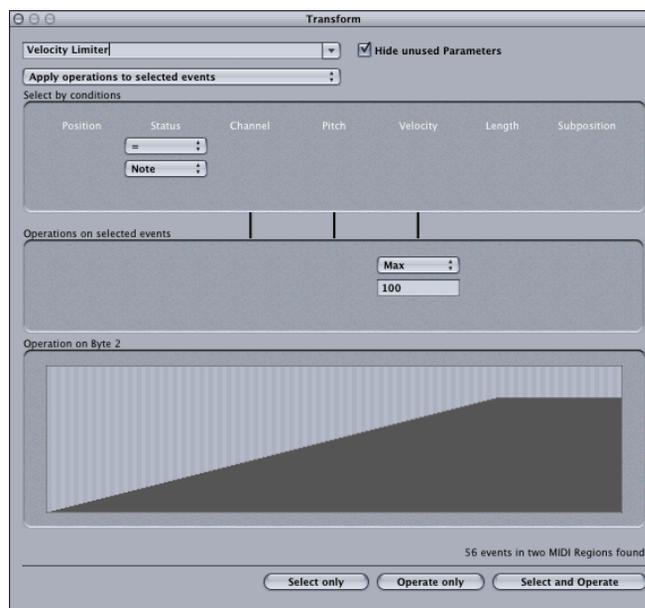
Rhythm Section Parts

To create typical rhythm section parts with chord symbols and Beat Slashes, select a Score Style whose *Rest* parameter is set to "Slash".

The Transform window is a very powerful non-real time processing tool. It enables very specific data event changes to one or multiple MIDI Regions, through the use of user-defined conditions.

This window allows you to select, say, all note events with a velocity that falls between 80 and 86 to be adjusted to a fixed volume of 93. This can be done on one or a thousand MIDI Regions. The alternative of using another Logic editor to do this—note by note—is simply not feasible, or desirable, particularly on a thousand MIDI Regions!

Transform Window—Introduction



Usage

The Transform window can be used to alter existing events that match user-definable parameters. These parameter settings can be saved as “transform sets,” and used later.

The Environment contains a similar Transformer Object that is used for real time editing of MIDI data.

The Transform window provides an extremely high degree of flexibility and power for complex edits and transformations of MIDI data.

Opening the Transform Window

Select *Windows > Open Transform* (Command-4) to open a new Transform window.

Effective Range

The Transform window is only used to edit events. As with other editors in Logic, the operations are only performed on selected events. These might be:

- All selected events (in one of the editors),
- All events in selected Regions, or
- All events in selected folders.

You can use the link button in the top left corner to link the effective range with other windows.

All selected events on the same display level fall within the effective transform range, as do all events in the selected Region.

The title bar of the Transform window indicates the effective range; the song name and the name of the first selected MIDI Region, if applicable, are shown.

Purpose of the Transform Window

Conditions

This part of a transform function defines which events will be edited. If the *Select and Operate* or *Select Only* options are used, the transformer checks to see whether the individual parts of the events (Position, Status, Channel, and so on) fall within the effective range, as defined in the pull-down menus in the *Select by Conditions* panel.

Operations

The Operations section of the Transform window defines the edit operations that you wish to perform. These operations are defined via the pull-down menus in the *Operations on selected Events* panel.

Actions

The three main buttons at the top of the Transform window work as described below:

Select only

All events (in the effective range) that fulfil the Conditions will be selected, but not transformed. You can use this option to refine your selection, and ensure that your Conditions are set to only affect the events that you truly want to “transform”.

Operate only

All selected events are transformed, in accordance with the Operations settings (Conditions has no effect). This is useful if you want to edit events that you’ve already selected, manually.

Select and Operate

This is a combination of both actions: the events are selected in accordance with the Conditions, and are then transformed as per the Operations settings.

The title bar shows how many events have been selected and/or transformed after each action.

Use of *Select only*, followed by further selections in an editor, allows more refined (and/or safer) transformations—activated with *Operate only*.

Display

The *Hide unused Parameters* checkbox allows you to remove all unused pull-down menus in the Conditions and Operations panels. This provides a better overview of the settings being used, and also protects the hidden menus from any accidental alterations.

Transformation Mode

Basic operating modes are defined in the pull-down menu above the *Conditions* panel:

Apply Operations to selected Events

As described above, Operations are performed on selected events (default setting).

Apply Operations & Delete unselected Events

The selected events are edited, and all non-selected events are deleted. This ensures that the only events remaining after the transform operation are those that matched the Conditions.

If you set the Operations up correctly, you can use the Transform window as a programmable filter in this mode—where only events that match the Conditions survive.

Delete selected Events

The selected events are deleted.

In this mode, you can use the Transform window as a programmable erase function. All events that match the Condition are deleted, and all other events remain unchanged. The Operations setting is irrelevant in this mode.

Copy selected Events & Apply Operations

The selected events are retained in their original form, as well as being copied and edited.

You can use this mode for applications such as:

Imagine you want to add a mod wheel controller event (#1) 10 ticks before each note, with a value that matches the note's velocity. To do this, you set *Status = Note* in *Conditions*. In *Operations*, set the *Position* to *Add* and enter a value of *10* in the field below it. Set *Status* as *Fix Control* and *Pitch (-1-)* as *Fix 1*. The last of these operations means "the first data byte (-1-) receives the value of 1" (the first data byte defines the controller number for controller events, and mod wheel events happen to be #1).

If we analyze these settings, we see that all note events will be selected for operation. A copy of each will be made, then moved 10 ticks earlier than the original, and converted to CC#1 (Mod Wheel)—with a value that corresponds to the velocity of the original note. This is because the second data byte (Vel) is left unaltered.

Event Parameters

Individual MIDI event parameters have their own columns in the *Conditions* and *Operations* panels:

Position

Time position of the event, referenced to the start of the MIDI Region (not of the song).

Status

Type of event.

Channel

Recorded MIDI channel of the event.

-1-/Pitch

First data byte (note or controller number).

-2-/Vel

Second data byte (velocity or controller value).

Length

Length of the note.

Subposition

Time position of the event, within a bar.

Conditions

The middle section of the window (*Conditions*) defines the conditions that determine which events are selected for edit operations. Each column represents a different MIDI event parameter.

The condition is considered to be fulfilled when an event matches the defined effective range of all event parameters. These ranges are determined in the pull-down menus found under each of the event parameter columns (except the Status column). The possible value conditions are listed below.

The *All* setting in the top box means that all values fulfil the conditions, making all other boxes in the same column superfluous.

Conditions for the Status

You have a choice of just two settings here, *All* (means all event types fulfil the condition) and “=”. Clicking in the box below opens a pull-down menu, where you can select; note, poly pressure, control change, program change, channel pressure, or pitch bend.

Conditions for the values of Position, Cha, -1-/Pitch, -2-/Vel, Length, and Subposition

You can assign one of the following value conditions for each of the parameters (except the status):

“=”

The value in the event and the box below it must be equal, for the condition to be fulfilled.

Unequal

The value in the event and the box below it must be unequal, for the condition to be fulfilled.

smaller

The value in the event must be smaller than the value in the box below it, for the condition to be fulfilled.

larger

The value in the event must be larger than the value in the box below it, for the condition to be fulfilled.

Inside

The value in the event must be within the value range of both boxes below it, for the condition to be fulfilled.

Outside

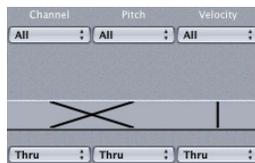
The value in the event must be outside the value range of both boxes below it, for the condition to be fulfilled.

Map

This condition compares incoming event components to the “map” before they are evaluated. The two *Range* parameters work in the same fashion as *Inside*. Incoming events with a mapped value that falls within the *Range* fulfil the condition—all others do not.

Exchanging Parameter Values

You can replace the value of each of the three event parameters: *Cha*, *-1-/Pitch* and *-2-/Vel* with the value of a different parameter from this group. Click on the lines between the Conditions and Operations fields to change the source for the parameter value. Note that the value is exchanged first, and then the operation is performed.



Operations

The bottom part of the window (*Operations*) defines the changes to events that meet the Conditions, and offers separate columns for each MIDI event parameter.

The *Thru* setting in the top box means that the relevant event type passes through unaltered, making the other boxes in the same column superfluous.

Status Operations

Thru

The event type passes through unaltered.

Fix

The event type is altered. Clicking in the box below opens a pull-down menu, where you can choose between; note, poly pressure, control change, program change, channel pressure, or pitch bend.

Map Set

This operation on the status of an event allows the universal map of a subsequent transformer to be controlled. The value of “-1-” selects the position in the map. The value of “-2-” determines the value at this map position. Internally, Logic sends a meta event pair: #123 for the position, and #122 for the value at this position. These types of meta event can also be created in other ways.

Operations on the values of Position, Cha, -1-/Pitch, -2-/Vel, Length, Subposition

For all parameters (except status), the top box determines the type of operation that is performed, using the values defined in the boxes below (referred to as the “set value” below). The following operations are identical for the channel and the first or second data byte, with the value ranges being automatically adjusted in the boxes below.

Fix

The parameter is fixed to the set value.

Add

The set value is added.

Sub

The set value is subtracted.

Min

Parameter values lower than the set value are replaced by it. Larger parameter values remain unaltered.

Max

Parameter values that exceed the set value are replaced by it. Smaller parameter values remain unaltered.

Flip

The parameter values are reversed around a set point. Values above this amount are moved to the same distance below it and vice versa.

Mul

The parameter value is multiplied by the set value (4 decimal places).

Div

The parameter value is divided by the set value (4 decimal places).

Scale

The parameter value is multiplied by the top value, and the bottom value is then added. This is a combination of *Mul* and *Add*. Negative values can be used to generate an inversion of the plus/minus sign, and subtraction, rather than addition.

Range

Parameter values outside the set value range are replaced by the values of the (range) “limits” (combination of *Min* and *Max*).

Random

Random values are generated within the set limits.

+—Rand.

A random value between zero and the set value (positive or negative) is added.

Reverse

The parameter value is reversed within its value range (no value can be set here).

Quantize

The parameter value is quantized to a multiple of the set value.

Qua & Min

Like *Quantize*, but the quantization does not fall below the set value (a combination of the *Quantize & Min* functions, with the same set value).

Exponent.

The parameter value is scaled exponentially. The extreme values (0 and 127) remain unaltered. The set value determines the shape of the curve. Positive values result in the exponential scaling of data (increasing input values remain lower for longer, and then rise quickly), and negative values result in the logarithmic scaling of data (decreasing input values remain higher for longer, and then drop off more quickly).

Crescendo

This only works if the *Inside* position condition is selected (crescendos need start and end points.). Crescendo creates a smooth alteration of the current parameters, between the set value boundaries.

Rel.Cres

This only works if the *Inside* position condition is selected. The effect is similar to that achieved by Crescendo, but the previous values of the parameters being altered are taken into account when the crescendo is created, preserving the relative feel of the original.

Use Map

The set Map will be used when this operation is selected.

Parameter Sets

Presets

The first twelve items in the pull-down menu are write-protected presets. If you try to alter any of their parameters, Logic reminds you that the changes can't be saved. You can alter the presets temporarily, but any changes you make will be discarded when you leave the preset. Creating your own transform sets, which can be configured and saved as part of the song, is worthwhile.

Here is a list of the Presets:

- Crescendo
- Scale 14 bit PitchBd (Pitch Bend data will be scaled, keeping the 14 bit information intact)
- Double Speed (doubles the tempo by halving positions and lengths)
- Half Speed (halves the tempo by doubling positions and lengths)
- Humanize (adds a random value to the position, velocity, and length of notes)
- Reverse Position (reverses the positions of notes within a section)
- Reverse Pitch (inverts the pitch)
- Transpose (transposes the notes)
- Exponential Velocity (alters the scaling of the velocity curve)
- Velocity Limiter (limits the velocity)
- Fixed Note Length (creates constant note lengths)
- Maximum Note Length (limits the maximum note length)
- Minimum Note Length (limits the minimum note length)
- Quantize Note Length (quantizes the note length).

Your Own Sets

Select the bottom menu item: **** Create User Set! **** to store your own settings in a user set.

You can name the new transform parameter set by double-clicking the selection field. All settings will be stored immediately.

Recalling Presets and your own Sets

Individual Transform sets can be selected directly via *Functions > Transform* submenu in the Event, Matrix, Hyper Editor and Score windows.

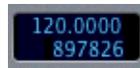
Logic provides several different tools and methods to create and edit tempo events.

This chapter discusses these tools, and covers the possible interactions between tempo events and MIDI and Audio Regions.

Display and Functions

Tempo Display

If your song has a tempo that stays the same throughout, you can set this constant tempo in the Transport window.



The current tempo is always displayed here, even if you're using programmed tempo changes or external synchronization.

You can set the tempo display format on the *Preferences > Display > Global* preferences page.

Tempo Track

Tempo changes are controlled by tempo events, which are stored in a special Tempo track. This track can be displayed by choosing *View > Global Track Components > Tempo*. The Tempo track applies to the whole song. The tempo track also determines the relationship between incoming time code and the current song position.

Recording Tempo Changes

Open *File > Song Settings > Recording* and activate the *Allow Tempo Change Recording* checkbox. All tempo alterations made during recording are automatically stored as tempo events on the Tempo track. These events can be edited in one of the tempo editors.

Adjusting the Tempo to Fit Regions

The *Options > Tempo Adjust Tempo using Region Length and Locators* command adjusts the MIDI tempo, making the length of the selected Audio Region exactly match the distance between the locators (Cycle area). If you want to use this function to adapt the MIDI tempo to match the tempo of a drum loop, make sure that the drum loop is cycling smoothly (use the Sample Editor for this), and that the length of the Region corresponds exactly to a specific musical length of the audio material. As an example, to ensure that the Region measures exactly two bars when played back, set a Cycle to match the musical length of the Region (two bars, in this case), and select *Options > Tempo > Adjust Tempo using Region Length and Locators*.

Tempo List Editor

You can open the Tempo List by clicking and holding on the Transport's Sync button with the mouse. A pull-down menu will appear, allowing you to select *Open Tempo List* or you can simply select *Options > Tempo > Tempo List Editor*.



Note: The layout, and way you use the Tempo List, are very similar to the Event List (see “Using the Event List” on page 439).

To create a tempo change in the Tempo List:

- 1 Set the song position to the required point.
- 2 Click the *Create* button.
- 3 A tempo event (of the current song tempo) appears. You can alter the tempo in the tempo column.

You can also use the Pencil tool to create a tempo change:

- 1 Click on the word “Tempo” in an existing tempo event with the pencil tool.
- 2 A new tempo event will appear, accompanied by an open position input box. Enter the required bar position and press Enter.

To delete tempo changes in the Tempo List:

- You can delete tempo events by clicking them with the eraser, or pressing Backspace.

To copy a tempo change from a passage:

- 1 Set the locators to the passage containing the correct tempo change.
- 2 Choose *Edit > Select Inside Locators*.
- 3 Copy the tempo events to the Clipboard (Command-C).
- 4 Deselect all tempo events (by clicking the background).

- 5 Paste the tempo events from the Clipboard (Command-V).
- 6 A position input box appears at the first tempo event, allowing you to alter the bar position. If the first tempo change is not at the start of the bar in the passage, be sure to alter the bar number, and leave the beat, sub beat and frame or tick values unaltered.
- 7 Press Enter. The copied tempo changes will be selected, and you can undo the operation if necessary.

Alternative Tempo Lists

You can use up to nine different tempo lists. This is useful in songs with tempo changes, as it allows you to:

- temporarily slow down the tempo when recording MIDI Regions,
- temporarily disable tempo changes,
- try out different tempo variations.

To switch between the different tempo lists:

- 1 Open the tempo list.
- 2 Choose *Options > Tempo Alternatives > 1...9* and select the desired tempo list.

Other Functions

The entries in the tempo list interact with and affect each other. Please refer to the Positioning Bars to Frames section for details. You can also make several synchronization settings here. All other functions are identical to those in the Event List (see "Using the Event List" on page 439).

Note: You can move any selected tempo event to the current song position by using the *Pickup Clock Position* key command.

Tempo Operations

The Tempo Operations window is used to edit existing tempo changes, and to create new ones. The window automatically displays the area you've selected for editing, and changes are displayed graphically, in real time, as the tempo curve is processed, so you can see what's happening. The displayed tempo curve (which is calculated from the tempo settings you've made) is shown in red.

The Tempo Operations Window

The Tempo Operations window can be opened from the Arrange window via *Options > Tempo > Tempo Operations*, the Transport window Sync button pull-down menu, or by means of the *Open Tempo Operations* key command.

The different functions in the *Operation* menu provide several interesting options for tempo change edits, and changes to the sync reference. The lock symbol allows certain parameters to be fixed, preventing them from being changed.

Create Tempo Curve

This function lets you create numerous tempo change events with just a few parameters, and provides a smooth overall change in tempo.

Three kinds of tempo curves are available from the *Curve Type* pull-down menu. Each of these offers a *Curvature* parameter, which determines if the tempo should speed up or slow down, dependent on whether positive or negative curvature values are entered.

To create a tempo change in the Tempo Operations window:

- 1 Select the desired *Curve Type*.
- 2 Use the *Position* or *Time* settings to determine the area that the tempo change should take place across: the left entry is the start point, the right entry is the end point.
- 3 Enter the desired start and end tempos in the *Tempo* line.
- 4 Finally, set the *Curvature* and watch the graphic display, as the tempo changes.

Note: The *Continue with new Tempo* checkbox determines whether; the original tempo resumes after the tempo curve ends (unchecked), or the new tempo (the last tempo change event in the curve) is maintained (checked).

The concentration of graphical tempo events can be altered with the *Density* parameter. Values of 1/8 and finer should only be used if really necessary (with very slow tempos and fast tempo changes, for example). Even finer settings (1/16 and 1/32) can be entered by holding down *Option*.

Note: Don't select a resolution higher than 1/8 or finer, just to make the curve look smoother.

Create Constant Tempo

This function creates a constant tempo in any selected area. The default setting assigns an average tempo for the selected section.

If you want to remove all tempo variations between two points, without changing the SMPTE time for the right-most position, just click *Do It*.

Don't forget the *Continue with new Tempo* checkbox, which keeps the new tempo or returns to the initial tempo.

Scale Existing Tempo Changes

This handy function alters existing tempo changes proportionally (scales them). This enables you to speed up an entire song section, without losing the relationships between any subsequent tempo changes within the area. Scaling is done by percentage. Positive percentage values speed up sections, and negative ones slow them down.

Stretch Existing Tempo Curve

This function stretches or compresses an existing tempo curve. The *Position* or *Time* values are used to define the start point of the Region that you want to change. You can then enter either the new end point of the tempo curve as a bar position or SMPTE value, or set a *Stretch* value for the curve (as a percentage).

Thin Out Existing Tempo Changes

Position or *Time* defines the start and end points of the area to be processed. *Density* determines the number of tempo events that will remain per bar after processing. You can select values between one per bar (1/1) and eight times per bar (1/8).

Randomize Tempo

Position or *Time* defines the start and end points of the area to be processed. *Randomize* determines the amount of deviation from the current tempo, in beats per minute (bpm).

Density defines how often the new tempo events will occur. You can select values between one per bar (1/1), and eight times per bar (1/8).

Tempo Interpreter

The computer keyboard and/or incoming MIDI events can be used to set the sequencer tempo. Put another way, Logic allows manual synchronization (also known as “human sync”).

The *Tap Tempo* key command must be assigned to a particular key (any key can be used), or to a particular MIDI event in the Key Commands window.

The sync is fairly loose, in that if the manual sync impulses stop coming in, the sequencer continues at the last tempo it received.

If you have an Unitor, a Mark Of The Unicorn interface (a MIDI Time Piece or MIDI Express), you can convert percussive audio signals into MIDI notes. This feature lets you use (say) a bass drum track (either live or from tape), to control Logic’s tempo.

You can enter manual sync mode in the following ways:

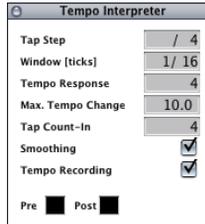
- manually, using the Sync menu;
- automatically in auto sync mode, if Logic encounters a *Tap Tempo* command.

The parameters that control Logic’s response to tap tempo commands can be found in the Tempo Interpreter window.

The Tempo Interpreter window

The Tempo Interpreter can be opened; from the Sync button's pull-down menu on the Transport, by using the *Open Tempo Interpreter* key command, or by selecting *Options > Tempo > Tempo Interpreter* in the Arrange window.

You will find the following parameters in the Tempo Interpreter window:



Tap Step

This parameter sets the note value that Logic will assign to manual taps. The best results are obtained when using larger values, rather than smaller ones. 1/4 note is usually a good choice.

Window (Ticks)

This sets the size of the time region displayed in the window, during which the tempo-determining tap notes will be entered (the size of the window is set in ticks, or 1/3840 note). Only taps made within this window are used to determine the tempo. Any taps outside it are ignored.

The narrower the window, the more effectively Logic will be able to withstand the influence (on the tempo) of any taps that fall between the “defined” note values (as set with the Tap Step parameter).

The larger the window is set, the easier it becomes to create drastic tempo changes.

If you set the window parameter to 0, the tap window will disappear altogether, and all taps will be accepted as tempo-determining information. The sequencer will also come to a halt, if taps are not generated.

Tempo Response

This sets the sensitivity for tempo changes: the larger the value, the greater the sensitivity. Suggested value: 4.

If the tap timing is imprecise, but Logic is supposed to be playing at a constant tempo, reduce this value to (say) 2.

Max. Tempo Change

This sets the maximum tempo change possible per tap (in bpm). To obtain as regular a tempo curve as possible, follow this rule: set the smallest possible value (and only as large as necessary).

Tap Count-In

This sets the number of taps used as a count-in. Logic starts on the tap after this number of taps is entered.

Smoothing

Switching on this function smooths out jumps in tempo, resulting from incoming taps (which could prove useful when using Logic live). You need to switch it off, if you want the sequencer's tempo to follow your taps as precisely, and quickly as possible.

Tempo Recording

The Tempo Recording function creates a tempo list that follows your taps, when in record mode. This function should normally be switched off.

Pre and Post

These are the ways your tap signals are displayed:

- *Pre*: displays every tap that is input;
- *Post*: displays every accepted tap that occurs within the tap window (as defined above), or on or around a tap step (again, as defined above).

The *Pre/Post* tap signals flash yellow if the taps are within the allowed range, and red if they are out of range.

Real Time Tempo Fader

You can create a real time Tempo fader in the Environment window by selecting *New > Fader > Specials > Tempo Control*. This can control Logic's tempo (using Meta event #100). There is no need to connect this fader to anything, unless you want to record its output.

The Tempo fader has a range of possible values from 50 to 177 bpm. External MIDI data can be used to control it, with an input value of 0 resulting in a tempo of 50, and an input value of 127, resulting in a tempo of 177.

If you place the tempo fader between the physical input and the sequencer input, you will be able to:

- record tempo changes;
- control the tempo with any desired MIDI event types:

The Tempo Fader Parameter box displays Pitch Bend events as the In-definition (by default). This allows control of Logic's tempo with your keyboard's Pitch Bend wheel.



The Effect on Recording

This way, new tempo track data can be recorded “intelligently”: The original tempo data will only be erased in areas that actually contain tempo changes.

The Effect on Playback

If the tempo fader is moved during playback or recording, all data defined in the tempo list is switched off, until the sequencer is stopped.

The Effect on External Sync

Movements of the tempo fader are ignored when external SMPTE sync is active.

The tempo fader can therefore be used to deactivate the sync reference during playback or recording, if you wish.

Logic can be synchronized with external hardware and software via a number of different synchronization protocols.

This chapter discusses the synchronization of Logic—as both synchronization master and slave—in a number of different situations.

Functions

Switching on External Sync

Activation of the Transport *Sync* button synchronizes Logic to the chosen sync source.



You can use the *Sync* button to turn off external sync at any time, without changing your selected sync source. This allows you to temporarily remove Logic from the sync master's time axis. This could prove useful if you need to quickly edit a MIDI Region while the external sync source (tape machine, VTR, and so on) is still running, for example.

Recording with External Synchronization

When *Record* is pressed during external synchronization, Logic enters record mode, but does not start until it detects external time code.

Incoming MIDI Time Code Display

The flashing dot on the Transport window's *Sync* button indicates that Logic is receiving error-free MIDI time code.

If the dot “sticks,” an error has occurred. Although Logic is capable of dealing with many MTC errors, you should nevertheless check the quality of your SMPTE signal, as well as any other potential error sources.

MTC Interpretation

As the MIDI standard only supports four of the possible six time code formats (the 30 fps and 29.97 fps formats cannot be differentiated), Logic needs to decide which format is “intended,” when it encounters incoming time code:

Incoming MTC format is interpreted as:

- 24 fps—24 fps
- 25 fps—25 fps
- 30 drop fps—29.97 drop fps
- 30 fps—30 fps

In other words, the much more commonly used 29.97 fps and 30 drop fps formats are used in place of the uncommon 30 fps, and the virtually-unheard-of 29.97 drop fps formats.

You can, however, manually set the format to whatever you like in the *Song Settings > General > Frame Rate* pull-down menu: to convert material to 30 fps for black and white TV transmission in the NTSC format, for example.

Receiving MIDI Clock/SPP

Synchronization via MIDI Clock/SPP is the most accurate method to use—if Logic is being synchronized to a bar-referenced master.

MIDI Clock has a resolution of 24 PPQN (pulses per quarter note), while Logic has an internal resolution of 960 PPQN (some 40 times more accurate). For this reason, Logic needs to interpolate the 39 steps between two incoming clock pulses.

If you experience small variations in the timing between master and slave, you can tighten the sync (when in external sync mode) by entering the expected tempo changes from the master into Logic’s internal tempo list as well.

Even if you don’t take this step, synchronization should still be fairly tight, as long as you avoid large deviations, such as an internal setting of 200 bpm, with an external tempo of 40 bpm.

Continue Event

When a MIDI Continue Event is received, Logic doesn’t leap to the last valid position received via MIDI Clock. Rather, playback continues from the current song position. This allows you to manually change the song position while the sequencer is stopped, and then restart from the new position, with a MIDI Continue command.

Synchronization Window

Overview

You can open this window from the Arrange window using *File > Song Settings > Synchronization*, or by click-holding the Sync button in the Transport window.



At the top, there are tabs for selecting the various pages: General, Audio, MIDI, Unitor.

General

This page of the synchronization window contains the major synchronization parameters for running Logic as a slave.

Audio

This page of the synchronization dialog window contains all parameters relevant to synchronizing Audio and MIDI.

MIDI

This page configures Logic to send timecode via MIDI, when the sequencer is running. This enables you to synchronize external devices as slaves to Logic, which acts as the master.

Unitor

This page is used to set the major synchronization parameters for the Unitor8.

General Sync Mode

This parameter defines the master that Logic is synchronized to:

Internal

Logic's internal timer. Logic is the master. External devices can be synchronized via MIDI Clock or MTC (the relevant settings are made on the MIDI page).

MTC

MIDI Time Code mode. Logic runs as a slave. MIDI Time Code can either arrive at a MIDI In port, or be generated by a MIDI interface that "translates" it from incoming SMPTE time code.

MIDI Clock

MIDI Clock and Song Position Pointer. Logic runs as a slave. Clock and SPP can be received at any MIDI input.

Manual

Tempo interpreter mode. Manual synchronization or “human sync” mode. Logic runs as a slave to impulses that are recognized as valid beats by the tempo interpreter. The tempo interpreter can be controlled by MIDI events, or a key on the computer keyboard.

Auto Enable external Sync

When this option is activated, Logic runs as the master (Internal sync mode), until it receives a synchronization signal—either in the form of MTC, Clock/SPP, or from the tempo interpreter.

Logic automatically locks to the first synchronization signal it receives. Please ensure that different synchronization signals don’t arrive simultaneously—there can only be one time code master.

Frame Rate

This is where you set the frame rate (in “fps”, frames per second). This frame rate applies to both transmitted and received time code.

Frame rate and typical applications

- 24: Film
- 25: Audio (Europe) and PAL Video
- (30 d): Unusable (not realtime)
- 30: Audio (USA) and NTSC Video (s/w)
- 29.97 d: Audio (USA) and NTSC Video (color)
- 29.97: Extremely rare (not realtime)

“d” stands for “drop frame”. In “drop frame” formats, certain frames are left out, following a regular pattern. To distinguish between them, formats without drop frame are sometimes referred to as “nd” or “non drop”.

Auto Detect Format of MTC

This checkbox, when active, analyzes the incoming time code and automatically sets the correct frame rate. You should generally leave this option switched on.

Please note that it is not possible to automatically distinguish between MTC frame rates of 29.97 and 30 because:

- the MTC standard does not allow a distinction, and
- a measured rate of 30 fps could also be 29.97 fps time code running too fast, and vice versa.

Logic automatically interprets frame rates of “approximately 30 fps” as either 29.97 df or 30 nd, depending on whether or not the drop frame format is used. This interpretation will usually be correct, because only these two formats are actually used as a standard.

“Auto Detect” only switches to 29.97 df or 30 nd if one of the other conventional formats was previously set. If you want to synchronize Logic to one of these unconventional frame rates, you need to define the format manually. This setting will not be altered by “Auto Detect”.

Validate MTC

This pull-down menu option allows you to specify how often Logic checks for incoming time code, in order to ensure synchronization. In general, you should leave this option set to *always*. There are some devices, however, that generate timecode pulses that may require a specific number of frames to be set, in order to maintain synchronization. The *never, Jam Sync* option basically sets Logic to “free-wheel” if synchronization is lost. In other words, Logic will run on its own internal clock (at the most recently received tempo) if the synchronization pulse is lost. This approach ensures that recording will continue, even if the incoming timing pulse fails.

SMPTE Offset

This is where you set the SMPTE offset for the song. As songs don’t always need to start precisely at bar 1, you can select any bar position to be played at the set SMPTE time.

The preset is 1/1/1/1 at 1:00:00:00. The SMPTE offset 1:00:00:00 is normally used, because it allows you to pre-roll an amount of time code.

SMPTE View Offset

If you want to see the absolute time from the start of the song in Logic’s time display, rather than the actual SMPTE time, click *Enable separate SMPTE View Offset*. Then choose Bar Position 1/1/1/1 displayed as SMPTE 00:00:00:00 (preset). If necessary, you can set other view offset values here.

The Tempo List always shows the real SMPTE time, never the *SMPTE View Offset*. The *SMPTE View Offset* is used in all other windows.

You can individually set each open Transport window to display SMPTE time with or without a *SMPTE View Offset*, via the “arrow” menu *Use SMPTE View Offset* option.

Audio

MTC [fps]

This display shows the deviation between the incoming MTC, and its nominal frame rate.

If the deviation is too large, please make sure that you have set the right frame rate (on the General page of the synchronization window). If in doubt, set the frame rate to 24 fps and switch on *Auto detect format of MTC*.

If the frame rate is correct, you can use this display to adjust the tape speed of the master machine to the nominal value (the same speed used when the time code was recorded). Adjust the varipitch control on the master machine, until the vertical yellow line is centered.

Sample Rate (Hz)

This display shows the deviation of the sample rate from its nominal value.

Bear in mind that some audio hardware will not allow any variation in the sample rate.

Deviation (ms)

This display shows the current phase deviation of the word clock from the time code master—in other words, the deviation between audio and MIDI.

Varying time code signals shown in this display indicate how Logic regulates the sample rate of the hardware, when in *MTC continuous* sync mode. Even large time code variations result in no deviation between audio and MIDI. Your audio hardware must be capable of continuously variable sample rates, for this to function.

Small deviations between audio and MIDI are unavoidable, because MIDI can (and should) follow the time code master directly.

Audio Sync Mode

This is where you define how each individual piece of audio hardware should be synchronized to an external time code master.

Not all audio hardware can work in every sync mode described below. This is particularly dependent on whether or not the hardware's sample rate can be controlled.

There are two pull-down menus available, for Core Audio and DAE/TDM hardware. Use one or both, as applicable to the hardware installed on your system.

MTC Continuous

Audio regions are started in sync, and the sample rate is continuously regulated in accordance with variations in the time code master signal. Even very long audio regions stay in sync in this mode.

MTC Trigger + Auto Speed Detection

Similar to MTC Trigger (see below), but the Speed Detection constantly monitors the tempo of the time code master, while Logic is running. The next time you start Logic, it will use an adapted sample rate.

This mode keeps long regions in better sync with the time code master, although not as closely as “MTC Continuous”. It does, however, use a constant sample rate, which is not affected by variations in the time code master signal.

MTC Trigger

Audio regions are started in sync, but are then played at a constant sample rate, regardless of any variations in the time code master signal. Logic always uses the set nominal sample rate (44.1, 48, 88.2, 96, 192 kHz).

This mode is suitable when it is vital to retain the absolute pitch of a recording. If the speed of the time code master deviates from the nominal value, you may need to split long Regions into shorter sections.

External or Free

Logic has no influence on the sample rate. The audio hardware is responsible for ensuring that the position and sample rate of audio Regions match. This mode is only advisable if you are sure that the word clock and time code master are running in sync—by using an external SMPTE/wordclock synchronizer, for example.

Digital

Similar to *External or Free*, but the hardware is also set up to synchronize to the sample rate of the incoming digital signal.

SSD/VSD Type

Exactly the same as *Digital*, but a SMPTE Slave Driver (SSD) or Video Slave Driver (VSD) is used in addition—to synchronize with the sample and frame rates used in Logic. The SMPTE slave driver is a device for synchronizing ProTools hardware to time code or word clock.

MIDI

Transmit MIDI Clock

The checkboxes activate transmission of MIDI Clock. The pull-down menus determine the MIDI output ports for the MIDI Clock signal.

The two *Destinations* allow you to specify discrete MIDI ports.

Every time you start, “Song Position Pointer” (SPP) is also sent.

As not all devices can process SPP, the MIDI system realtime “Continue” message is also sent. The exception to this is when you start at position 1 1 1. In this situation, the realtime “Start” message is sent.

MIDI Clock can easily be sent with other normal MIDI events (notes, controllers). When using multiport MIDI interfaces (such as the Uitor8), better timing is achieved by sending MIDI Clock to *All* ports, rather than to several individual ports.

If MIDI Clock is transmitted to all ports, the events are only sent once from the computer to the interface. If you address individual ports, one event needs to be sent for each port, placing a higher strain on the bandwidth of all ports.

Transmit MIDI Clock Delay

This parameter allows you to delay the transmitted time code. Negative values mean that the MIDI Clock signal is transmitted earlier. This enables you to compensate for any reaction delays in external MIDI Clock slaves.

Transmit MTC (MIDI Time Code)

The checkbox activates transmission of MIDI Time Code. The pull-down menu determines the MIDI output port for the MTC signal.

It is not advisable to send MTC to all ports. MTC is very data-intensive, so use a MIDI port that isn't being used for anything else.

Transmit MMC (MIDI Machine Control)

This is where you can switch on transmission of MIDI Machine Control (see "MIDI Machine Control" on page 616). These commands are then sent whenever you operate Logic's transport functions (Start, Stop, Rewind, and so on).

MMC is normally used when Logic is running as a slave to an external master (such as an ADAT), and you want to control the external master's transport functions from Logic. Logic therefore acts as MMC master, and MTC slave simultaneously.

If you want to use the external master's transport controls, you don't need to use MMC. In this situation, Logic will follow the MTC master as a slave.

You can also use MMC to place tracks on the MMC slave device into record-enabled mode.

Listen to MMC Input

Logic can be controlled by MMC (MIDI Machine Control) and so-called "Full Frame Messages" (Listen to MMC Input). *Transmit MMC* has been available in Logic for quite some time.

Logic recognizes these commands when "listening" to MMC Input:

- Play
- Deferred Play
- Stop

Deferred Play is a special command for mechanically slow synchronization slaves such as reel-based tape recorders. Rather than having the machine play immediately, it is asked to reach the desired SMPTE position before playback is started. You'll find no difference in Logic's response to the play and deferred play commands, as Logic can locate as quickly as any hard disk recorder.

Logic ignores these messages when incoming external MTC (MIDI Time Code) commands are detected.

Logic also obeys so-called “full frame messages”, and sets Logic’s song position line to a new location, without starting playback. Once again, incoming MTC data has higher priority, if conflicting information is received.

Some synchronizers send “Full Frame Messages” (instead of MTC) to locate the slave device (Logic in this case) to a new position, without implicitly starting playback. This is useful when in slow shuttle or single frame advance modes with video machines, because the slave device is perfectly located, without being in playback mode.

The MIDI Sync Preferences button launches the MIDI Synchronization preferences window (see “MIDI Preferences: Sync” on page 648).

Unitor SMPTE Mode

Here, you can instruct the Unitor8 to write SMPTE. You must switch from Read to Generate, and set the frame rate and start-time in the “General” page. In Refresh mode, fresh time code is generated in sync with received time code. “Refresh” works with both VITC and LTC.

You should always use “Refresh” whenever you need to copy an LTC track, because you cannot directly copy LTC without a considerable loss of quality. When copying whole multitrack tapes, you should patch all tracks directly, but refresh the TC track via the Unitor8.

You should only use Refresh mode if you are copying time code.

SMPTE Type

This is where you define the SMPTE format that you want to use:

LTC: Longitudinal Time Code is written to a tape track.

VITC: Vertical Interval (or Vertically Integrated) Time Code is written invisibly to a video tape.

Freewheel

You can set the freewheel time in frames for LTC and VITC. The freewheel parameter affects the SMPTE reader, and specifies how long the synchronizer continues transferring MTC to the sequencer, after time code ceases to be read.

Long freewheel times can maintain synchronization, even if there are drop outs in the time code, but they also increase Logic’s reaction time—after the time code master stops. In practice, you should set the value as large as necessary (for sustained operation), and as small as possible (for short waiting times).

TV Format

Allows you to define the television format for time code burn-in:

PAL: The video format used in Europe. If you are working with video in SECAM Norm, select PAL.

NTSC: The video format used in the USA and Canada.

You don't just need this setting when writing and reading VITC. If you're working with LTC, and you want to generate a video picture with burned-in SMPTE time, you also need to set the correct format here.

VITC Line 1, VITC Line 2

VITC is written into two lines of the video picture, which are normally invisible. The lines should not be adjacent, and are usually situated between 12 and 20.

If "Scan" is enabled, the VITC lines are automatically recognized. You should only enter the lines manually if there are problems with "Scan" mode.

Visible Time Code Display

The parameters allow you to set the position, size, and color of the time code counter window, which is burned-into the video picture.

Bar Ruler—Time Ruler

Use *View > Show SMPTE Time Ruler* to individually switch the Bar Ruler of each window into a SMPTE time ruler. The number on the left of the vertical lines refers to minutes, and the one on the right refers to seconds. If the vertical height is sufficient, both the time ruler and the Bar Ruler are displayed.

Event Position and Length as Time

Selecting *View > Position & Length in SMPTE units* in the Event List editor switches all positions and lengths to SMPTE times.

Both functions are accessed with the *Positions/Time Ruler in SMPTE units* key command.

If the time ruler is switched on when you move an object's position:

- the position in the help tag is also shown as a SMPTE position,
- holding down Control switches the snap grid to frames, and holding down Shift as well, switches it to subframes.

Naturally, the time ruler takes account of any tempo changes.

Positioning Objects to Frames (Pickup Clock)

Set the song position to the required SMPTE time, by going to a specific frame of the film in the Video track, for example. Select the object that you want to place at this time position. It doesn't matter whether this is an individual event, tempo event or a Region. *Pickup Clock Position* then sets the start time of the object as required, *Pickup Clock and select next event* selects the next object after moving your current selection. This allows you to quickly continue after making alterations.

When using Pickup Clock with Audio Regions, it is the Region's Anchor (not start point) that is moved to the song position.

Fixing Objects to Frames

In situations where you're working with synchronized film, you often want specific sound effects to play at a specific SMPTE time, rather than a particular bar position.

If the tempo of the piece needs to be altered at a later stage, the SMPTE time location of events that have already been positioned will change. The *Lock SMPTE Position* function prevents this from happening.

You can SMPTE-lock individual events in the Event List, or entire Regions (along with all events they contain).

Lock SMPTE Position

This function "locks" selected objects to their current SMPTE position. If there are any subsequent tempo changes, the bar positions of the "locked" objects are adjusted accordingly. You can tell that an object or event is locked to a SMPTE position by the small padlock symbol in front of its name.

Copies of locked objects do not preserve their locked status, whether copied/pasted via the Clipboard, or by dragging while Option is held down.

Unlock SMPTE Position

All selected objects that were "locked" to their SMPTE position are now fixed to their current bar position, just like normal events. This means they can be shifted by any future tempo changes. The padlock symbol in front of the name disappears.

Moving the SPL by Frame

In addition to the usual position commands, you can also use the *Rewind One Frame* and *Forward One Frame* key commands to move one frame backwards or forwards.

Positioning Bars to Frames

If you want a particular bar in the song to coincide with a specific SMPTE time, you need to alter the tempo of the preceding passage.

The following procedure will save you from having to do this by trial and error:

- 1 Open the Tempo List (see “Tempo List Editor” on page 598).
- 2 Create a tempo event at the desired bar position.
- 3 Set the desired time position for this tempo event in the SMPTE-Position column. The preceding tempo event is automatically adjusted to generate the correct bar and time position for the inserted tempo event.
- 4 You can then delete the tempo event you inserted, if you want to keep the same tempo for the following passage.

MIDI Machine Control

MMC is a set of MIDI commands that Logic uses to control the transport functions of any MMC-capable tape machine. The recording process can also be controlled and automated from Logic via MMC. This tape machine then provides the SMPTE signal that Logic uses as a synchronization source (with Logic as the slave).

You can control connected devices from Logic by using the normal transport functions (including direct positioning and cycle jumps). Don't forget that Logic needs to wait for the connected device to finish rewinding or forwarding. If MIDI Machine Control is enabled, dragging the song position line will send “MMC Locate” commands continuously, until the mouse button is released.

Switching on MMC

Activate *MIDI Machine Control* from the Sync button's pull-down menu. You can also temporarily switch the function off from here, allowing quick edits to be made.

This option can also be accessed by selecting *Song Settings > MIDI*.

Record Functions

Logic supports up to 64 MMC tracks, enabling the operation of devices such as the Alesis ADAT via MIDI machine control.

Each Arrange track can act as a tape (control) track, by selecting an instrument with the “tape deck” icon (#305).



You only need to create one instrument with the “tape deck” icon, and you may then assign that same instrument to as many tracks as needed, to control your external recorder. It’s a good idea to group these tracks together in their own folder. These tracks must be placed at the top of the Arrange window track list. If you pack them into a folder, this must be the first track in the list.

The “tape deck” (#305) icon is the only icon that actually affects the way an object behaves. All other icons are purely graphic in nature.

If the tape track is the current record track, the following functions apply:

- Selecting the tape track switches the corresponding track on the tape machine to “record ready”, and deactivates the “record ready” status of any other tracks. To select several tracks for recording, use Shift when clicking.
- The record button in the Transport window sends the “record strobe” command to the tape machine. This also puts Logic into MIDI record mode, and sends an MMC “Play” command to the tape machine (or HDR or whatever). Logic doesn’t start until it receives time code back from the MMC device.
- If you use the autodrop function, the tape machine goes into record mode at the left locator position, and drops out of record mode at the right locator position.
- If you click on any track—not just a tape track—while holding down Control-Shift, you can individually toggle the record ready status for each track of the tape machine (selected tracks are switched on, and non-selected tracks are switched off). Control-clicking on a track switches all other tracks out of record ready mode. If the current record track was assigned a tape deck icon (see above), you must not use Control.
- *Space* (or the *Record Toggle* key command) is used to toggle record status, if a tape track is the currently selected record track.
- Following an MMC-controlled recording, Logic automatically creates an empty MIDI Region on the tape track. This is to let you know that a recording has taken place on the tape machine. This applies to all MMC recordings, including those controlled by the Autodrop function. If you activate several tape tracks (by Shift-clicking), the corresponding number of Regions are created. If a MIDI Region with an identical start point already exists on a tape track, no new MIDI Region is created on that track. This avoids overlapping objects.
- A double stop command sets the song back to the beginning.

The MMC Record Switches also offer you a simple way to arm tracks on your tape machine with Logic. It is already set to the tape icon.

You should finish all MMC-controlled recordings with *Stop* or *Space*. Some tape machines react differently to a series of “MMC Record” commands. Sometimes, this can result in Logic showing a track to be recording, when the tape is actually playing back (or even worse, the opposite situation). As such, you should always finish a recording with *Stop* or *Space*, just to be on the safe side.

Sync Problems and Solutions

Faulty Digital synchronization

If Logic is synchronized to external wordclock (*Audio Sync Mode: External /free*), you must ensure that a valid digital signal is always available. If you encounter error messages such as “Sample Rate xxx kHz recognized” it may be that the DAT recorder (or whatever clock source you have connected to your audio hardware’s digital input) does not transmit wordclock in stop or pause mode (or has switched itself off).

Faulty synchronization to an External Tape Machine

Create a new song, make a new recording and see if that does the trick. Why? If an old recording on tape was not properly synchronized to time code, you won’t be able to use it. One basic rule: the playback situation must be identical to the recording situation.

If everything is working fine with the new recording, this means the present setup is okay. Next, check whether anything has changed in your global setup. Has the frame rate changed? Has the tape speed changed? If you have changed a 30 fps setting, try variations such as 30 drop or 29.97.

If MIDI and Audio are not synchronized

Open the *Synchronization > Audio* page and select the *MTC continuous* or *MTC Trigger/ASD Audio Sync Mode*.

If your audio hardware doesn’t support either mode, you should cut extremely long Regions into shorter sections.

If MIDI and SMPTE are not synchronized

Check all frame rate settings. The frame rate of all connected devices must be identical, including the time code on the tape machine, the synchronizer, and in Logic itself.

Some synchronizers encode the wrong frame rate in MTC. In this situation, open the Tempo Editor, switch off the *Detect* option, and set the correct frame rate manually.

Logic supports the viewing of QuickTime video files in the Arrange Video track, making film and TV scoring quick and easy.

You can also view QuickTime video files in a separate window. This chapter covers the use of video files in Logic.

Synchronizing QuickTime Movies

QuickTime is a Macintosh standard for digitized, data-compressed films which can run in individual windows. If you want to play these films, Quicktime must be installed on your system.

You also need a fast hard disk, and above all a fast Mac, allowing the movie to be played smoothly. If you want to record a film like this yourself from a video recorder, you need specialized hardware, and relevant software (such as iMovie).

You can make QuickTime movies run in a Logic window, in sync with a song. Wherever you move the song position the film follows, and vice versa.

Opening a Movie

Select the global *Options > Movies > Open Movie* function to open a typical file selector box. You can then select a QuickTime movie from your hard disk or other storage device.

If you select *Options > Movies > Open Movie as Float* you can open a QuickTime movie in a float window. This ensures that the movie window will always stay on top.

Reopening a Movie

The *Open Movie Again (as Float)* command reopens a movie window with the same film clip. This is particularly useful if you want to open the video clip in a different Screenset.

Working with Movies

In the QuickTime window, you can enter the SMPTE offset of the film in the *Movie Start* row. This is independent of the SMPTE offset for the song. Grabbing and dragging the position slider at the bottom of the video, or using the forward/rewind buttons to the right, moves the film to any position, and Logic will “chase” to the corresponding song position. All QuickTime transport functions interact with those of Logic.

Optimal Image Size

If you click once on the gray bar at the bottom of the video image, the QuickTime window will expand to fill the whole screen in such a way that the entire video image, whatever its shape, best fits your monitor. The window borders will also disappear (*Best Size without Borders*)

This proportional enlargement does mean that strangely-shaped images may not fill the entire monitor. There are two advantages to this: the proportions of the image is retained, and a faster screen refresh rate can be obtained, because the graphics card is not overloaded with conversion calculations for altering the movie’s proportions.

Clicking on the gray bar at the bottom of the image restores it to its original format and size.

Options

Clicking and holding on the movie image opens the options menu. You can set various proportional image formats, from half-size to 8 × size here.

The following image sizes are also selectable, allowing a non-proportional enlargement of the image if it is oddly-shaped for the monitor you’re using:

Pixel 512 × 384

Changes image size to NTSC Underscan format.

Pixel 640 × 480

Changes image size to PAL Underscan, or NTSC Overscan format.

Pixel 768 × 576

Changes image size to PAL Overscan format.

Make Proportional

This selects the next-largest proportional setting.

Center

Choosing this option places the video image in the middle of your screen.

Best Size without Borders

This option is equivalent to the click on the gray bar at the bottom of the video screen.

Synchronization Methods

The *Contiguous Sync* option allows you to switch between the following sync methods:

When *Contiguous Sync* is turned on, Logic controls the playback speed of the movie, keeping music and pictures in sync at all times. If the film has a soundtrack, the audio signal will be transposed slightly, if necessary, by means of sample rate conversion. This sync method is possibly more precise, but requires greater processing power.

Video to song adjust

Found under *Preferences > Video*, this global setting can be used to fine tune the starting point of a movie. There is a separate setting for the display on external devices.

DV Playback via FireWire

QuickTime movies in DV format can be output from your Logic song to a FireWire device. For technical reasons, only QuickTime movies in DV format are supported.

You can easily activate this option by selecting FireWire as the *Video Output option* in the *Song Settings > Video* menu (your FireWire DV device must be connected at the time). You can also access this preference by opening your QuickTime movie as usual and then holding the right mouse button down in the movie window, which displays the Quicktime options pop-up menu.

Video Thumbnail Track

The Video Thumbnail Track is a special track class in the Arrange, which displays the loaded Quicktime movie as thumbnails on an Arrange Track. This track type only appears in songs created in version 6 of Logic. The number of thumbnails shown depends on the current zoom level. The frames are always left aligned, with the exception of the final frame, which is right aligned. What this means is that the left border of every frame (but the final frame) represents the correct song position for that frame. The final frame is right aligned to ensure that (at least) the first and last frames of a movie will be visible, regardless of zoom level. No editing operations are possible on Video Thumbnail tracks.

Settings

The settings of the Video Thumbnail Track can be adjusted in the Video Thumbnail track section (*Preferences > Video*).

Cache Resolution

Resolution of the thumbnails kept in the temporary internal memory (Cache). Higher resolutions display more details but take up more space in the cache.

Maximum Cache Size (in MB)

Amount of memory reserved for the Thumbnail cache. 40 MB is recommend for medium resolution. Use a higher value for higher resolutions. The memory will only be occupied when actual movie data is displayed.

Automatic Scene Cut Detection/Scene Markers

The Find Scene Cuts function is available in the context menu of the movie window or via the Options > Movies submenu.

The movie will be analyzed for significant content changes, and (SMPTE locked) markers will be generated. These positions will also be indicated by thumbnails in the video track.

The function currently uses a fixed threshold value, which works quite well for most types of movies (cartoon, real life, CGI etc).

How it works

The Find Scene Cuts function follows the “decision path” outlined below, when determining which part will be evaluated:

- marquee selection
- cycled song part
- selected objects
- all—if none of the above criteria are met
- This decision path is also used for the Remove Movie Markers function.

Remove Movie Markers

The Options > Movie > Remove Movie Markers facility allows you to remove recognized cuts (movie markers) inside a defined song part. In cases where there’s no marquee selection, no active marker and no object selection, all markers are removed.

New Thumbnail Algorithm

As a spin-off of the Find Scene Cuts function, a new thumbnail positioning system is used.

It no longer uses a fixed number of pixels between two thumbnails, but rather a fixed time between two thumbnails—usually of one second in duration.

Should the tempo or zoom settings cause two thumbnails to overlap when employing this method, the distance will be multiplied until the overlap disappears. This approach makes much more efficient use of cache memory.

If the movie is removed from the Song (by opening a new movie), a new check for scene markers (SMPTE locked, name of “Scene”) provides you with the option to remove these markers.

Import/Export Audio Tracks from/to QuickTime Movies

Once a movie has been opened in a Song, you can make use of the Movie sub menu to perform the following functions: Extract Audio from Movie or Export Audio to Movie.

Both functions open dialogs that allow you to choose the audio tracks of the movie that you'd like to replace or import, as shown below.

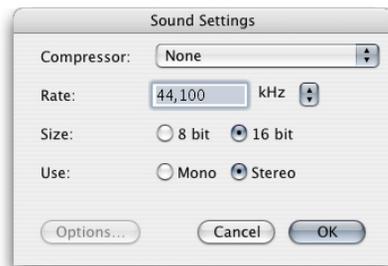


Export Audio to Movie

Should you choose to Export the audio, the following dialog allows you to select the desired format.

Extract Audio from Movie

Once you've made your selection, and clicked OK, your audio will be extracted and placed in the Audio window. It will retain the name of the video file, with the selected file format appended (AIF, SDII, and so on).



The Song Settings and Preferences allow you to define many of Logic's basic operating parameters. This section explains each of these menu items individually.

Unless otherwise indicated, the descriptions of the various options apply when the selection box next to the option is checked (in other words, when it's active).

Song Settings and Preferences are accessible via the *File > Song Settings* and *Logic > Preferences* menu items. When either is selected, a Preferences or Song Settings window will be launched.

Each window features a number of icons and tabbed panels. These are much like menus and sub-menus. To adjust a given Preference, simply select the desired icon, then the appropriate panel tab, and then activate/deactivate the preference, or make your selection from a pull-down menu. Just close the window once you've made your selections.

In some instances, you will find a button that links to the Song Settings window, while you are in the Preferences window (and vice-versa). Clicking on this button will launch the Song Settings window, and will automatically select the relevant panel. As an example, the Preferences > MIDI > Sync panel features a MIDI Sync Song Settings button. Clicking on this button will launch the Song Settings > Synchronization > MIDI panel.

Both the Song Settings and Preferences windows can be visible at the same time, making the set up of Logic's operating parameters faster and clearer.

Some of these can also be reached directly from Logic's local menus (in the Score window, for example), or from the Transport buttons, via pop-up menus.

Saving of Song Settings and Preferences

The Song Settings are stored with the song file. If you want to start Logic with certain settings, simply make the desired settings in your Autoload song or a Template.

The Preferences are saved whenever you quit Logic. There are several Preference files, which are stored separately in the `~/User/Library/Preferences` folder. Logic preference files all begin with “com.apple.Logic”.

Note: All choices made in the Song Settings window are specific to the saved song. All items selected in the Preferences window globally affect *all* songs.

Song Settings

Song Settings, as mentioned, are saved independently with each song, which means that different songs can have different song settings. You can save all of your standard settings in the Autoload Song, which is the default song file that is automatically loaded when you boot Logic (unless you’ve started the program by double-clicking on a specific song file instead of the actual program icon, or have selected a Template). This way, you can start each Logic session with your preferred working setup.

Synchronization Settings

All Synchronization Song Settings are described in the Synchronization Chapter (see “Synchronization” on page 605).

Metronome Settings

File > Song Settings > Metronome or a long click on the Metronome button in the Transport Bar opens a settings dialog window for the Metronome. This window combines all settings for the MIDI Click Environment Object.

In addition, the Metronome dialog features a virtual metronome sound source called *Klopfggeist* (see the *Klopfggeist* section in the Plug-in Reference). It can be used either, in addition to, or in place of, the speaker and MIDI click source.

MIDI Click Settings

These settings include the MIDI port of the MIDI Metronome and allow you to separately set the Channel, Note, and Velocity for the Bar, Beat, and Division (format value) of the click.

Klopfggeist Parameters

The *Klopfggeist* checkbox activates/deactivates this virtual metronome.

The *Tonality* parameter changes the sound of the virtual metronome from a short click to a pitched percussion sound, similar to a Wood Block or Claves.

Volume adjusts the overall sound level of the virtual click sound.

Output (assignment): Provided the audio hardware used by Logic offers more than two outputs, this field allows the routing of the Klopfggeist metronome sound to a different set of hardware outputs.

Note: Klopfggeist is a software instrument found in the Mono plug-in menu of Audio Instrument channels. Klopfggeist is inserted on Audio Instrument channel #64, by default. Logic will automatically create Audio Instrument channel #64 (with Klopfggeist inserted) when the *Klopfggeist* checkbox is activated. Theoretically, any other Logic or third-party instrument could be deployed as a metronome sound source—using Audio Instrument channel 64.

Klopfggeist can also be used as a simple and unique software instrument as well. The Klopfggeist Plug-In window offers a few additional sound parameters over those found in the Metronome window.

Other Settings

Metronome plays through built-in speakers

This sends the metronome click to the computer loudspeaker.

Note: The System Preferences > Sound pane must be set to Internal Speakers in order for the speaker click function to work.

Click while recording (e)

The metronome click is automatically switched on for recording. This is the same as activating the Metronome button in the Transport Bar during recording.

Only during count-in

When this option is active, the recording mode click will only be audible during the song count in, and is then switched off.

Click while playing (p)

The metronome click is automatically switched on for playback. This is the same as activating the Metronome button in the Transport Bar during playback.

Polyphonic Clicks

The MIDI Metronome Environment Object sends notes, as defined for bars, beats, and divisions. As an example, two or three notes may be sent simultaneously at the beginning of each measure. If this option is unchecked, the metronome will only transmit one note at a time.

Recording Settings

This page can be reached in various ways: by key command (default: Option-R), the *File > Song Settings > Recording* menu option, or from the *Recording* menu item, accessible by click-holding on the Metronome or Record buttons of the Transport.

The Recording Song Settings determine how Logic responds while in record mode. You can enable/disable some checkboxes via the computer keyboard, by using the keys indicated in brackets after the function name. Any key commands normally assigned to these keys will be temporarily deactivated while the Song Settings window is open.

General

Auto mute in cycle record

If recording in Cycle mode, this function creates a new Region for every cycle—provided that there is data input during each “pass.” All Regions created in previous cycle passes are automatically muted. If the *Auto create tracks in cycle record* function (described next) is not active, all Regions are layered onto one track. Activation of this function deactivates both of the *Merge* functions.

Auto create tracks in cycle record

While recording in Cycle mode, this option creates a new track with each new cycle pass—provided that there is data input. The recorded Regions from earlier cycle passes are moved down to the track(s) below, with the “oldest” tracks ending up at the bottom of the list. Use of this option deactivates both *Merge* functions. This functionality is useful when attempting multiple takes of a solo, while cycling over a section of music. The recordings made during each cycle pass will appear on their own tracks, making it easy to sort through them, once you have finished recording.

Allow Tempo Change Recording

All tempo changes made while in record mode are recorded. For details on editing these “tempo recordings,” please see the Tempo section (see “Display and Functions” on page 597).

When Beginning: Count In

If Record Pre-roll is disabled, a pull-down menu will be activated, allowing you to set the desired Count In period that precedes a recording.

- *Wait for Note*: keeps running in a “symmetrical” loop of one beat, centered around the start point of the recording, until MIDI events are input. As the loop starts half a beat before the start point, you are allowed up-beat notes of up to half the value of the bar denominator (e.g. with n/4 time, a maximum of 1/8 notes).
- *No count-in*: the recording begins with no count in.
- *x Bar count-in*: x bars of count-in.
- *x/4 Count in*: The count-in’s time signature may be set here. These settings are useful when the count-in falls across a bar change.

When Beginning: Record Pre-roll

If enabled, this parameter allows you to set a pre-roll time in seconds and milliseconds. When recording, this value will be deducted from the current song position.

MIDI

Merge new recording with selected Region

After each recording, all newly-recorded data is merged with all selected Regions on the recorded track, to form one Region. When *Merge new recording...* is activated, *Merge only new Regions in cycle record* is automatically activated as well.

Merge only new Regions in cycle record

When recording in Cycle mode, this function merges all data recorded during subsequent cycles to the Region recorded during the first cycle. It can be used independently of *Merge new recording with selected Regions*.

Auto demix by channel if multitrack recording

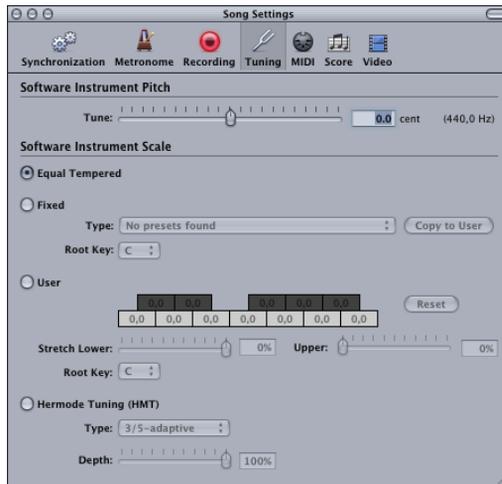
This setting switches between the two multitrack recording modes.

MIDI data reduction

Controller events are thinned out during recording, to reduce the data load on the MIDI bus during playback. This improves the timing of dense arrangements when using interfaces with only a few MIDI ports. The function actually reduces the duration of controller events, using an intelligent algorithm which retains the value at the end of a succession of controller messages.

Tuning Settings

A real-time tuning system is available for use with Logic's software instruments. There are a number of parameter settings that are accessible via the *File > Song Settings > Tuning* panel.



We'll discuss these options shortly, but before beginning, we'd like to cover some basics and background information.

About Alternate Tunings

The twelve tone scale that is currently used in Western music is a development that took centuries. Hidden in-between these twelve notes are a number of other microtones that represent different mathematical ways of expressing the frequency intervals between "tones."

To explain, let's take a look at the harmonic series, and the underlying harmonic theory. Imagine that you have a fundamental frequency of 100 Hz (100 vibrations per second), the first harmonic is double that, or 200 Hz. The second harmonic is found at 300 Hz, third at 400 Hz, and so on. Musically speaking, we know that when frequency doubles, pitch increases by exactly one octave. The second harmonic (300 Hz) is exactly one octave and a pure fifth higher than the fundamental frequency (100 Hz).

From this, you would assume that tuning an instrument so that each fifth is "pure" would be the way to go, right? In doing so, you would expect a perfectly tuned scale, as you worked your way from C though to the C above or below. Close, but no cigar.

To simplify this example, we'll start tuning at a frequency of 100 Hz and we'll call it 'C' (a real 'C' would be closer to 130 Hz). The first fifth would be tuned by adjusting the pitch until a completely clear tone is produced, with no beats (beats are cyclic modulations in the tone). This will result in a 'G' at exactly 150 Hz. This is derived from this calculation:

- the fundamental (100 Hz) $\times 3$ (=300 Hz for the second harmonic)
- divided by 2 (to drop it back into the same octave as your starting pitch).

This relationship is frequently expressed in terms of the ratio 3:2.

For the rest of the scale:

Tune the next fifth up: $150 \times 3 = 450/2 = 225$ (which is more than an octave above the starting pitch, so you need to drop it another octave to 112.5).

Note	Frequency (Hz)	Notes
C	100	$\times 1.5/2$
C#	106.7871	divide by 2 to stay in octave
D	112.5	divide by 2 to stay in octave
D#	120.1355	divide by 2 to stay in octave
E	126.5625	divide by 2 to stay in octave
F (E#)	135.1524	
F#	142.3828	divide by 2 to stay in octave
G	150	($\times 1.5$) divided by two
G#	160.1807	
A	168.75	
A#	180.2032	
B	189.8438	
C	202.7287	

As you can see from the table above, there's a problem!

Although the laws of physics dictate that the octave above C (100 Hz) is C (at 200 Hz), the practical exercise of a (C to C) circle of perfectly tuned fifths results in a C at 202.7287 Hz.

This is not a mathematical error. If this was a real instrument, the results would be clear.

There is, as you can see, a choice. Either:

- each fifth is perfectly tuned, with octaves out of tune, or
- perfectly tuned octaves with the final fifth (F to C) out of tune.

It goes without saying that detuned octaves are more noticeable to the ears.

The Comma

The difference between a perfectly tuned octave and the octave resulting from a tuned circle of fifths is known as the “comma”.

Over the centuries, numerous approaches have been taken to solve this mystery, resulting in a range of scales, and finally arriving at the concept of “equal temperament”.

Other temperaments that have been devised throughout history maximize or emphasize different aspects of harmonic quality. Each compromises in some way or another. Some maximize pure thirds (Mean Tone) while others emphasize pure fifths, at the expense of the thirds (Kirnberger III, for example).

Every temperament has its own “character,” and a given piece of music may sound fine in one key, but awful in another. Transposing a piece to a new key can completely change its character.

Careful attention must be paid to the selection of temperaments for authentic performances of historic keyboard music. The wrong choice could result in an unsatisfactory and historically inaccurate musical experience.

About Equal Temperament

Equal temperament takes the tuning ‘error’ (the comma), and spreads it equally between each step of a chromatic scale. The result is actually a scale of equally mis-tuned intervals, with no interval grossly out of tune, but none in perfect tune. Equal temperament has become the de-facto standard for two main reasons:

- Convenience—Retuning an instrument to a specific temperament that is better suited to a particular piece of music is a hassle. Many instruments are not capable of being alternately tuned (fretted string instruments, for example).
- Portability—All Western musical pieces can be performed (adequately) on an instrument tuned to equal temperament. Obviously, some of the nuances may be missing for pieces that were originally performed in another temperament. On the flipside, pieces that depend on equal temperament may sound terrible by the placement of various mis-tuned intervals.

What is Hermode Tuning?

Hermode Tuning controls the tuning of electronic keyboard instruments automatically during a musical performance.

In order to create clear frequencies for all conceivable fifth and third intervals in all possible chord and interval progressions, a keyboard instrument would require a significantly higher number of keys per octave instead of the usual 12.

Hermodé Tuning can help with this problem: it retains the pitch relationship between keys and notes, while using a controlled program to correct the individual notes of electronic instruments—ensuring a high degree of purity. This process makes up to 50 finely graded frequencies available per note, while retaining compatibility with the fixed tuning system of 12 notes per octave.

How Hermodé Tuning Works

Frequency correction takes place on the basis of analyzed chord structures.

The position of individual notes in each chord are analyzed and the sum of each note's distance to the tempered tuning scale is "zero". In critical cases, different compensatory functions help to keep the degree of re-tuning small, if necessary at the expense of absolute purity.

As an example:

- The notes C, E, and G form a C Major chord.
- To harmonically tune these, the third (the E) needs to be tuned 14 cents (a "cent" is 1/100th of a tempered semitone) and the fifth (the G), needs to be 2 cents higher.

It should be noted that Hermodé Tuning is not static, but rather dynamic. It adjusts itself continuously to the content of the music. This is done for the following reason:

As an alternative to "tempered" or normal tuning, fifth, and third intervals can also be tuned to certain ideal frequency ratios: the fifth to a ratio of 3:2, the major third to 5:4. Major triads will then sound very strong and convincing.

With clean (that is scaled) tuning, Hermodé Tuning changes the frequencies to values that are partly higher or partly lower.

Software Instrument Pitch

Tune

This parameter determines the global tuning of all software instruments. The default is concert pitch A=440 Hz. To adjust, simply grab the slider and move it to the left or right. Detuning is in cent (1/100th of a semitone) steps.

Scale

Activation of alternate tuning scales is achieved by clicking the appropriate radio button in the *File > Song Settings > Tuning pane*. The selected tuning scale will be saved when the song is saved, and reloaded the next time the song is opened.

Equal Tempered

This mode disables any tuning, and uses an equal tempered scale—just like earlier Logic versions.

Fixed Tuning

This option activates a number of fixed tuning Scales and Keys. The *Type* pull-down menu provides you with the most important historic tuning scales, amongst others.

The *Root Key* pull-down menu allows you to select a global key (C–B) for the chosen scale as an easy way to reference the chosen historic scale to any root note.

This mode tunes keys to different degrees of scaled tuning, and delivers a “key signature character”. When playing mostly white keys (in the *Pure* setting, and with C as the *Root Key*), C major will be the main focus, and tuning will be scaled to that chord. An A major chord that is played immediately after a C major (and is therefore subject to C major scaled tuning) will be affected somewhat by the scaled tuning effect, but will not sound completely tempered. If you normally play polyphonic music, this mode (when using the *Pure* setting) will sound most pleasing to your ears.

The Fixed Tuning scales are ideal for a number of Baroque and Mediaeval instruments and styles of music.

User

Each semitone can be detuned from equal temperament in semitone steps. To do so, just click-drag—vertically—on each semitone box until the desired value is reached. Alternately, you can double-click in each semitone box, and type in a value. Press Enter or click on another box to exit the text entry mode.

The *Reset* button will reset all of your tuning adjustments to their default values.

The *Stretch Lower* and *Stretch Upper* sliders can be used to stretch the tuning in the bass and treble, to simulate the “stretched tuning” of some instruments, for example acoustic pianos.

Stretch Lower determines the deviation from the equal-tempered scale in the bass end of the sound. The higher the value, the further down the low notes are tuned. A setting of 0 results in an equal-tempered scale tuning.

The Stretch Upper parameter does the same in the treble end of the sound.

Hermoder Tuning (HMT)

In the Type menu, you can choose between the following options:

3/5-all

This mode provides a broad and regular tuning of pure 5ths and 3rds. In cases of conflict, the degree of purity will be temporarily reduced. This mode can be used for all types of music. The value of the Hermoder Tuning *Depth* parameter indicates the degree of the 5th and 3rd purity. A setting of 100% determines maximum purity. A 10% value is the lowest purity setting. *Off* sets the tuning to an equal tempered scale.

3/5/7-all

5ths, 3rds, and also 7ths are changed in this mode. It is great for Pop and Jazz styles, especially when using held chords. It is less suitable for polyphonic music, as the de-tuning of the natural 7th is quite high. This mode should always be used with a Hermode Tuning *Depth* of 90% or 100%, as other values will render the natural 7th acoustically ineffective.

3/5-adaptive

This mode tunes pure 5ths and 3rds—with changing characteristics. In tonal music, with a clear harmonic center, the center chords are tuned very purely, whereas more distant chords are tuned less purely. If the harmonic center becomes unclear/unfocused, all chords are tuned with equal purity. As with the other mode parameters, a Hermode Tuning *Depth* value of 100% determines the highest purity, and a value of 10%, the lowest purity. *Off* sets everything to equal tempered tuning.

Depth

The clarity and presence derived from scaled tuning isn't everything. Compatibility with normal (equal) tempered tuning is every bit as important—with the key concept being that the changes need to be nearly inaudible.

As all tuning requirements cannot be satisfied simultaneously with any one Hermode Tuning setting, different modes can be selected. Furthermore, degrees of effect between 0% and 100% can be selected.

As a good rule of thumb, when playing with other tempered instruments, a *Depth* of around 70% sounds quite pleasing to the ear.

MIDI Settings

This page can be reached from the main menu *File > Song Settings > MIDI* option or the Option-M key command. These settings determine the behavior of the MIDI inputs and outputs. Simply click on the appropriate tab to access the parameters described in each section.

General: Miscellaneous

After loading Song, send:

Used Instrument MIDI settings

Sends the checked Instrument MIDI Settings (see “Adjusting the Sound of a Track” on page 125) automatically after loading a song.

All fader values

This option causes all Environment fader values (see “Special Functions” on page 246) to be automatically sent after a song is loaded.

MIDI Remote

Global Switch for controlling Logic via MIDI Commands. Clicking on the *Configure* button will launch the Key Commands window (see “To assign a function to a MIDI message:” on page 51).

Scrubbing with Audio in Arrange

This setting is required for simultaneous scrubbing of MIDI and Audio.

General: MIDI Thru

SysEx with MIDI Thru function

Incoming SysEx messages are passed through the computer to the MIDI output(s), along with other MIDI data. This is particularly important when using hardware programmers, as only then will you be able to immediately monitor the changes to the synth you are editing. If you just want to record SysEx dumps, don't select the checkbox. It rarely makes sense to divert dumps through the computer unless you want to record a dump, and simultaneously transmit it to a second device of the same type.

Instrument without MIDI Thru Function

The instrument selected here will not pass events through the computer, when the instrument is assigned to the selected Arrange track. Normally, you would set the “No Output” instrument here.

If your master keyboard does not have a “Local Off” setting, you can use this feature to avoid unwanted note doubling when recording:

- With multitimbral sound sources, assign the instrument (usually channel 1) which plays the part that is heard when playing with the computer turned off.
- With mono-timbral sound sources, assign the instrument which represents the sound generating part of your master keyboard.

In either case, you should turn down the volume control of your master keyboard whenever you are recording tracks for any other instrument.

It is possible to disable MIDI Thru for any MIDI track in the Arrange window selectively, by simply disabling the “R” button to the left of the track name.

General: Software Instruments

Use MIDI Controllers

This pull-down menu allows you determine the behavior of software instruments when addressed by MIDI Controller messages higher than CC #65.

Input Filter

The input filter switches are used to filter out certain event types at the sequencer input. When a switch is enabled (checked), it will filter the corresponding incoming events. You can filter the following event types:

- Note events.
- Program Change events.
- Pitch Bend events.
- Control Changes (such as the modulation wheel of a MIDI keyboard).
- Aftertouch events (channel pressure).
- Polyphonic Aftertouch (polyphonic key pressure).
- System Exclusive data (such as patch dumps from synthesizers).

Chase

This MIDI Song Settings panel is used to alter the Chase Events (see “Chase Events” on page 106) settings.

You can reach this page via the main menu *File > Song Settings > Chase Events* option.

You will see a number of checkboxes that determine the event type(s) that will be chased. If a checkbox is ticked, it indicates that chase events is activated for that event type.

Notes

This button only affects Note On and Note Off events in Regions played by instruments where the No Transpose box is *not* checked.

Sustained

Activation of this checkbox causes Logic to search (before the current playback start point) for any notes that should still be playing because of a sustain pedal message.

In ‘No Transpose’ Instruments

Activation of this checkbox ensures that all notes (including instruments with an active *No Transpose* parameter) are chased. If these are instruments for drum sounds or loops, as is typically the case, this box should *not* be checked.

Program Change

The most recent program change event (before the current playback start point) is sent.

Note: Please keep in mind the time that your sound module may require to respond to an incoming program change event.

Pitch Bend

Pitch bend data is searched for.

Control Changes

If this switch is active, you can switch three groups of MIDI controllers (control change messages, such as modulation, volume, pan, and sustain) on and off individually:

0—15

Controller numbers 0 to 15 are chased. These include the following controllers: modulation wheel, breath, foot, volume, pan, portamento time, balance, and expression, plus the MSB (most significant byte) for data entry and bank selection.

64—71

“Switch” controllers 64 to 71 are chased. These include: sustain, sostenuto, hold 2, soft pedal, and portamento.

All other

All other controller numbers are chased.

Aftertouch

(Channel) Aftertouch data is chased.

Polyphonic Aftertouch

Polyphonic Aftertouch data, generated by pressure sensors under the individual keys of the keyboard controller, is chased.

System Exclusive

The most recent SysEx message(s) in the Regions (before the current playback start point) are transmitted. If a Region contains pre-recorded SysEx fader data, the fader will be set to its correct state at the playback start point.

Note: Chase events cannot always fully restore the correct state of SysEx data at the playback start point. To do so would involve not just searching for, but also analyzing all SysEx messages for the entire song, both before and after the playback start point. Given the non-standardized data structure of SysEx messages, this is completely impossible.

If even a couple of sound parameters have been recorded, each with separate SysEx faders of differing settings before the playback start point, there will be deviations in the sound. To circumvent this issue, try recording controller data for remote-control of the SysEx faders during playback. As chase events searches all controller numbers separately, any sound parameter SysEx settings (that have been substituted with controllers) will be correct at the playback start point. Another advantage to this method is that controller events can be edited graphically in the Hyper Editor, or by using Hyper Draw.

Text Meta Events

Chases lyrics imported from MIDI files.

Chase separate channels in 'All Channels' instruments

This option affects multi instruments with the Channel parameter set to All. All defined event types in Regions that are started part-way through are chased separately for each MIDI sub-channel of the multi instrument.

Chase on Cycle Jump

Switches on the chase events function for cycle jumps (when a Cycle reaches its end point, and returns to the Cycle start point). Notes are only chased in a cycle jump when both the *Notes* checkbox and the *Chase on Cycle Jump* checkbox are activated.

Send full MIDI Reset before Chasing

A full MIDI reset (for all ports and all MIDI channels) is sent before any event chasing begins.

Score Settings

All Score Song Settings are described in the Score Section (see "Song Settings for Score Display" on page 560).

Video Settings

Video Output/DV Mode

These settings are only relevant when a FireWire video device is connected to the computer. They determine the desired output mode.

Sound Output

Determines whether the sound of an imported video is muted or played back via the internal sound system of the computer, or an external sound system (via FireWire).

Preferences

The settings made in Logic's Preferences panels are saved as a number of files in the *\$/User/Library/Preferences* folder. Keyboard shortcuts (key commands) are saved in a separate file in the same folder. Preference settings apply to all songs.

Note: You can't open the Preferences files directly. Any changes must be made in Logic.

Initializing the Preferences...

If you erase any of the Preference files, Logic will create new Preferences files the next time it is launched. All parameters will be reset to their default values. When you erase the Preferences files, you also lose all of your customized key commands.

...and how to do it without losing your keyboard assignments

If you'd like to initialize the Preferences, but don't want to lose your customized key commands, select the *Preferences > Initialize all except Commands* menu item.

Global Preferences

Global Preferences: Song Handling

Hide Windows of inactive Songs

Only the windows of active songs are displayed. All other windows belonging to songs currently in memory are hidden. In this mode, you must use the main *Windows* menu to switch between songs.

When opening a song, ask to close current song(s)?

Whenever you load a new song before closing the old one, a dialog box will appear, and ask whether or not the current song should be closed. If this option is left unchecked, you will not be asked the question, and the current song will remain open.

Empty Trash after saving a Song

After saving a song, Logic's internal Trash is emptied (containing deleted Regions). If the box is not checked, the saved song will still contain the Trash contents. The song's Trash can only be emptied by using the *Empty Trash* key command.

Export MIDI File... saves single MIDI Regions as Format 0

If only one MIDI Region is selected when you make use of the *File > Export MIDI File...* function, the contents of the Region are saved in MIDI file format 0. This file format is guaranteed to be compatible with every MIDI file player.

Automatically open most recent song on startup

Activation of this option will automatically launch the song that you were working on when Logic was last closed.

Auto Backup:

This pull-down menu switches on, and controls the automatic backup (see "Saving Songs" on page 68) function. The menu options are self-explanatory.

Global Preferences: Editing

Right Mouse Button:

This pull-down menu determines the right mouse behavior. Options are: *Is Assignable to a Tool*, which allows any tool to be assigned to the right mouse button. The *Opens Toolbox* option does just that, when the right mouse button is clicked.

Limit Dragging to One Direction In: Matrix and Score

In the Matrix or Score Editors, you can only move notes in one direction (horizontally or vertically), per operation. This means that a note may be either transposed or moved in time, but not both at once. This prevents accidental alteration of one or the other parameter.

Limit Dragging to One Direction In: Arrange

This restricts the direction you can move Regions and folders in the Arrange window, in a similar way to, and for the same reasons, as the option above.

Double-clicking a MIDI Region opens:

This pull-down menu allows you to select which Editor opens when you double-click on a MIDI Region in the Arrange window. Options are the Score, Event, Matrix, and Hyper Editors.

Limit Multiple Undo Steps

Limits the number of Undo Steps (see “Undo” on page 34). Click on the arrows to increase or decrease the number of Undo steps.

Add ‘Last Edit Function’ to Region Name

After performing any edit operation (cutting, for example), the description of the edit operation is added to the name of the arrange Region (or resulting Regions).

‘Living Groove’ connection

When active, this option breaks the “living connection” between a MIDI Region and a quantization template derived from it. If the MIDI Region is edited, this has no effect on the quantization template. If there is no check in the box, editing the original MIDI Region will also alter the quantization template, which will in turn affect all MIDI Regions that are quantized to that template.

Global Preferences: Cycle

Cycle Pre-Processing

In order to ensure a smooth cycle jump, the cycle jump is processed slightly before its actual position. This pull-down menu setting allows you to change the value of the pre-processing time.

Smooth Cycle Algorithm

This improves the timing of cycle jumps, making it easier to set the length of sample loops while in Cycle mode—although this is somewhat mitigated through the use of Apple Loops. If your computer has a very slow CPU, this setting reduces the processing performance for graphic operations. In general, you’ll want to keep this on, whenever possible, especially if you’re working in a style which involves frequent cycling of musical sections. If you find that your Cycled sections are not as smooth as you’d like them (and that your loops are actually perfect), you may wish to disable this parameter.

Global Preferences: Catch

Catch when sequencer starts

Every time you start the sequencer (start or pause), the Catch (see “Relationships between Windows” on page 29) function is automatically switched on, in all windows.

Catch when moving song position

Activation of this option ensures that whenever you move the SPL, the Catch function is automatically switched on.

Allow content Catch by position if Catch and Link are enabled

If the catch and content catch functions are active, the contents of the Region at the current song position are shown. If this option is inactive, the window view still follows the song position within the displayed Region, but does not update to show the contents of subsequent Regions as the SPL passes them in play or record mode.

Global Preferences: Project Manager

Load Project Manager database on program launch

Load Project Manager database on program launch simply defines when the database is loaded. As this takes a few seconds, you can launch Logic without reading the database immediately, thus starting Logic a little faster. The database is loaded as soon as you open the Project Manager window for the first time. Engaging this parameter is simply a matter of taste, and of how often you use the Project Manager. It has no effect on Logic's functionality—apart from the time taken for the database to be loaded.

Check for deleted files after loading Project Manager database

Check for deleted files after loading Project Manager database does exactly what the parameter name says. The check for files that have been deleted by dragging them to the Trash with the operating system shouldn't be necessary, if you're disciplined enough to only "trash" files from within the Project Manager. If your working style isn't quite so "proper", you can ensure that the Project Manager doesn't miss a thing by checking this option. Needless to say, this procedure always takes a little time. If you're relatively disciplined, and only move things to the Trash from within the Project Manager, you can reassure yourself that nothing's been lost by periodically checking for deleted files manually (*Function > Check for modified or deleted files*). If you can maintain this level of discipline, then you can leave this preference unchecked, and save yourself some time.

Search files using:

The following search functions affected by the *Search files using:* preference only deal with a case that should never happen. The case in question involves files that aren't in the location that's been saved with the song or EXS instrument, when loading a song or EXS instrument. In the real world, however, you may occasionally and inadvertently move files on the desktop, without using the Project Manager's copy and move functions.

When opening a song or EXS24 instrument, Logic expects its audio files to be found in the locations saved with the song or EXS file. Even in earlier versions (prior to 6), Logic didn't just offer a file selector box, in cases where files couldn't be found where they should reside. In such instances, Logic would automatically search for the appropriate files with the right names on all disks, in every folder. As you may already know, this procedure could take a little while, especially with complex EXS instruments. This behavior is still possible.

- *Search files using: Search engine Only* instructs Logic to search for every file on all disks, when a song or EXS instrument is opened, and its respective audio files cannot be found. Thus, every possible matching file with the right name will be found, but the search process takes a relatively long time—depending on the number of files and number, and size, of disks to be searched. This search method was used by Logic 5 and earlier versions.
- *Search files using: Project Manager Database Only* instructs Logic to search for the file using the Project Manager’s “knowledge” about the location of every file. If you haven’t scanned the appropriate folders or haven’t performed *Functions > Check for modified or deleted files* (within the Project Manager window) since the problem was created, the search may fail. The benefit of this setting is its speed. If a song or EXS instrument fails to find its associated files, you should rescan and *Check for modified or deleted files*.
- *Search files using: Project Manager Database and Search Engine* instructs Logic to use both strategies for searching. The advantage: Logic will not display an error message while opening a song or EXS instrument if the necessary audio files are on your disks at all. The disadvantage: you will not recognize if an audio file is missing from the Project Manager’s Database.

Global Preferences: Caps Lock Keys

Enable Caps Lock Keys

A further *Enable Caps Lock Keys* option allows you to completely enable or disable the Caps Lock Keyboard functionality.

Space bar acts as Sustain Pedal

Should you wish to use the Space Bar key command (usually Start/Stop), rather than as the Sustain function for the Caps Lock Keyboard (when active), you can disable the *Space bar acts as Sustain Pedal* option.

Show window when active

After familiarizing yourself with the operation of the Caps Lock Keyboard for a while, you may wish to prevent the window from appearing when using it. To do so, disable the *Show window when active* option in the Preferences > Global > Caps Lock Keys menu.

Audio Preferences

Audio Preferences: General

Create Overview after recording

To allow you to view new recordings of audio files in the Arrange window, Logic has to create an overview. Before it can do this, the whole audio file has to be read, which can be time-consuming, depending on the amount of data involved. If you want to continue working in the Arrange window without the waveform display, you can switch off the creation of the overview after the recording. If necessary, the menu option “Update File Information” in the Audio window will recognize that the overview is missing, and create it later.

Force record & convert interleaved into split stereo file(s)

This setting only applies with Universal Track Mode switched off. It stores Stereo Recordings (see “Split and Interleaved Stereo Formats” on page 369) in two separate files instead of one interleaved one.

Plug-In delay compensation

This option is useful for DSP-cards (for example TC PowerCore, Universal Audio UAD-1 and Creamware XTC). It compensates for delays of audio data which might be introduced when using plug-ins with DSP-cards. We recommend turning off this option if no DSP-card is used. This compensation is effective with effect plug-ins inserted in audio and Audio Instrument tracks.

Audio engine overload message

If switched off, the playback will simply stop in an overload situation instead of displaying an alert box.

Sample accurate automation

As the name implies Sample accurate automation is the most precise type of automation. However, it requires more overall system performance. Therefore Logic offers three options:

- *Off*: needs less system performance and might be required for older songs (pre version 5 songs);
- *Volume, Pan, Sends*: the most important parameters are automated with sample accuracy;
- *Volume, Pan, Sends, Plug In Parameters*: all of these parameters are automated with sample accuracy. Please note: not all Audio Unit plug-ins can be automated in this way.

Recording File Type

Lets you the determine the file type of recorded audio files. The options are:

- SDII = SoundDesigner II
- AIFF = Audio Interchange File Format (Default)
- WAVE = Most common Audio Format on Windows PCs

Pass Keyboard Events to Plug-ins

Any key commands that are not used by a plug-in, will be passed on to Logic. Under normal conditions, this ensures that functions like Start and Stop will continue to work. If this is not the case, you may use this pull-down menu's options to define that only certain key combinations will be passed to the plug-in, while all other key presses on the computer keyboard will be received by Logic.

Crossfade Time

Determines a global crossfade time for all crossfade operations in the Arrange window.

Crossfade Curve

Determines a global crossfade curve type for all crossfade operations in the Arrange window.

Audio Preferences: Drivers

The Audio Driver preferences are covered in the Audio Driver chapter (see "Audio Drivers" on page 377).

Audio Preferences: Display

Display Color in Audio Window

If audio regions in the Arrange window are very brightly colored, it can sometimes be difficult to make out the waveform display in the Audio window. You can, therefore revert to a black and white display here.

New Style Audio Objects

This setting toggles the look of the Audio Objects between the old and new (since V 3.0) style.

Open Plug-in window on insertion

With this setting on, the window of a plug-in or a virtual instrument is automatically opened after inserting it in the corresponding slot of an Audio Object.

Audio Preferences: Sample Editor

Warning before process function by key command

Before you carry out a destructive edit in the Sample Editor using a key command, a warning appears—giving you the opportunity to cancel it, before altering the data.

Dependent on the key commands and window combinations you are using, there is a danger of executing edit commands accidentally. To avert any disasters, Logic is preset so that an alert box appears before a destructive audio edit is carried out. If you feel confident that you won't accidentally process a file, you can switch off the alert here.

Clear Undo History when quitting

Switch this on to automatically delete the Undo History for all edited audio files, when you exit Logic.

Record selection changes in Undo History

Switch this on if you wish to undo and redo changes to selected area(s) in the Sample Editor.

Record “Normalize” in Undo History

Disable this parameter if you do not wish to create any undo files once the Normalize function is invoked.

Note: As normalization is generally the last step in sample editing, this parameter (if active) can destroy the undo history. As a safety feature, a warning will be shown if an undo history exists (and the switch is on), providing you with the opportunity to create an undo file.

Number of Undo Steps

This parameter limits the maximum number of recorded undo steps. Use the mouse as a slider to adjust the (number of) step(s) value.

Store undo files in Song Folder

Activate this parameter if you would like the Undo History to be stored in a sub-folder alongside the song.

Note: This is switched on by default if the song is part of a project (see “Projects” on page 59).

Global undo file path

All Undo History files are saved into a “global” location (a user-defined folder) if the *Store undo files in Song Folder* option is not switched on.

Audio Preferences: Surround

Assigning surround channels to audio outputs

The standard settings for the Pro Logic, 5.1, 7.1, and EX formats (each of which is available with or without center speaker) and LCR (Left-Central-Right) are pre-set in the pull-down menu labelled *Show as;* these settings can be edited. Click on one of the nine rectangles to choose an output.

Bounce Extensions

You can see which file name extensions will be applied to the file names resulting from a bounce procedure. Remember that bouncing a surround mix will create more audio channels than your usual stereophonic bounce/mixdown. These extensions are used to identify the files. By clicking them you can edit the extensions.

Audio Preferences: MP3

Bit Rate (Mono/Stereo)

The bit rates are selectable between 8 kbps and 320 kbps, but default to 80 kbps mono, and 160 kbps stereo. These rates offer acceptable quality and good file compression. If you can afford the extra file size, we recommend selecting 96 kbps for mono and 192 kbps for stereo streams for better audio quality. You can, of course, choose even higher rates, but the quality improvement in bit rates above 96/192 kbps is minimal.

Use Variable Bit Rate Encoding (VBR)

Variable Bit Rate encoding compresses simpler passages more heavily than more harmonically rich passages, generally resulting in better quality MP3s. Unfortunately, not all MP3 players can accurately decode VBR-encoded MP3s, which is why this option is off by default. If you determine that the listener/s of your MP3 can decode VBR-encoded MP3s, you can switch this option on.

Quality

Keep this set to *Highest* whenever possible. Reducing the quality will speed up the conversion process, but at the expense of audio quality.

Use Best Encoding

Again, like the *Quality* parameter, if you uncheck this option, you will gain encoding speed at the price of audio quality. This should always be kept on unless conversion time is an issue.

Filter Frequencies Below 10 Hz

When this option is checked, frequencies below 10 Hz (which are usually not reproduced by speakers, and are not audible to human ears at any rate) will be removed, leaving slightly more data bandwidth for the frequencies which we can hear, resulting in an improvement in perceived quality. Only uncheck this if you're experimenting with subsonic test tones, or exporting MP3s for whales...

Stereo Mode

You can select joint stereo or normal stereo mode. Depending on the original file, these settings may (or may not) offer any audible difference. Experiment with both settings to determine your preference.

Audio Preferences: Reset

Send Reset Messages to Audio Instruments:

Reset messages of the specified type (*Control 64 off (Sustain)*, *Control 1 (Modulation) to zero* and *Pitch Bend to center position*) are sent to all active Audio Instrument channels for each of the checkboxes. This may be useful if you are encountering hung notes, or are finding that controller settings are incorrect when in Cycle mode or when returning to the beginning of a section or the Song start point.

MIDI Preferences

This page handles Logic's communication with your MIDI interface and other programs. All active CoreMIDI Drivers are automatically available in Logic. There is no need for further settings.

MIDI Preferences: General

Use UME (Unified Virtual and Classic MIDI Engine)

The Unified Virtual and Classic MIDI Engine unifies the Classic MIDI Engine (used for hardware MIDI devices) with the use of Virtual MIDI Instruments (software instruments). This engine is switched on by default, which is the recommended setting. For compatibility reasons, it can still be switched off, and an alternate MIDI engine will be used.

Note: Not all Arrange features are available for software instrument use (the Loop parameter, for example) when this setting is switched off, so leave it on, unless you're having problems.

External Stop ends Record Mode

If you are using external synchronization, and the time code stops during the recording, record mode is switched off. If there is no check in this box Logic stops, but remains in record mode (record + pause).

Always stop when opening song

With this setting on, a song will always be opened in Stop mode, even if it was saved in Play mode.

Reset All MIDI Drivers

The *Reset All MIDI Drivers* button resets all MIDI drivers. This may help should you experience MIDI communication problems.

MIDI Preferences: Sync

All MIDI Output: Delay:

This slider delays or advances the MIDI Output for all ports, allowing you to compensate for any timing differences between Audio and Audio Instrument tracks, and MIDI tracks. Simply drag the slider to the left or right to set the desired (positive or negative) millisecond value. Alternately, you can type the desired value into the *ms* field.

MIDI Clock: Allow Song Position Pointer while playing

Song Position Pointer data is not normally sent while the sequencer is in play mode (this is in accordance with the MIDI Standard). This option allows Logic to send SPP while the sequencer is running. The advantage is that external devices can also follow Logic in Cycle mode. If your external devices cannot process SPP, you should switch off this option.

Note: If your devices can follow MTC (MIDI Time Code), you should leave this option unchecked, and make use of Logic's MTC functions.

MIDI Time Code (MTC): Pickup Delay

This parameter should generally be set to zero to ensure the quickest possible pickup time while Logic is in MTC sync mode. There are, however, some devices which seem to transmit imprecise MTC commands when first started. As a result, sync might not be perfectly reliable, and there could be an offset every time synchronization is established. In such situations, you can set a delay for MTC pickup, and Logic will ignore the initial MTC commands. A (frame) value of 25 to 30 corresponds to a delay of about a second, depending on the frame rate. Use this parameter when synchronized to hard disk recorders and other devices, if the sync doesn't appear to be consistent.

MIDI Time Code (MTC): Transmit MTC Delay

This parameter allows you to delay the transmission of MIDI Time Code. Negative values result in MTC being transmitted earlier. This facility enables you to compensate for any reaction delays (to incoming MIDI Time Code) in external MTC slaves.

MIDI Machine Control (MMC): MMC Uses:

This pull-down menu offers the following options:

- MMC standard messages: The MIDI MMC specification is strictly followed.
- Old Fostex Format: The old Fostex format is used for MIDI Machine Control.

MMC Output ID (Transport)

The *All* checkbox sends MMC to all ports. The panel to the right allows you to specify an output port ID. To do so, simply type in the desired value.

MMC Input ID (Transport)

The *All* checkbox sends MMC to all ports. The panel to the right allows you to specify an input port ID. To do so, simply type in the desired value.

Transmit MMC Locate Commands When: Pressing Stop twice

This checkbox enables transmission of MMC Locate commands when the Stop command is pressed twice (either on the Transport or by key command).

Transmit MMC Locate Commands When: Dragging Regions

If this option is enabled and Logic is stopped (not in Play or Record mode), MMC locate commands are sent with the position of a Region that is dragged in the Arrange window

Transmit Record enable commands for audio tracks

If this option is enabled, MMC record enable commands are also sent when audio tracks are record enabled (armed) or disabled. In addition, any received MMC Record enable commands will set the record enable status of audio tracks.

MIDI Sync Song Settings

Pressing this button will launch the MIDI Sync Song Settings window.

MIDI Preferences: Reset Messages

This page is only left for compatibility reasons with older MIDI hardware. Logic handles MIDI Reset Messages automatically and intelligently, so you should generally make sure that all options are switched off (this the default).

All selected checkboxes will send a reset message for the selected controller type to all MIDI outputs. This reset message will be sent on Cycle jumps and when playback begins, but the use of these options shouldn't be necessary.

Display Preferences

These parameters alter the general appearance of Logic. Before we take a look at them, we'd like to cover a global setting. Namely changing the:

Interface Language

Logic features a Mac OS X compliant method to set the dialog language:

To set Logic's interface language:

- 1 Select the Logic application in the Finder.
- 2 Press Command-I (to open the Information dialog).
- 3 Select/Flip open the "Languages" section.
- 4 Choose the preferred language, and uncheck all other languages.

Display Preferences: General

Windows: Anti-aliased text

Displays all Logic text strings in the Mac OS X Anti-aliased mode.

Windows: Large local window menus

The title and items of the local menus are displayed using the normal System font. If the is not checked, a smaller font is used instead.

Windows: Wide song position line

A thicker Song Position Line is used.

Windows: Show Help Tags

This enables help tags throughout Logic. As the mouse cursor hovers over parameters and tools, a small pop-up description (or value) of the item will momentarily appear onscreen.

Menus: Use hierarchical pull-down menus

Hierarchical pull-down menus are used in the Arrange window Track List and elsewhere in Logic.

Menus: Sort Instrument menu by layers

The instruments in the pull-down instrument selection menu are sorted by (Environment) layers.

Displays: Display Middle C as:

This pull-down menu option affects the description of notes in the editors. The bottom C on a five-octave keyboard (note # 36) is labeled C1, and middle C (#60 or c') is labeled C3. According to this standard, the lowest MIDI note (# 0) is called C-2. This is the official standard, and is used by most manufacturers. Use of the C3 (*Yamaha*) option will set Logic to this "standard" mode.

Should you select the C4 (*Roland*) option, the bottom C on a five-octave keyboard is labeled C2, and middle C is labeled as C4. In this standard, the lowest MIDI note is C1.

Displays: Zeros as Spaces

In SMPTE times that start with zeros, the zeros will be replaced by spaces when this checkbox option is selected.

Displays: Display SMPTE:

This pull-down menu can be used to set the following options for the SMPTE time display:

- *With Bits*: subframes (SMPTE bits 0 to 79) are shown.
- *Without Bits*: subframes are not shown.
- *With Quarter Frames*: quarter frames are shown.
- *As Feet Frames, 35 mm film*: the display is displayed in feet and frames, for 35 mm film.
- *As Feet Frames, 16 mm film*: the display is displayed in feet and frames, for 16 mm film.
- *With Milliseconds*: the frame fractions are displayed in milliseconds instead of SMPTE bits (also called "subframes"). Don't forget that this value is dependent on the frame rate: at 25 fps, a frame is 40 milliseconds long, at 30 fps, approximately 33 ms.

Displays: Display Tempo As

This pull-down menu can be used to set the following options for the tempo display:

- *Beats Per Minute (BPM, Maelzel)*: beats per minute, to four individually adjustable decimal places.
- *BPM without Decimals*: beats per minute, with no decimal places.
- *Frames Per Click with Eighths*: frames per beat with eighths. After the value, you will see "fpc".
- *Frames Per Click with Decimals*: frames per beat, to four decimal places. Take care, this display can easily be confused with the bpm display.

Displays: Clock Format

This pull-down menu offers various format options for the song position display:

- 1 1 1 1
- 1. 1. 1. 1
- 1 1 1 0
- 1. 1. 1. 0
- 1 1. _ 1
- 1. 1. _ 1
- 1 1 _ 0
- 1. 1. _ 0

Display Preferences: Arrange

Background: Muted regions are textured

Determines the look of muted Regions or MIDI Regions. If this setting is switched off, muted Regions are displayed without color. If it is switched on, muted Regions retain the same color, but are textured, making them easier to identify.

Background: Background Pattern

This allows you to choose an Arrange background pattern (High Resolution Background) or a color for the plain background (*Arrange > View > Plain Background*)

Automation Transparency: Regions

Higher values increase the color intensity of Regions in comparison to the Track Automation area.

Automation Transparency: Other Data

Brightens the display of other automation data (see “Display” on page 315)—other than the one currently active. Note that this functionality is dependent on the zoom level of the Region.

Display Preferences: Other

Environment: Allow ‘All Objects’ layer option

A layer, showing every Object in your Environment, is accessible from the *Layer* menu in the Environment. If this checkbox is not selected, the “All Objects” layer will not be available.

Matrix Background Colors: Background Type

These radio buttons allow you to select a *Dark* or *Light* Matrix editor background color. By default, a Light color scheme is selected.

Matrix Background Colors: Matrix Color Setup Panel

The Matrix Editor (see “Display” on page 468) features a grid that follows the pattern of the keyboard keys shown on the left hand side. The colors of the Matrix window grid, background, lines, and so on can be adjusted for both the “Light” and “Dark” Background views with the parameters in this recessed panel.

- *White Keys:* Double-click on the color swatch to launch the Mac OS X Colors applet. Select or determine the desired color for the grid lines aligned with the white keyboard keys.
- *Black Keys:* As above, for the black keyboard keys.
- *C, D, E Key Brightness:* This slider allows you to intensify the brightness of these specific keys in all octaves, making transposition easier by providing a consistent reference point.
- *Bar Lines/Dotted:* As with the White and Black Keys options, you can select a color for the bar lines. The Dotted checkbox will change the appearance of the solid bar line to a dotted line.
- *Beat Lines/Dotted:* As above for beat lines.
- *Division Lines/Dotted:* As above for division lines.
- *Reset:* This button resets all user changes to default values.

Score Preferences

The Score Preferences are described in detail in the Score chapter (see “Score Preferences” on page 574).

Video Preferences

Adjustments: Video to Song

A global setting for fine tuning the start point of a movie.

Adjustments: External Video to Song

The same setting as above, but for external FireWire Video devices. This setting compensates for the latency of the video hardware in use, if applicable.

Video Thumbnail track: Cache Resolution

Resolution of the thumbnails kept in the temporary internal memory (Cache). Higher resolutions display more detail, but take up more space in the cache.

Video Thumbnail track: Maximum Cache Size

Amount of memory reserved for the thumbnail cache. 40 Mb is recommend for medium resolution. For higher resolutions use a higher value. This section of reserved memory will only be occupied when actual movie data is displayed.

Video Song Settings

This button launches the Video Song Settings window.

Automation Preferences

The Automation preferences globally affect all Automation tracks.

Move Automation with Regions:

This pull-down menu allows you to select what happens to Track Automation data when you move Regions. You can choose between *Never*, *Always*, and *Ask*, which should be self-explanatory. *Ask* is the default setting.

Ramp Time:

The time required by a parameter to return to its previously recorded setting, is selected via this panel. Double-click on the value to enter a new number (in milliseconds).

'Write' Mode Changes To:

This pull-down menu option determines the mode that faders automatically change to once the recording of Track Automation data was completed. Options are: *Off*, *Read*, *Touch*, *Latch*, and *Write*.

Touch/Latch/Write Erase:

The checkboxes in this section determine the types of Track Automation data that can be written in Touch, Latch, and Write Erase modes.

Automation Quick Access:

These parameters are discussed in detail in the Automation Quick Access section (see "Automation Quick Access" on page 320).

Control Surfaces Preferences

The Control Surface preferences are discussed in the Control Surfaces chapter (see "Control Surface Preferences" on page 664).

Logic offers dedicated support for several surfaces plus the option to program unsupported devices. Control surfaces are hardware units that enable the operation of Logic using faders, rotary knobs, switches, and displays.

There are a number of simple control surfaces that feature conventional faders and no displays. More progressive units are equipped with motor faders, rotary encoders, LED rings, and programmable displays. The more feedback a control surface provides, the easier it is to use, as you don't need to watch the computer screen in order to determine what mode the unit is currently in.

Although we recommend the Emagic Logic Control and Logic Control XT, other control surfaces are supported as well.

Logic supports many functions of modern control surfaces. Its modular concept and learning mode allows the addition of support for new control surfaces, or enhancements to existing support. The extensible control surface plug-in architecture allows the full use of all possibilities of a given controller, down to the finest details.

The following chapter describes functions applicable to all control surface models. Specific documentation for various models is available in individual PDF files.

Installation

Control Surface Plug-ins

Dedicated control surface support is achieved through the use of special plug-in files. These files are automatically added when Logic is installed.

They are located in the *Contents > MIDI Device Plug-Ins* sub-folder of the Logic application bundle (to view the bundle contents, Control or right-click on the Logic application icon, and choose *Show Package Contents* from the menu). Logic also checks for control surface plug-ins in the (optional) “/Library/Application Support/Logic/MIDI Device Plug-Ins” and “~/Library/Application Support/Logic/MIDI Device Plug-Ins” (the “~” denotes your user home directory) folders.

When new control surface plug-ins are released independently from a Logic update, please place them in the folders described above (or as advised in the documentation supplied with the plug-in).

The Setup Window

Some control surface units (Logic Control, for example) are automatically detected when Logic is launched. Units which are not detected automatically can be added via the Setup window. This is accessed via the *Setup* option in the *Preferences > Control Surfaces* menu.

Installation is very easy: all you need to do is select the devices that you wish to use in Logic, in the following ways:

- 1 Select *New > Install*, and in the ensuing Install window, select the desired device from the list.
- 2 Press the *Scan (or Add)* button. The selected units will appear onscreen.
 - Optionally, you can also click *Scan all*. This will search for all supported control surface units on all MIDI ports. Please be aware that this may take a while.
 - The *Scan* function, *Setup* window and *Install* window can all be accessed directly in the *Preferences > Control Surfaces* menu.

Rebuild Defaults

The *Preferences > Control Surfaces > Rebuild Defaults* option re initializes the support of all connected control surfaces.

The Install Window

The Install window is used to automatically scan for devices, or to install them manually.

Selecting the Models

First, select the desired devices in the *Install* window before you scan or manually add them. You may select one or more models. If you select more than one model, Logic performs the desired operation for each model in turn. Logic displays the icon of the selected device beneath the buttons.

- To select just one model, select it by clicking on the name.
- To select more than one model, select them with Shift held down.

Scanning

Click the Scan button to start the process. You can also press Enter or double-click the device name. Logic will then analyze your MIDI system, and will automatically install the devices it finds, including the correct connection settings.

This option is preferable to manual installation, as Logic is able to gather the maximum amount of information about the devices.

Scan All

If you don't want to select the models to be scanned manually, simply click this button. Logic will then scan for all supported models. This can take some time.

The *Scan All* function is also directly available via *Preferences > Control Surfaces > Scan*. This will automatically scan all MIDI ports for all supported control surfaces.

Manually Adding Devices

Some control surfaces don't support automatic scanning. Such devices must be added manually to your setup. In this scenario, you will need to manually set the MIDI In and Out port parameters.

To manually add the selected devices to your system:

- click the *Add* button,
- or Option–double-click on one of them.

If a control surface of the selected type already exists in your setup, you will be asked whether or not you really want to add the new device. You will need to manually alter the MIDI In and Out port values in the device parameters to match those of the connected unit.

Done

Once you have completed the scanning or installation of the devices, click *Done*. The window will close.

Setup Window Parameters

Control Surface Groups

If you have multiple control surface units, you define how they relate to each other, and can build *Control Surface Groups*. A Control Surface Group consists of a number of control surface units of the same kind which are combined to create a single, unified (and larger) control surface.

You can build up to 20 Control Surface Groups. Each “group” can consist of any number of physical units. The only limiting factor is the number of available MIDI In/Out ports.

When multiple control surface units are combined, you can independently define the default behavior for each physical device. This is discussed in the Setup Window Device Parameters section.

- To build a Control Surface Group out of several units, simply arrange their icons in the Setup window in a single horizontal row by dragging each icon to the desired onscreen location. The order of the icons from left to right also defines how the tracks and parameters are arranged on the units.
- To use two control surfaces independently, arrange them in separate rows—that is one above the other.

Here is an example with two Logic Control, three Logic Control XT units and a HUI: Computer icon connected to three rows, as below:

Row 1—XT #1 | XT #2 | Logic Control #1

Row 2—Logic Control #2 | XT #3

Row 3—HUI

The top row, consisting of Logic Control XT #1, Logic Control XT #2 and Logic Control #1 form a single Control Surface Group with 24 channels. XT #1 controls channels 1 to 8, XT #2 controls channels 9 to 16, and Logic Control #1 handles channels 17 to 24.

Logic Control #2 and Logic Control XT #3 form a second Control Surface Group, displaying, say instruments (on channels 1 to 8) and busses (on channels 9 to 16).

The HUI forms a single unit control surface group.

Each Control Surface Group has individual settings, such as *Flip Mode*, *Fader Bank Offset*, *Plug-in Parameter Bank Offset* and others. This allows you to access, edit, and automate different sections of Logic’s mixer.

In our example, the three units in the top row could be used for control over audio tracks and MIDI channels. In the middle row, Logic Control #2 could be used for Audio Instrument channels 1 to 8, and XT #3 could be used for busses. The HUI might edit group definitions. The physical placement of units, and the way you use them, is entirely up to you.

Note: The placement of your control surface units in relation to each other should be the same onscreen as in the real-world. Simply drag 'n drop the desired icon horizontally in your Control Surface Group to do so.

Device parameters

Each control surface unit must be connected to an independent MIDI In and Out port. The automatic setup or *Scan* procedure should have automatically found, and set, the correct MIDI In/Out port settings for each unit.

In the event that the MIDI In or Out port identification is incorrect, you can manually select the appropriate one for the unit. To do so, click-hold on the *MIDI Input* and *Output* pull-down menus, and select the appropriate port(s) of your MIDI interface.

Some devices allow you to define a device ID (or global/basic channel). This can be set in this area. Module name, model name and firmware version are also displayed in the device parameters.

Special Parameters

Some control surfaces may allow the definition of “special” parameters. An example of this is fader touch sensitivity. Such parameters can be found in the *Special Parameters* area. A detailed description can be found in the documentation of the particular control surface plug-in.

Control Surface Group Parameters

The following parameters are shown in the Setup window. They apply to the Control Surface Group associated with the selected device, and allow you to set each group up to meet your needs. This facility is of great benefit when multiple Control Surface Groups have been created.

Many (if not all) Control Surface Group parameters can also be changed directly from the control surface. The parameter display in the Setup window is for information purposes only.

Any changes to settings (made here, or on the control surface) are saved in a preferences file, which is independent of the Logic program preferences: it's named “com.apple.Logic.cs”, and is located in your *\$/home directory/Library/Preferences*.

Display Parameters

Flip Mode

Many control surfaces offer both a fader and a rotary encoder for each channel strip. *Flip Mode* allows you to swap the encoder assignment with that of the fader for each channel. Alternately, you can assign both controls to the same parameter.

There are four “flip” or “swap” modes.

- *Off*—disables *Flip Mode*, making the fader act as a volume control.
- *Duplicate*—makes both the fader and encoder active for the currently selected encoder parameter.
- *Swap*—swaps the fader and encoder, making the fader a Pan control and the encoder a channel volume control, for example.
- *Mute*—disables the faders. This is useful for situations where recording is taking place in the same room as the control surface, and you wish to avoid the mechanical noise of the faders. Any existing automation data will still function as per normal.

Display Mode

If there is insufficient space available for the display of both the parameter name and value (on the control surface LCD), you can specify what is displayed here:

- *Value*—displays the parameter value
- *Name*—displays the parameter name

Clock Display

- *Beats*—the song position display shows Bars/Beats/(optional) Sub Division/Ticks
- *SMPTE*—As above, but in Hours/Minutes/Seconds/Frames

Note: The exact elements displayed, and thus their positions, depend on the selected SMPTE or bar/beat display option defined in Logic’s Preferences.

Track View Mode

This parameter determines which tracks or channels are displayed:

- *Mixer*—displays channels in their order of appearance in the Track Mixer window (while Global mode is disabled). Instruments/channels used by multiple tracks are merged into one channel.
- *Global*—displays all Objects of certain type(s)—MIDI or Bus channels, for example—independently of their usage by tracks. They merely need to be defined as an Environment Object. The Object types to be displayed are defined by another parameter which is not shown in the parameter list. If a control surface supports switching to Global View, it also allows you to define which Objects to display.
- *Arrange*—displays channels in their order of appearance in the Track List of the Arrange window, including multiple tracks using the same instrument or channel. The Hide button status is taken into account, with tracks hidden in the Arrange window also being hidden on the control surface.

Mixer View Fader Bank

This parameter affects the *Mixer and Arrange View* mode by shifting channels by the defined amount. Imagine that your control surface has eight channel strips, and you were looking at audio tracks 1—8 in the Arrange window. These would appear as channels 1—8 on the control surface. Using the *Mixer View Fader Bank* parameter, you could offset this view by a defined number of channels, looking at audio tracks 3—11, for example.

Global View Fader Bank

The *Global View Fader Bank* parameter does the same thing as the *Mixer View Fader Bank*, but only applies if multiple Object types are enabled. When single Object types are enabled, there are separate fader bank parameters (these aren't displayed in the parameter list).

Track/Channel Parameters

Track Parameters

Defines the current Track Assignment behavior for the encoders. Options are:

- *Volume*—adjusts channel volume.
- *Pan*—adjusts channel panorama.
- *Mode*—adjusts/selects channel mode (mono/stereo).
- *Input*—adjusts/selects channel input source.
- *Output*—adjusts/selects channel output (main outs/busses/surround).
- *Automation*—adjusts/selects channel automation mode.
- *Group*—adjusts group membership of the track. Editing the parameter allows you to set either no group or a single group. Enabling membership of multiple groups is not possible here.
- *Displayed parameter*—adjusts the automation parameter displayed in the Arrange window. This is especially useful if you set the control surface to Arrange View mode, and your Arrange window shows multiple sub-tracks with various parameters.

Surround Parameter

Defines the default Pan/Surround Assignment behavior for the encoders. Options are:

- *Angle*: adjusts surround angle.
- *Diversity*: adjusts surround diversity (direction).
- *LFE*: alters LFE level.
- *Mode*: switches between the various Surround formats.
- *X*: adjusts surround x position.
- *Y*: adjusts surround y position.

Note: The X and Y parameters are a different representation of the Angle and Diversity parameters, and thus are independent from them. The X and Y parameters support the use of surround joysticks.

EQ Band

EQ Band allows you to select the current band in the *EQ Multi Channel View*.

EQ Parameter

Related to the selected band, defined by the *EQ Band* parameter. This determines the current EQ Assignment behavior for the encoders in *EQ Multi Channel View*:

- *Frequency*—Determines the frequency of the selected band.
- *Gain*—Changes the gain of the selected EQ band. For the Low Cut and High Cut bands of the Channel EQ, this parameter controls the slope.
- *Q*—Changes the Q factor of the selected band.
- *On/Off*—Bypasses the selected EQ band.

EQ Parameter Page

Defines the first EQ parameter displayed in the *EQ Channel Strip View*. This parameter is required if the Control Surface Group displays fewer than 64 parameters simultaneously.

Send/Plug-in Parameters

Send Slot

Determines the currently selected *Send* slot. Normally, a value of 1 would be used, as this accesses the first (top) Send on each channel. A value of 2 accesses the second Send, and so on, up to the eighth Send. The Send slots are accessed by pressing the *Up/Down* buttons.

Send Parameter

Defines the currently displayed encoder Send parameter when in the *Send Multi Channel view*:

- *Destination*: encoder is used to determine the Bus channel number for the Send slot.
- *Level*: encoder is used to adjust the Send level.
- *Position*: Sets Pre and Post fader modes.
- *Mute*: Mutes/Unmutes the selected Send slot.

Send Parameter Page

Much like the EQ parameters, up to 32 parameters are available in *Send Channel Strip View* on a given channel (8 Send slots multiplied by the four parameters listed above). *Send Parameter Page* determines the current page for these parameters.

Split: no. of upper parameters

Control surfaces that support split mode allow the display of two separate parameter sections within one plug-in (or even different plug-ins). They are called Split Upper and Split Lower.

This parameter defines how many encoders belong to Split Upper, leaving the remaining encoders to Split Lower. A value of 0 means that Split Mode is off—all encoders then belong to the Split Upper area.

Instrument Parameter Page

Determines the parameter index (counted from 1) which is assigned to the left-most encoder when editing a software instrument. The next Instrument parameter is assigned to encoder #2, and so on.

With Split Mode enabled, this applies to Split Upper.

Inst Parameter Page (Split Lower)

As with Instrument Parameter Page, but for Split Lower.

Insert Slot

Determines the current insert slot number for both selecting a plug-in (in *plug-in Channel Strip View*) and editing its parameters. A value of 1 accesses the first (top) plug-in slot on each channel. A value of 2 accesses the second plug-in slot, and so on.

With Split Mode enabled, this applies to Split Upper.

Insert Slot (Split Lower)

As with Insert Slot, but for Split Lower.

Plug-In Parameter Page

As with Instrument Parameter Page, but for editing plug-ins. Having these parameters separate allows you to quickly switch between editing an instrument and a plug-in on a track, without the need to adjust the parameter page every time.

With Split Mode enabled, this applies to Split Upper.

Plug-In Parameter Page (Split Lower)

As with Plug-In Parameter Page, but for Split Lower.

Track

Specifies the currently displayed track for Channel Strip Views.

With Split Mode enabled, this applies to Split Upper.

Track (Split Lower)

As with Track, but for Split Lower.

Track Lock

When this parameter is set to “on,” selecting a track in Logic does not change the Track and Track (Split Lower) parameters. In other words, the control surface group continues to display the same track, independent from the currently *selected* track.

When Track Lock is disabled, the control surface group automatically switches to the selected track, whenever a track is selected.

Other Parameters

Track Name Format

Changes the track name display to show the track name alone, or the track name, and its track number. As an example, a track named “Audio1” may actually be placed on track 12 in the Arrange window. When a value of *#:Name* is toggled, “Audio1” would be displayed as “12:Audio1”.

Parameter Page Shift Mode

Defines whether the parameter is shifted by an entire “page” or by one parameter.

Relative Change Mode

This determines the behavior of assignments with a relative value change mode (e.g. rotary encoders).

- *Coarse*: the parameter can be adjusted in coarse steps.
- *Full*: the parameter value is set to its minimum if $\Delta < 0$. If greater than 0, it is set to the maximum. This way, you can jump to the last or first track instead of the next or previous bank.
- *Fine*: the value is incremented/decremented in fine steps—one tick/by one “unit”. In this mode, the adjustable resolution is ignored, and the highest possible resolution is used instead. As an example, using the Sample Delay parameter: every encoder rotation tick in/decreases the value by 1 ms, no matter what the value of the resolution.

Coarse is the mode used by default.

Mix Group

When in Group Edit mode, this parameter defines the edited group.

Group Parameter Page

As with Instrument Parameter Page, but for the parameters of the edited group.

Control Surface Preferences

The Control Surface preferences window is accessible via the *Logic Menu > Preferences > Control Surfaces > Preferences* menu.

General

Resolution of Relative Controls

This defines the default resolution of controls that change values in a relative manner. The default is 128 steps.

As an example: adjusting the Sample Delay (value range 0 to 4000 ms) in/decreases the value by 40 ms with every encoder rotation “tick”, if resolution is set to 100.

Maximum MIDI Band Width

This slider determines the maximum amount of MIDI bandwidth that can be used by your control surface. By default, this is set to 50%, which should be suitable for most situations. You can adjust the value if you find that your MIDI or Automation playback is being affected.

Touching fader selects track

Activation of this parameter will automatically select the track that corresponds to the selected fader. You require a device that features touch-sensitive faders for this functionality to work.

Jog resolution depends on horizontal zoom

If your control surface features a jog/shuttle wheel (or similar), the precision of any scrubbing is affected by the horizontal zoom level of Logic. To retain a consistent resolution, regardless of Logic window zoom levels, disable this checkbox.

Pickup Mode

Enable this option to activate Pickup Mode. Pickup Mode is used by Controller Assignments that use a *scaled* value mode and have either; no feedback or local feedback (when the user operates the control, feedback occurs locally due to the control's mechanical nature). In Pickup Mode the current value must be reached ("picked up") by the control before a value change can occur. This link is broken (Pickup Mode is non-functional) whenever the parameter changes its value by playing back existing automation data. In this mode, move the control towards the parameter's current value (which is then "picked up") if you want to change the parameter with the control. When the Pickup Mode option is disabled, adjusting a fader modifies the parameter immediately.

Multiple Controls per Parameter

These parameters determine whether one, or multiple, encoders are used per parameter when editing effect plug-ins or software instruments.

When multiple encoders are used per parameter, the encoders are subdivided into groups (for example 1/2, 3/4, 5/6, 7/8). The first encoder of each sub-division controls the parameter shown in the display. The remaining encoder(s) are inactive.

Using more than one encoder per parameter shows fewer parameters at any given time, but you gain space on the LCD to cater for longer parameter names and values. The more control surfaces you have within a Control Surface Group, the more you benefit from this feature.

The *Multiple controls per parameter* pull-down menu defines the maximum number of encoders which will be used for a single parameter.

- 1: parameters are always displayed using one encoder per parameter, with the least space available for parameter name and value in the LCD.
- 2: on each unit, encoders 1 and 2 are used for the first parameter, encoders 3 and 4 for the second, and so on.
- 4: on each unit, encoders 1 to 4 are used for the first parameter, encoders 5 to 8 for the second, and so on
- 8: on each unit, encoders 1 to 8 are used for the first parameter, and so on.

The default setting is “2”.

Only when all Parameters fit in one Page

When this option is checked, the defined number of encoders are only used when there are sufficient encoders available to show all parameters without changing pages.

As an example:

- You have a Logic Control and two Logic Control XTs, providing you with 24 encoders.
- A plug-in with 13 parameters will be shown with one encoder per parameter. Eleven encoders will remain unused.
- A plug-in with 11 parameters will be shown with two encoders per parameter. Two encoders will remain unused (and of course the inactive encoders of the above mentioned sub-divisions).

When the option is unchecked, multiple encoders are used for each parameter, which may require scrolling. This would not be the case if only one encoder was used for each parameter.

Show Value Units For:

Allows you to adjust whether parameter values will be appended by the measurement “unit”, where applicable—“Hz” or “%”, for example. You can set this option separately for *Instrument/Plug-in parameters* and *Volume and other parameters*. If you can do without the value units, the display is less cluttered.

Controller Assignments

The *Controller Assignments* button launches the Controller Assignments Editor.

Setup

The Setup button launches the Control Surfaces Setup window.

Help Tags

Control Surfaces that have freely programmable displays which cover multiple controls in one row, can use Control Surfaces help tags. These help tags are similar to Logic's help tags, showing additional information during operation. You can define the information that is displayed in the help tags pane of the Control Surfaces preferences.

While Editing Show Long Names For:

- *Parameter Name*—While editing a parameter, the upper LCD line displays the full parameter name, rather than an abbreviated form of it.
- *Parameter Value*—While editing a parameter, the lower LCD line displays the full parameter value. If the *Show value unit for Parameter* box (see below) is checked, it will be appended by the measurement unit, where applicable—“dB”, “Hz” or “%”.

Note: The following options only have an effect if at least one of the two parameters above is active.

Display duration (s)

Use the mouse to adjust the time that parameter names and values remain on the LCD display, following selection/adjustments.

Allow multiple info

This determines the behavior when you edit multiple parameters simultaneously. When enabled: the long name info remains in the display, until the most recently edited parameter's display times out. This may cause overlapping text. When disabled: the long name display is only shown for the most recently edited parameter. This can cause flicker.

Show info when selecting tracks

When this option is checked, and you select a track, you will see “Selected” in the upper row, and the selected track's name in the lower row of the LCD. You can disable this feature, if you find it disconcerting.

Show info when editing volume

When this option is checked, and you edit a track's volume, you will see “Volume” in the upper row and the new volume value in the lower row. You can disable this feature, if you find it disconcerting.

Show Value Units For:

Allows you to adjust whether parameter values will be appended by the measurement “unit”, where applicable—“Hz” or “%”, for example. You can set this option separately for *Instrument/Plug-in parameters* and *Volume and other parameters*. If you can do without the value units, the display is less cluttered.

Note: This parameter only applies while editing.

Customizing Control Surfaces

Logic allows you to reprogram existing assignments for supported control surfaces and to program new assignments for unsupported control surfaces. This facility allows you to extend the use of faders, knobs, and switches, either directly or through the use of modifier commands. As an example, the F1–F8 buttons of the Logic Control are assigned to recall Screensets 1–8 by default. When reassigned directly, or combined with the Shift, Option, Control, and Command modifiers (used in any combination), you can freely assign any command to these function keys (F1–F8).

To assign a MIDI control to a parameter:

- 1 Click the destination parameter that you want to “teach” Logic.
- 2 Activate Learn by pressing Command-L (default), or via the *Logic > Preferences > Control Surfaces > Learn Assignment for “xxx”* menu option (the parameter name is appended to the menu item text).
- 3 The Controller Assignments window is opened, with the *Learn Message* button enabled.
- 4 A help tag will indicate what needs to be done next (move control, for example).
- 5 After the first message has been received, you can assign another MIDI control by simply clicking the desired parameter and operating the desired MIDI control. This allows you to learn multiple assignments in one go.

Note: If no MIDI messages are received, releasing the Command (modifier) key(s) leaves the *Learn Message* button enabled, allowing you to immediately retry the generation of the intended control message. You will need to disable the *Learn Message* button manually, once the procedure is completed.

To abort the learn procedure:

- Either press Command-L a second time, or click the *Learn Message* button. You can re-enable the *Learn Message* button to assign a message.

To delete a MIDI control assignment:

- 1 Click the destination parameter that you would like to delete.
- 2 Select *Edit > Clear* from the main menu bar.

To assign a control surface button to a key command:

- 1 Select the desired key command in the Key Commands window.
- 2 Click the *Learn New Assignment* button.
- 3 Press a control surface button that sends a MIDI message.

Note: After about 5 ms, the *Learn New Assignment* button is automatically deactivated to prevent recording of a button release message.

It is also possible to assign a key command to a button/key release message:

- 1 Press and hold the desired button/key before you enable the *Learn New Assignment* button.
- 2 When you release the button/key, the selected key command is assigned to the button release message.

To delete a key command assignment:

- 1 Select the desired key command in the Key Commands window.
- 2 Press the Backspace key.

Shortcuts for Defining Multiple Assignments

If you would like to make multiple assignments for a number of consecutive parameters, Logic offers you a shortcut. You can assign the first parameter and the last parameter of a row to two controllers. Provided that the controller number distance is the same as the parameter distance, Logic will offer you, to assign the parameters in between to the corresponding controllers automatically.

Example 1: assign faders 1 to 16 to volume of tracks 1 to 16

- 1 Learn volume track 1 for fader 1.
- 2 Learn volume track 16 for fader 16.
- 3 As the track “distance” (15) is the same as the controller number distance for the two most recently learned assignments, the following message appears: “It seems you have just defined two assignments for the first and last of a consecutive row of parameters. Would you like to fill up in between?” Select OK to automatically fill the faders with corresponding Volume assignments for each track.

Note: This feature also works for any other track parameter (Pan, Solo, Mute, and so on).

Example 2: assign knobs 1 to 16 to plug-in parameters 1 to 16

- 1 Learn parameter 1 for knob 1.
- 2 Learn parameter 16 for knob 16.

Note: The parameter enumeration is shown in the Plug-in window’s Control view.

- 3 As the gap between parameter numbers (15) is the same as the gap between controller numbers for the two most recently learned assignments, the following message appears: “It seems you have just defined two assignments for the first and last of a consecutive row of parameters. Would you like to fill up in between?” Select OK to automatically fill the knobs with corresponding Parameter assignments for each.

Note: This feature also works for instrument parameters. Currently, this only works for knobs that send a single channel message, where the first data byte is the controller number and the second data byte is the value. Alternatively, the controller number can be encoded in the MIDI channel, with a fixed first data byte.

Zones, Modes, and Assignments

You can define “groups” of controls on a control surface that can be switched between different operating modes. As an example, the Logic Control rotary encoders can be used to control Pan, Send Level or plug-in parameters.

Such “groups” are called *Zones*. The different operations that can be performed within a Zone are called *Modes*.

A Zone contains one or more Modes, one of which is the active Mode. A Zone may also contain mode-less assignments—assignments which are always active.

The reason for this structure is that you can place mode-less assignments nearer to the modal assignments they are associated with. As an example, where pressing and releasing the Option button switches between two modes for the Function keys of an assignment.

A Mode contains any number of assignments. Only the active Mode’s assignments are processed for incoming MIDI and feedback. Assignments of inactive Modes are ignored.

A Zone’s active Mode can be switched by special Assignments (see below).

There can be multiple Zones. As examples, one for the encoders and a second one that switches the F1 to F8 keys to different functions.

Zones and Modes can be defined across multiple control surfaces, to create Control Surface Groups.

You can visualize the Control Surface System as a hierarchical list. As an example:

Zone 1

- Mode-less Assignment
- Mode-less Assignment
- *Mode 1*
 - Modal Assignment
 - Modal Assignment
- *Mode 2 (active)*
 - Modal Assignment
 - Modal Assignment
 - Modal Assignment
 - Modal Assignment
- Mode 3
 - Modal Assignment

Zone 2

- Mode 4 (active)
 - Modal Assignment
- Mode 5
 - Modal Assignment
 - Modal Assignment

Reassigning a Control

If you want to reassign a control, the procedure depends on the current state of the control.

Case 1: Control is currently active (an assignment for this control is part of an active Mode).

If you attempt to learn an assignment for an “active” controller, the following message is displayed: “This control is currently assigned to xxx. Do you want to reassign the control?”

- *Cancel*—Deletes the learned assignment.
- *Parallel assignment*—Retains the new assignment. Typical usage: one knob controls multiple parameters as a macro.
- *Reassign*—Deletes all existing active assignments for this parameter. Typical usage: reassigning an F1 to F8 key to a new key command.

Case 2: Control is currently inactive (an assignment for this control is part of an inactive mode).

The learned assignment is moved to the active mode of the zone where the inactive assignment was found.

Typical usage of this facility: Supported control surfaces have empty user pages available, allowing for new encoder assignments. You would select user mode, and then learn an assignment for the encoder.

You can define multiple pages for a control surface.

Cases 1 and 2 can occur simultaneously.

The Controller Assignments Window

The Controller Assignments window is opened via the *Logic > Preferences > Control Surfaces > Controller Assignments* menu item.

It allows you to edit all assignments of the Controller Assignments table. This table is a part of the Control Surfaces Preferences and is stored (along with all other control surface support settings) in the `~/Library/Preferences/com.apple.Logic.pro.cs` file.

The Controller Assignments window offers two view modes: *Easy* and *Expert*. The view modes can be switched via the Expert View option at the top of the window.

Easy mode is designed to make learning Track parameter assignments as fast and efficient as possible. Therefore this window only shows Track parameters—at least when you first open it. After switching to Expert view and manually choosing another parameter class, the according parameters are also shown in Easy view. However, we strongly recommend to use Easy view only for Track parameter assignments.

Easy mode offers an overview of the following parameters:

- Control Name (*Learned* for unsupported devices; name of control for supported devices)
- Track (default): This field can be used to specify the track parameter you would like to assign. You can choose between the following options: Fader Bank, Selected, Index, Output, Bus, Master. In the numerical input field to the left of the Track pop-up menu, you can enter the number of the desired parameter.
- Parameter: Displays clear text of the addressed parameter.
- Input message: Displays the incoming message data.

Note: For details on the abovementioned Assignment parameters read the “Assignment Parameters” section on page 673. For a full view of all parameters, enable the *Expert View* option.

Only the parameters of one assignment are visible. You can choose the desired assignment with the left/right arrows at the bottom of the window. If you activate the Follow option at the top of the Controller Assignments window, the window always selects the assignment that matches the most recently received incoming MIDI message.

In Expert mode, there are four re-sizable columns:

- *Zone*—Selects the Zone that contains the Modes and assignments being edited. The first entry “(No Zone)” is for zoneless assignments. Double-click a Zone name to edit it.
- *Mode*—Selects the Mode that contains the assignments being edited. The first entry “(No Mode)” is for mode-less assignments. Double-click a Mode name to edit it. Selecting a Mode in the list also makes it the Zone’s active Mode. The active Mode is marked with an arrow.
- *Control/Parameter*—Selects the assignment displayed in the editor to the right. Multiple selection is possible for operations in the Edit menu. In this scenario, however, only the first selected assignment is displayed. The left column displays the control name, the right column the controlled parameter (in an abbreviated form).
- *Assignment Parameters*—Displays all parameters of an assignment. See the next section.

Assignment Parameters

The following section explains all parameters that can be edited in the Controller Assignments window.

Control Name

Name of the control (Fader 1, for example). This is *Learned* by default for assignments created with the Learn function (see above) from supported control surfaces. This name is for informational purposes only and has no influence on functionality.

Label

Text displayed on control surfaces that feature a display and are supported by a plug-in. A @ character starts an escape sequence which acts as a placeholder for dynamically generated text. The escape sequence consists of three characters: @ and two additional characters:

First Character:

Character	Meaning
t	Track
r	Surround
s	Send slot
S	All Sends
e	EQ band
E	all EQs
p	Plug-in Insert slot
i	Instrument

Second Character:

Character	Meaning
#	Number of above (track number, Send slot, EQ band, Plug-in slot)
n	Name of above
p	Name of parameter addressed by the assignment
P	Name of first parameter
o	Parameter offset, counted from 1
O	Maximum parameter offset, counted from 1
b	Parameter bank (= parameter offset/bank size), counted from 1
B	total number of banks (= parameter offset/bank size), counted from 1

Example: "Send@s#" shows "Send1", "Send2" and so on.

Flip Group

When set (to any value other than “none”), this number defines a counterpart for Flip Mode. By setting a fader and an encoder to the same Flip Group, for example, they are coupled. To set “none,” enter 0.

Exclusive

Only for supported control surfaces: when the Exclusive checkbox is enabled, the assignment deactivates all other assignments that have *Exclusive* disabled (for the same control). This lets you limit the overwriting of a mode-less assignment to particular modes.

Example: Faders normally control volume. If you want to have a mode where faders control send level, enable *Exclusive*.

Class

This pop-up menu can be used to define the assignment class or, put another way, what type of destination parameter is controlled. The following section explains all available Class options.

Mode Change

The Mode Change option allows you to use an assignment to activate a mode in a Zone. An additional Mode pop-up menu appears below the Class menu, offering different Modes you can switch to. As an example: The *Assignment* buttons on a Logic Control choose several Modes for the encoders.

Note: The Mode that is recalled also depends on the option set in the Value section’s Mode menu (see the “Mode” section on page 680). The following table explains how the different Value Modes take effect.

Value Mode option	Explanation
Direct	The stated Mode is activated in the Zone it belongs to. It is not necessary for the Mode Change assignment to be located in the same Zone. Example: While Shift is held down, button X switches the encoders to EQ view. The Shift and X buttons are in Zone A, but the encoders are in Zone B. All other value modes: Only the Modes of the Zone the Mode Change assignment is located in can be recalled. The destination parameter minimum is this Zone’s first Mode, and the maximum is the Zone’s last Mode.
Toggle	A button might toggle between the Zone’s first Mode and the stated Mode
Relative	Useful for stepping up and down through Modes of a Zone using two buttons, or for choosing a mode using an encoder.
Rotate	Useful for stepping through all modes using a single button. A jog wheel, for example: Off → Scrub → Shuttle → Off

Global

The Global option allows you to use an assignment to control global parameters. An additional Global pop-up menu appears below the Class menu, offering the parameters listed in the following table.

Global Options	Explanation
SPL	Song Position Line; Text feedback in format of foreground window (beats or time code)
SPL (Beats)	Song Position Line; Text feedback in beats format
SPL (Time Code)	Song Position Line; Text feedback in time code format
SPL (Beats, Scrubbing)	Song Position Line; Text feedback in beats format. Value change does not set SPL directly, but initiates scrubbing. The value defines the scrubbing speed
Move Locators	Moves left and right locators
Left Locator	Sets left locator
Right Locator	Sets right locator
Move Drop	Moves Drop In and Drop Out locators
Drop In Locator	Sets Drop In locator
Drop Out Locators	Sets Drop Out locator
Marker Position	Edits position of current marker
Marker Length	Edits length of current marker

Note: All options listed in the table above work only in relative mode. See the “Clock Part” sub-parameter.

Global Options	Explanation
Nudge selected Regions/Events	Nudges the selected Regions or events by the chosen Nudge Value (see below)
Any Solo	Feedback only, used for “Rude Solo Light”. On if there is any Solo (track or Region) enabled
Nudge Value	Nudge Value used for <i>Nudge selected Regions/Events</i> . Possible values are: <i>Tick, Format, Beat, Bar, Frame, 1/2 Frame</i>
Scrub Status	Sets the scrubbing status for parameter SPL (beats, scrubbing). Possible values are: <i>set clock, audio scrubbing, Shuttle</i>
Automation of all tracks	Sets the automation mode of all tracks. Possible values are: <i>Off, Read, Touch, Latch, Write, MIDI</i>
Alert Text, Alert Button, Alert Icon	Used by plug-ins to define special alert mode.
Dummy	No function; Used to temporarily disable a mode-less assignment, using “Exclusive”
Cycle	Sets Cycle mode
Drop	Sets Drop mode
Go to Marker	Sets the SPL to marker number

Global Options	Explanation
Group Clutch	Sets the Automation Group Clutch; Automation Groups are disabled when the Clutch is enabled. For buttons, set the Group Clutch to 1 when the button is pressed, and set it to 0 when the button is released
Active Sense	Used by the HUI to process incoming “Active Sense” messages.
Shuttle Speed	Sets Shuttle Speed directly; Use for shuttle rings that send an absolute value
Waveform Zoom	Sets Waveform zoom in active Arrange window, if open and in foreground
Quantize value	Sets the Quantize value in the current window (if this parameter is available)
Format	Sets the Format value in the current window (if this parameter is available)
Horizontal Zoom	Sets horizontal zoom in the current window (if this parameter is available)
Vertical Zoom	Sets vertical zoom in the current window (if this parameter is available)

Dependent of the option chosen in the Global menu, you have access to the following two additional parameters:

- Clock Part—Chooses the resolution of the parameter change: Bar, Beat, Format, Ticks, Cycle Length
- Marker No—Determines the destination marker number

Track

The Track option allows you to use an assignment to set a track parameter. An additional Track pop-up menu appears below the Class menu, offering the parameters listed in the following table.

Track Options	Explanation
Fader Bank	This addresses a track in the Control Surface Group's current View mode (Mixer, Global, Arrange), depending on the Control Surface Group's current Fader Bank value for this Mode (see below). Example: The View mode is Mixer, the Mixer view Fader Bank is five, and the number next to this parameter is two. Thus, the eighth track in the Mixer view is addressed (Fader Bank and No. are 0-based, so add 1)
Selected	This normally corresponds to the selected Arrange track. Exception: if the Control Surface Group's Track Lock parameter is enabled, then “Selected” corresponds to the track that was selected when Track Lock was enabled
Index	Same as Fader Bank option, but doesn't depend on the current Fader Bank value
Bus	An Audio Bus. <i>No.</i> defines which Bus is addressed; (again: 0-based; to address Bus 2, use a value of 1)
Output	Same as <i>Bus</i> option, but for Output Objects
Master	The Master Output Object; If it does not exist in the song, the first Output Object is addressed instead

If you choose the Fader Bank, Index, Bus, Output, or Master option in the Track pop-up menu, the following two parameters are also available:

- **No.**—A 0-based offset which is added to the track number. Typical usage: Fader 1 uses offset 0, Fader 2 uses offset 1 and so on.
- **Parameter**—Clear text of the addressed parameter. Can only be set by the *Learn Assignment for xxx* menu item. Note that for plug-in and instrument parameters, Parameter Page offsets apply, allowing you to shift the parameter addressing up and down.

Key

If you choose the Key option in the *Class* menu, a key press is emulated. A field appears below the Class menu, allowing you to input the key that should be emulated.

Key Command

If you choose the Key Command option in the *Class* menu, a key command is executed. A field appears below the Class menu, where the key command that should be executed is displayed.

Some key commands provide on/off or enabled/disabled feedback. This can only be set by using the *Learn New Assignment* button in the Key Commands window.

Control Surface Group

If you choose the Control Surface Group option in the *Class* menu, you can set a property for the Control Surface Group that the assignment belongs to. A Parameter menu appears below the Class menu, where you can choose between the options described in the “Control Surface Group Parameters” section on page 659, with the additions listed in the following table.

Note: Assignments for unsupported control surfaces always belong to the first Control Surface Group.

Parameter Option	Additional Info
Current Mode Fader Bank	Maps to the Fader Bank for the currently used View mode (Mixer, Global, Arrange). This way, you need only one assignment per left/right button for all View Modes.
Global View Filter	When this parameter is selected, eight additional switches for the eight object classes are displayed when the View mode is <i>Global</i> . Depending on the Value Mode, these switches define which objects are displayed (by using “Direct” mode) or which are toggled (by using “X-OR” mode).
MIDI Tracks Fader Bank; Inputs Fader Bank; Audio Tracks Fader Bank; Instruments Fader Bank; Aux Fader Bank; Busses Fader Bank; Output Fader Bank; User Fader Bank;	These Fader Bank parameters are used in Global View when only one object class is displayed. This way, you can switch between several object classes while retaining the current Fader Bank for each class.

If you choose a Fader Bank or Parameter Page option in the Parameter menu, the following Bank Type options are also available.

- By One—The fader bank or parameter page is shifted by one track or parameter.
- By Bank—The fader bank or parameter page is shifted by the number of displayed tracks or parameters.
- CS Group Setting—The fader bank or parameter page is shifted by the value defined by the “Parameter Shift Mode” Control Surface Group Parameter.

Automation Group

If you choose the Automation Group option in the *Class* menu, you can use the assignment to set an automation group parameter.

A Parameter Group field that allows you to determine the edited group appears below the *Class* menu. *Current* (entered with “0”) means the group selected in the *Automation Group* Control Surface Group parameter.

The additional Parameter menu allows you to set the automation group parameter. For further information, see the “Group Settings” section on page 277.

MIDI Input

Incoming MIDI messages are only processed on MIDI Input. When this parameter is changed, all other assignments using the same input will also have their input changed accordingly. If the assignment belongs to a supported control surface, the device's MIDI Input will also change in the Setup window. This feature allows you to create default assignments for a new control surface, which other users can use immediately. To do so, they simply need to place your *com.apple.Logic.cs* preferences file into their Preferences folder, open the Controller Assignments Editor and change one assignment's MIDI Input parameter in accordance with their MIDI setup.

Value Change

The incoming MIDI messages that cause a value change in the destination parameter are displayed here. To edit these MIDI messages, switch to the Expert View by activating the corresponding checkbox in the upper right corner of the Controller Assignments Editor.

In the Expert View you'll find two fields: the lower one is only a display that shows the Value Change message in plain text. The upper field display allows the messages to be viewed and edited as a sequence of bytes, displayed in hexadecimal. There are placeholders for the variable part:

- Lo7: Low 7 bits of the value
- Hi7: High 7 bits of the value

If there is only a Lo7 placeholder in the message, the value is treated as 7 bit. If there is also a Hi7 placeholder, the value is treated as 14 bit. The order of Lo7 and Hi7 is honored, and there may be constant bytes in between. This allows you to define Control Change LSB and MSB portions. As an example: B0 08 Hi7 B0 28 Lo7

Note: When entering multiple MIDI messages, do not use Running Status. Always write down the entire MIDI messages, ensuring that you repeat the status byte, even if it's the same.

If the message does not contain Lo7 or Hi7 placeholders, an incoming value of 1 is assumed. This is typical for pressed or released buttons. Also see the "Multiply" section below.

Touch/Release

The incoming MIDI message(s) causes a change in the touched/released status of the destination parameter. A non zero value means touched; a value of 0 means released. The messages are displayed and entered in the same way as the *Value Change* field (see the "Value Change" section above).

Note: This only applies to the *Track* Assignment Class and parameters that can be automated.

Min/Max

Defines the minimum and maximum range for incoming values represented by Lo7 and Hi7. Typically the full range of 0—127 is used, but some control surfaces may use the same message with different value ranges for different controls (CM Labs Motor Mix, for example).

Format

Defines the way negative values are encoded in the 7-bit portions sent over MIDI. You can choose between the following options:

- **Unsigned**—No negative values are possible. The full 7 or 14 bit range is treated as a positive number. This results in a value range of 0 to 127 or 0 to 16,383
- **2's complement**—If the most significant bit is set, the value is negative. To obtain the absolute value, invert all bits and add 1. This results in a value range of -128 to 127 or -8192 to 8191.
- **1's complement**—If the most significant bit is set, the value is negative. To set the absolute value, invert all bits. Note that this allows two possible encoding options for zero. This results in a value range of -127 to 127 or -8191 to 8191.
- **Sign Magnitude**—If the most significant bit is set, the value is negative. To set the absolute value, clear the most significant bit. Note that this allows two possible encoding options for zero. This results in a value range of -127 to 127 or -8191 to 8191.

Which format to use should be documented in your control surface's user manual.

Multiply

Allows the incoming value to be scaled. Especially useful for button presses that have a value of 1. Examples: to set the automation mode to *Write*, set *Multiply* to 4.00 and *Mode* to *Direct*. To decrement a parameter by 1 with a button press, set *Multiply* to -1.00 and *Mode* to *Relative*. The *1* and *-1* menu items in the combo box's menu conveniently enter the most commonly used values of 1 and -1

Mode

Defines the way the incoming value modifies the current parameter value. You can choose between the following parameters:

- **Direct**—The incoming value is the new parameter value.
- **Toggle**—If the parameter's current value is 0, it is set to the incoming value. Otherwise it is set to 0. This option is useful for buttons which toggle a value: Mute, Solo, and so on.
- **Scale**—The incoming value is scaled from its value range to the destination parameter's value range. Most useful for faders and rotary pots.
- **Relative**—The incoming value is added to the parameter's current value. Used by encoders, but also for buttons that increment/decrement by a certain amount (set by the *Multiply* parameter).

- Rotate—The incoming value is added to the parameter’s current value, cycling between maximum and minimum values. This is useful for button presses that cycle between modes: automation mode, for example.
- X-OR—The value defines a bit mask which is applied to the parameter’s current value with the “exclusive or” Boolean operation. Useful for enabling/disabling single Object types in Global View.

Feedback

Defines the way the parameter’s current value is displayed on the control surface. You can choose between the following options:

- None—No feedback is sent.
- Single Dot/Line—LED rings: only one LED; LCDs: a single vertical line.
- Left to Right Bar—A bar from the minimum to the current value.
- Right to Left Bar—A bar from the current value to the maximum.
- Q/Spread—A bar from the center to the current value.
- Ascending Bar LCDs—A bar from the bottom to the current value.
- Descending Bar LCDs—A bar from the top to the current value.
- Text Only—LED rings: no feedback; LCDs: no feedback as a graphic element.
- Automatic—Dependent on the currently assigned parameter, the most suitable feedback mode is used: Plug-in and Instrument parameters carry this information, Pan uses *Single Dot/Line*, all other parameters use *Left to Right Bar*.

Note: Feedback only works for supported control surfaces, and not all settings are available for all controls.

Text Feedback Checkbox

If enabled, a textual representation of the current value is sent to the control surface’s display. The plug-in determines the display position and number of characters that are used.

Local Feedback (Fader/Knob) Checkbox

If enabled, no feedback is sent while the parameter is in *Touched* mode, in order to prevent motor faders fighting against the user.

Glossary

AAF Abbreviation for Advanced Authoring Format. This file format, typically used for data exchange with Digidesign ProTools software, can be imported and exported by Logic. It allows multiple audio tracks to be imported, with reference to tracks and Region position, volume automation included.

accelerando A gradual increase in tempo (see tempo).

AD converter or ADC Short for analog/digital converter; a device that converts an analog signal to a digital signal.

ADAT Abbreviation for Alesis Digital Audio Tape. The ADAT (supported by Alesis, Studer, and Fostex) is an eight track digital multitrack cassette recorder that uses an S-VHS video tape to record audio at 16 or 20 bit depth. The optical port allows the parallel transmission of all eight audio channels.

ADAT optical Optical interface for parallel transmission of eight audio channels via fiber-optic cable. Now the established standard for digital multi-channel interfaces. Sometimes called the lightpipe.

AES/EBU Short for Audio Engineering Society/European Broadcasting Union; this is the association's standard transmission format for professional stereo digital audio signals. The format is similar to S/P-DIF, but uses balanced line drivers at a higher voltage. Depending on the type of devices involved, AES/EBU and S/P-DIF coaxial interfaces can communicate directly.

aftertouch MIDI data-type generated by pressure on keys after they have been struck. There are two types: Channel aftertouch, the value of which is measured by a full length keyboard sensor. It affects all played notes. Polyphonic aftertouch (rare) is individually measured and transmitted for each key. Aftertouch is also known as pressure.

AIFF Abbreviation for Audio Interchange File Format. A cross-platform file format supported by a large number of digital video and audio editing applications. AIFF audio can use a variety of bit depths, but the two most commonly used are 16 bit and 24 bit.

AKAI Common sample format that the EXS24 is compatible with.

alias A pointer to a MIDI Region in the Arrange window. An alias does not contain any data. It simply points to the data of the original MIDI Region. You can create an alias by Shift-Option-dragging the original MIDI Region to a new location. An alias can not be edited directly. Any change to the original Region will be reflected in the alias.

aliasing A digital artefact that occurs when the sample material contains frequencies higher than one-half of the sample rate.

allpass filter A filter that allows all frequencies to pass, providing only phase shift or phase delay without appreciably changing the amplitude characteristic.

amplifier Device which controls the level of a signal.

amplitude This term is used to describe the amount of a signal. If you have an audio signal, amplitude refers to the sound's volume, measured in decibels (dB).

analog signal A description of data that consists of a constantly varying voltage level, that represents audio information. Analog signals must be digitized, or captured, for use in Logic. Compare with digital.

Anchor point The start point of the audio file that an Audio Region is based on. Also see Sample Editor

Apple Loops An audio file in which recurring rhythmic musical elements or elements suitable for repetition are recorded. Apple Loops have tags and transients which allow Logic to perform time stretching and pitch shifting. These tags also allow you to quickly locate files by instrument, genre, or mood in the Loop Browser that is used to import of Apple Loops in Logic. To open the Loop Browser, choose Audio > Loop Browser.

Apple Loops Utility Logic's Apple Loops Utility allows you to create your own Apple Loops. To use the Apple Loops Utility, select a Region in Logic's Arrange window and choose Audio > Open in Apple Loops Utility.

Arrange window The heart of Logic. The primary working window of the program where Audio and MIDI Regions are edited and moved to create a song arrangement.

ASCII Acronym for American Standard Code for Information Interchange. Standard computer character set, providing a way for computers to deal with text characters. When you type ASCII characters from the keyboard (which looks like words), the computer interprets them as binary so they can be read, manipulated, stored, and retrieved. Also see scan code.

attack Start phase of a sonic event. Also part of an envelope (see envelope).

attenuate To lower an audio signal's level.

Audio Configuration window Logic window that provides an overview of all audio routing. Allows the copying of the entire audio configuration between Logic songs, and assists in renaming tasks. You can open the Audio Configuration window by choosing Audio > Audio Configuration.

audio file Any digital recording of sound, stored on your hard drive. You can store audio files in the AIFF, WAV, and Sound Designer II formats. All recorded and bounced WAV files are in Broadcast Wave format.

Audio Instrument Logic supports the use of software based instruments. Software instrument plug-ins are inserted into Audio Instrument Objects. Software instrument recording takes place on Audio Instrument tracks in the Arrange window. Playback of these tracks is routed via the Audio Instrument Object.

audio interface Device needed to get sound into and out of your computer. An audio interface converts digital audio from your computer to analog waves that speakers can broadcast, or, in the other direction, an audio interface converts analog waves into digital audio your computer can work with.

Audio MIDI Setup (AMS) in Mac OS X the Audio MIDI Setup (AMS) utility lets you configure audio input and output devices connected to your computer. Logic uses the settings defined in the Audio MIDI Setup utility, which can be found in the Applications > Utilities folder.

Audio Mixer An Environment layer that shows all Audio Objects of a song. The Audio Mixer is used for mixing multiple audio channels in real time. The Audio Mixer is also known as Environment Mixer.

Audio Object Audio Objects are found in Logic's Environment. They are the "building blocks" of the Audio Mixer. When expanded, Audio Objects look just like channel strips. Audio Objects tell Logic where to send audio signals. The following Audio Object types are available: Audio Track Object, Input Object, Audio Instrument Object, Bus Object, Output Object, Master Object, Aux Object.

Audio Region Chosen area of an audio file which is registered in the Audio window for use in the song and, can be placed on audio tracks in the Arrange window, just like a MIDI Region can be placed on MIDI tracks. Audio Regions are aliases (or pointers) to portions of audio files. They can be as short as a single sample, or as long as the audio file itself. You can use all of Logic's tools to edit Audio Regions. Editing is non destructive on the original audio file, as the Region is only an alias of the audio file. See also Region and MIDI Region.

audio track A track in Logic's Arrange window that is used for playback, recording, and editing of Audio Regions.

Audio Track Object Audio Object in the Environment's Audio layer. Used to playback audio tracks in Logic's Arrange window. All data on the audio track is routed to the Audio Object, that was assigned in the Arrange window's Track List menu.

Audio Units (AU) Audio Units is the standard format for real-time plug-ins running on Mac OS X. It can be used for audio effects and software instruments. The Audio Unit format is part of the Mac OS X operating system. Once installed, Audio Unit plug-ins can be accessed by all programs simultaneously. Logic supports all Audio Unit format plug-ins.

Audio window Logic window used for a number of audio file handling and conversion tasks.

Auto Track Zoom Function in the View menu, that automatically enlarges the currently selected track.

Autodrop button Autodrop function Autodrop means automatically going into and out of record at previously defined positions. Autodrop mode is most commonly used to re-record a badly played section of an otherwise flawless recording. The advantage is that you can concentrate on playing, not the mechanics of driving the program. Autodrop is activated by clicking on the Autodrop button in the Transport bar.

Autoload Song Song with your favorite settings and preferences. It loads automatically when you launch Logic, and serves as a starting point for your songs and projects.

automation Automation is the ability to record, edit, and play back the movements of all knobs, controls, and buttons, including volume faders and pan, EQ, and Aux send controls plus almost all effect and instrument plug-in parameters.

Aux Object Audio Object in the Environment's Audio layer. Aux Objects are similar to the Bus Objects, but are more flexible. Unlike Bus Objects Aux Objects also have Sends of their own, allowing you to form complex signal paths

bandpass filter This filter only allows the frequency band centered around the cutoff frequency to pass, while frequencies that lie further away (the lows and highs) are filtered out. A sound that contains lots of mid range frequencies is the result. Also see filter.

band rejection filter This filter cuts the frequency band centered around the cutoff frequency, while allowing the frequencies that lie further away to pass. The mid range frequencies will become softer and the lows and highs remain unchanged.

bar In musical notation, a bar is a measure that contains a specified number of beats, and establishes the rhythmic structure of a musical piece.

Bar Ruler Ruler found at the top of the Arrange, Matrix, Hyper, and Score windows. It displays musical time units including bars, measures, beats, and beat divisions. It is used to set and display the song position, the cycle and autodrop locators, as well as markers.

beat A musical time interval: “the beat is the regular rhythmic pulse in a composition that people tap their feet to.” Usually a quarter note.

Beat Mapping track Component of the Global tracks that helps to make a rhythmically meaningful display of recordings that do not correspond to a strict tempo throughout. It does this by redefining the bar positions of existing musical events, without changing their absolute time position, thereby preserving the audible result with its original timing.

beats per minute See bpm.

bit depth The number of bits a digital recording or digital device uses. The number of bits in each sample determines the theoretical maximum dynamic range of the audio data, regardless of sample rate. Also known as bit resolution, word length or bit rate.

bit rate See bit depth

bit resolution See bit depth

blue noise Highpass-filtered white noise, sounds like tape hiss.

boosting The act of raising an audio level.

bounce To process recorded or streamed MIDI and/or Audio Regions with any applied effects, such as delay or compression, combining them into one audio file. In Logic, you can choose between Realtime and Offline bouncing. Offline bouncing is faster, but doesn't allow you to apply live automation or record real time audio input.

Bounce button You can bounce the output of any Output Object to an audio file by clicking the Object's Bounce button. See also bounce.

bpm Abbreviation for beats per minute, a measure of the tempo of musical piece. As an example: 120 bpm means that in one minute, there will be 120 musical beats (quarter notes).

bus The term bus is used to describe a send/return routing scheme for audio channels. In Logic, effects can be sent to/from Bus Objects for processing or submixing tasks.

Bus Object Audio Object in the Environment's Audio layer. Usually used to route the signal of an individual send bus to Output Objects. See also bus.

bypass To deactivate a plug-in. Bypassed plug-ins do not drain system resources. In Logic you can bypass a plug-in by either clicking its Bypass button in the plug-In window or by Option-clicking on the appropriate plug-in slot.

cable In Logic the term cable is used to describe the virtual cables that represents the MIDI connection between two Environment Objects.

Catch button The button in the Transport bar featuring the running man icon. Activate this button (blue) to turn on automatic horizontal scrolling during playback. This ensures that the current playback position is always visible.

Catch function A window function that makes the currently displayed song section reflect the current song position. Also see Catch button.

CD Audio Short for Compact Disc—Audio; current standard for stereo music CDs: 44.1 kHz sampling rate and 16 bit depth.

cent A tuning subdivision of a semitone. There are one hundred cents in a semitone. Many of Logic's software instruments contain a Fine parameter that allows sounds to be tuned in cent steps.

channel strip A channel strip is a virtual representation of a channel strip on a mixing console. Each channel strip contains a number of similar controls, such as a Mute button, Volume fader, Pan/Balance knob, Output selector and Bus and/or Insert slots.

Channel Strip setting Logic allows the routing of a channel strip, including all inserted effects or instruments (plus their settings) to be saved and recalled. This simplifies the task of recreating complex serial effect routings between channels or songs.

checkbox A small box. You click a checkbox to select or deselect an option.

chorus effect Effect achieved by layering two identical sounds with a delay and slightly modulating the delay time of one or both of the sounds. This makes the audio signal routed through the effect sound thicker and richer, giving the illusion of multiple voices.

click Metronome, or metronome sound.

Clipboard The Clipboard is an invisible area of memory, into which you cut or copy selected objects, using the Edit menu. From there, you can paste these objects to different positions. Logic's Clipboard spans all songs, allowing it to be used to exchange objects between songs.

clipping (in digital recording) Feeding too much signal through a channel strip, thereby exceeding the limit of what can be accurately reproduced results in a distorted sound known as clipping. Logic's Audio Objects feature a clip detector, which indicates signal level peaks above 0 dB.

clock Electrical synchronization impulse, transmitted every 1/96 note. Was used in older drum machines before the advent of MIDI (MIDI clock is an example).

comb filter effect A short delay of feedback that emphasizes specific harmonics in a signal is generally termed a comb filter. The name is derived from the appearance of a frequency spectrum graphic, which resembles the teeth of a comb.

compressor An effect that restricts the dynamic range of an audio signal.

controller MIDI data type. As examples; sliders, pedals, or standard parameters like volume and panning. The type of command is encoded in the first data byte, the value in the second data byte.

Controls view All Logic plug-ins (and Audio Units) offer a non-graphical alternative to the Editor views of effect and instrument parameters. The Controls view is accessed via the Controls pull-down menu at the top of each plug-in window. This view is provided to allow access to additional parameters and to use less onscreen space.

Core Audio Standardized audio driver system for all Macintosh computers running version 10.2 or higher. Core Audio is an integral part of Mac OS X, allowing access to all audio interfaces that are Core Audio compatible. Logic is compatible with any audio hardware that offers Core Audio drivers.

Core MIDI Standardized MIDI driver system for all Macintosh computers running Mac OS X version 10.2 or higher. Core MIDI is an integral part of Mac OS X, allowing the connection of all MIDI devices that are Core MIDI compatible.

count-in Beats heard prior to the start of a recording.

cueing Monitoring while fast-forwarding or rewinding.

cutoff frequency Frequency at which the audio signal passing through a low or highpass filter is attenuated by 3 dB.

Cycle function A function in Logic which constantly repeats the area between the Locator positions. To turn on Cycle mode, click the Cycle button in the Transport window. The cycle function is useful for composing a part of a song or editing events, as examples. The Cycle area is shown as a green stripe in the top part of the Bar Ruler.

DA converter or DAC Short for digital/analog converter; a device that changes an analog signal into a digital signal.

DAE DAE is the abbreviated form of Digidesign Audio Engine. This is the driver software for many Digidesign cards, and is primarily used for the operation of TDM hardware and/or access to their on-board DSP chips.

data bytes These define the content of a MIDI message. The first data byte represents the note, or controller number; and the second the velocity, or controller value.

DAW Acronym for Digital Audio Workstation. A computer used for recording, mixing, and producing audio files.

dB Abbreviation for decibels, a unit of measurement that describes the relationships of voltage levels, intensity, or power, particularly in audio systems.

decay An envelope parameter that determines the time it takes for a signal to fall from the maximum attack level to the sustain level. See envelope.

Deesser A signal processor that removes hissing or sibilance in audio signals.

default The preset parameter value.

delay In the Environment, an Object that can create a series of repeats. In the Arrange window, a Region parameter which can delay or advance a selected Region by a given number of milliseconds. Delay is also an effect process that delays the incoming audio signal, resulting in subtle chorusing effects through to endless repeats of the signal.

destructive Destructive audio processing means that the actual data of an audio file is changed, as opposed to just editing peripheral or playback parameters.

dialog A window containing a query or message. It must be cancelled or replied to before it will disappear and allow you to continue.

digital A description of data that is stored or transmitted as a sequence of ones and zeros. Most commonly, refers to binary data represented using electronic or electromagnetic signals. All files used in Logic are digital. Also see analog for comparison.

disclosure triangle A small triangle you click to show or hide details in the user interface.

Display Format value Adjustable note value for the grid used in displays and operations. Third number in the position indicator.

distortion The effect produced when the limit of what can be accurately reproduced in a digital signal is surpassed, resulting in a sharp, crackling sound.

distributed audio processing See Logic Node application.

drag & drop Grabbing objects with the mouse, moving them, and releasing the mouse button.

driver Drivers are software programs that enable various pieces of hardware and software to be recognized by other programs in a computer, and also to have the appropriate data routed to them in a format they can understand. In Logic, you can use the Preferences > Audio > Drivers panel to select and configure your audio hardware drivers. If you do not have the proper driver installed, your computer may not recognize or work properly with a given piece of hardware.

drop in, drop out Going into and out of record to replace a section of an existing recording. This process can be automated in Logic. This function is also known as punch in/out.

DSP (digital signal processing) In Logic, the mathematical processing of digital information to modify a signal. An example is the Insert slot of channel strips, which assigns DSP effects such as dynamic compression and delay to a channel's signal.

DTDM Mixer Logic Pro supports a number of Digidesign hardware devices via Direct TDM. The DTDM mixer is created in Logic's Environment window, and allows the use of Logic "native" effects and instruments with suitable Digidesign hardware.

dynamics Refers to changes in volume or other aspects of a piece of music over time.

dynamic range The dynamic range of a sound system is the difference in level between the highest signal peak that can be reproduced by the system (or device in the system) and the amplitude of the highest spectral component of the noise floor. The dynamic range is the difference between the loudest and softest signals that the system can reproduce. It is measured in decibels (dB). See decibels.

editor Window for editing MIDI or audio data. Logic offers the Hyper, Matrix, and Score editors for MIDI event data, and the Sample Editor for audio data.

Editor view Almost all Logic plug-ins (and Audio Units) offer a graphical view of effect and instrument parameters. The Editor view is used by default, but can be accessed via the Editor pull-down menu at the top of each plug-in window, should the Controls view be visible.

effect A type of software algorithm that lets you alter the sound of a track in a variety of ways. Logic includes a set of EQ, dynamics, time-based, modulation, and distortion effects in Logic's native and Audio Unit plug-in formats.

envelope The envelope is the variation that a sound exhibits over time, an envelope basically determines how a sound starts, continues, and disappears. Synthesizer envelopes usually consist of Attack, Decay, Sustain, and Release phases.

Environment The Environment is Logic's brain: it graphically reflects the relationships between hardware devices outside your computer and virtual devices within your computer. Beyond basic input and output handling, the Environment can be used to process MIDI data in real-time, and can even be used to create processing "machines," such as virtual rhythm generators and step sequencers or complex synthesizer editors.

Environment layer A place in the Environment, used to organize Objects and making usage easier. Objects of the same type (Audio Objects, for example) are generally placed on the same layer.

Environment Mixer See Audio Mixer

EQ Shortened form of equalizer. Equalizers are used to boost or cut frequencies in an audio signal. There are several types available in Logic.

equalization See EQ

Eraser A tool used for deleting items. Click a selected item to delete it. All other currently selected items are also deleted.

ESB TDM The ESB TDM connects your TDM hardware with Logic's audio engine. This allows your computer's CPU to perform processes in Logic's native mixer, including audio track playback, the use of software-based instruments and effect plug-ins.

event Individual MIDI command, such as a note on command. Continuous controller movements (modulation wheel, for example) produce a quick succession of individual events with absolute values.

Event Definition Parameter used to define the display of a line in the Hyper Editor.

Event List A list that shows all events and Regions of a song. It allows you to directly manipulate events and Regions in a precise, numerical way. It also allows you to add different types of Events.

export To create a version of a file, such as a Logic song, in a different format that can be distributed and used by other applications.

Fade tool Tool in the Arrange Toolbox, used to create a cross-fade. To do so, click and hold the mouse button and drag across a section where two Audio Regions meet. You can also drag the Fade tool over the start or end points of a Region to create a fade-in or fade-out, respectively.

filter effect Filters are effects you can apply to Audio or MIDI Regions (when streamed or recorded as audio). They are designed to reduce a signal's energy at a specific frequency. A true filter always acts as a subtractive device, and doesn't add anything to the signal. The names of the individual filters illustrate their function. As an example: A Low Pass filter allows frequencies that are lower than the cutoff frequency to pass.

Filter button Buttons in the Event List/Track Mixer, that allow you to hide/show specific event types/channel strip types.

filter slope The filter slope is the steepness, or severity, of filter attenuation. As examples, a filter slope of 6 dB per octave would sound much softer than a filter slope of 12 dB per octave.

Find field In many Logic windows you find a field with rounded corners and a magnifying glass in the left corner. This field allows you to perform text searches. You can for example find the Find field in the Key Commands window or Apple Loop Browser.

Finger tool Tool (as used in the Matrix Editor, for example) that looks like a hand with an extended index finger. This tool allows you to manipulate the length of events or perform other operations in other areas of the program.

FireWire Apple's trademark name for the IEEE 1394 standard. A fast and versatile interface, for example used to connect audio interfaces to computers. FireWire is well suited to applications that move large amounts of data, and can be used to connect hard disks, scanners, and other kinds of computer peripherals.

flanger The flanger effect is similar to the chorus effect, where a slightly delayed signal (which is shorter than that of the Chorus) is fed back into the delay line input. Flanging makes a sound thicker, and slightly "out of phase".

float window Window with special status which always "floats" on the surface above all other windows, but can only be operated with the mouse. Any Logic window can be opened as a float window by holding down Option while opening it.

Folder A Folder is a container for Regions in the Arrange window. It can contain other Folders or Regions, much like a folder in the Finder can contain other folders or files. You can imagine a folder as a song within a song. The inside of a folder looks just like the Arrange area and Track List in a song. Within a song track, a folder looks like a MIDI Region with a dotted surface. Folders can be relocated, resized, looped, and aliased just like Regions. You can create Folders within other Folders, and can think of them as levels within an arrangement.

frame Unit of time. A second in the SMPTE standard is divided into frames that correspond to a single still image in a file or video.

Freeze function The Freeze function performs individual offline bounce processes for each "frozen" track, saving almost 100% of the CPU power used for software instruments and effect plug-ins. All plug-ins of a track (including software instrument plug-ins, if applicable, along with all related automation data) are rendered into a "Freeze file." You can use the Freeze function on individual Audio or Audio Instrument tracks.

frequency The number of times a sound signal vibrates each second, measured in cycles per second, or Hertz (Hz).

Glue tool This tool can be used to merge Regions or events by simply clicking on two (or more) of them.

GM Abbreviation for General MIDI. A standard for MIDI sound modules that specifies a standardized set of instrument sounds on the 128 program numbers, a standardized key assignment for drum and percussion sounds on MIDI channel 10, 16-part multi-timbral performance and at least 24 voice polyphony. The GM specification is designed to ensure compatibility between MIDI devices. A musical sequence generated by a GM instrument should play correctly on any other GM synthesizer or sound module.

grab (an object) Positioning the mouse cursor over an object, then pressing and holding the mouse button down.

grid Logic's grid is represented by vertical lines that are used to map the positions of measures, beats, and sub-beats in various editors.

Group A Group allows you to combine multiple channel strips in order to link some of their properties, such as volume faders and mute buttons. As an example, if multiple audio tracks (with individual choir voices) are assigned to a Group, changing the volume of one choir track within the Group changes the volumes of all (grouped) choir tracks.

GS Extended GM standard developed by Roland Inc.

Hand tool A tool used to move Regions in the Arrange window or events in the editors. It automatically appears when moving the mouse cursor over an object when the Pointer tool is selected.

help tag A small text window that appears when the mouse cursor is placed over an interface element that indicates the name or value. When editing operations such as moving or cutting a Region are performed, a larger help tag will display the current position of the Region or function—in realtime.

Hermode Tuning A microtonal tuning system that can be used on all Logic and Audio Unit software instruments. Hermode Tuning can make your software instruments sound harmonically richer by fine tuning thirds, fifths, and sevenths to specific intervals—in cents.

Hide buttons Buttons with the small "H" in the Track List. If you activate the individual Hide buttons on the desired tracks, and when you de-activate the global Hide View button, all Arrange track with activated Hide buttons will be invisible. See also View Hide button.

Hide View button The button with the big H to the right of the Link button in the upper left corner of the Arrange window. Activating this button will display the Hide buttons on each individual track. See also Hide buttons.

hierarchical menu Structured menus where choosing an individual entry opens a submenu.

high cut filter A high cut filter is essentially a lowpass filter that offers no slope or resonance controls.

highpass filter A highpass filter allows frequencies above the cutoff frequency to pass. A highpass filter that offers no slope or resonance controls is generally known as a low cut filter.

History window The (Undo) History window provides a list of previous editing steps. You can click on any entry in the list to undo or redo these steps. The number of steps is defined in the Global > Editing > Limit Multiple Undo Steps preference.

Hyper Draw function This function allows the creation and editing of automation data in the Arrange window by graphically inserting a set of points or nodes, which are automatically connected by lines. Hyper Draw can also be used in the various editors for volume and panning changes.

Hyper Editor Graphical editor that can be used to create or edit MIDI note and controller data. The Hyper Editor is ideal for “drawing” in drum and other parts.

Hyper Set All simultaneously displayed event definitions in the Hyper Editor.

icon Small graphic symbol. In Logic, an icon may be assigned to each track.

importing The process of bringing files of various types into a Logic project or song. Imported files can be created in another application, captured from another device, or brought in from another Logic project.

In button Button used to activate Step Input mode in the editors. Also see Step Input function.

input monitoring This function allows you to determine which signal you want to listen to on record enabled tracks. Auto input monitoring allows you to hear a track, even when Logic is not recording.

Input Object Audio Object in the Environment’s Audio Layer. The Input Object represents the physical inputs of your audio interface and helps managing audio from your audio interface into Logic.

Insert slot A point on Logic’s Mixers where you can patch in (insert) an effect plug-in. All audio channel types in Logic’s Track and Audio Mixers (except the Master Object) offer effect insert slots.

Insertion mode Also known as Step Input mode. A mode where Logic is “listening” to incoming MIDI input while not in record mode.

Instrument Object An Object in Logic’s Environment designed to communicate with a single-channel MIDI device. An Instrument Object represents a physical or virtual device which handles MIDI information. Also see Multi Instrument Object.

interface 1) A hardware component such as a MIDI or audio device that allows Logic to “interface” (connect) with the outside world. You need an audio or MIDI interface to get sound/MIDI into and out of your computer. Also see audio interface. 2) A term that is used to describe Logic’s graphical elements that can be interacted with. An example would be the Arrange window, where graphical interface elements such as Regions are interacted with to create an arrangement, within the overall Arrange interface.

key The scale used in a piece of music, centered around a specific pitch. The specified pitch is called the root of the key.

key command Function which can be executed by pressing a specific key (or key combination) on your computer keyboard or MIDI controller.

Key Commands window The Key Commands window is used for the assignment of key commands to computer keys or to MIDI messages. You can access the Key Commands window by choosing Preferences > Key Commands.

latency You may notice a delay between playing your keyboard and hearing the sound. This is a form of latency. A variety of factors contribute to latency including audio interface, audio, and MIDI drivers. One factor under your control, however, is the I/O buffer size, which is set in the Audio > Audio Hardware & Drivers preferences.

legato Method of musical performance that smoothly connects one note to the next.

level meter A meter that lets you monitor audio output levels from your computer. You use the level meters in Logic when recording, arranging, and editing audio files.

Link mode Link mode is activated by clicking the Link button. It determines the relationships between windows. An editing window in Link mode shows the same contents as the top window.

Link button Button featuring the chain link icon in the top left corner of most Logic windows. It controls the linking between different windows.

local menu Menu in a window that only contains functions that are relevant to that particular window.

Local Off mode Operating mode on a MIDI keyboard where the keyboard does not directly play its own integrated sound generator. This is useful when using it as a master keyboard in a MIDI setup with Logic.

Locators Lower two sets of numbers, displayed to the right of the Transport buttons in the Transport window. The number on top is the left Locator; the number on bottom the right Locator. The Left and Right Locators control the time-range which Logic's playback will cycle or skip during playback. The Locators also can be used to define the editing area for certain functions.

Logic Setup Assistant A utility that guides you through the process of setting up your Macintosh, audio, and MIDI hardware to work with Logic. The Logic Setup Assistant can be run at any time by choosing the Preferences > Start Logic Setup Assistant menu item.

loop An audio clip that contains recurring rhythmic musical elements or elements suitable for repetition. Logic also supports Apple Loops.

Loop function Loop is a Region parameter in Logic that creates "loop repetitions" for an Audio or MIDI Region. These repetitions will repeat until the song end point, or until another Region or folder (whichever comes first) is encountered on the same track in the Arrange window.

LTC Short for Longitudinal (or Linear) Time Code, a synchronization signal for video (or audio) that is recorded to a video tape's usual audio track (also see VITC).

LFO Abbreviation for Low Frequency Oscillator. An oscillator that delivers modulation signals below the audio frequency range—in the bandwidth that falls between 0.1 and 20 Hz, and sometimes as high as 50 Hz or 400 Hz.

lowcut filter A low cut filter is essentially a highpass filter that offers no slope or resonance controls.

lowpass filter The lowpass filter defines the maximum frequency that can pass through without being affected, thus controlling the brightness of the sound. Every signal above this frequency will be cut. The higher the cutoff frequency, the higher the frequencies that can pass through. A lowpass filter that offers no slope or resonance controls is a high cut filter.

Magnifying Glass This tool allows you to zoom in on any part of the active Logic window. You can choose this tool from the Toolbox, or activate it when using other tools by holding down the Control key and clicking.

marker Markers serve three purposes in Logic: They mark time-positions in the Arrange window. They hold text notes and they delimit song settings. Markers can be placed in the Marker track, or they can be placed in the Bar Ruler. Markers are generally used for indicating and navigating to different song sections.

Marker List A list of all song markers.

Marker Text window Each marker can have a note attached to it, which may be useful for recording session details, film cues and more. the Marker Text window allows you to enter and edit marker notes.

Marker track Part of the Global tracks. Displays all markers in a song.

Marquee tool This crosshair-shaped tool in the Arrange toolbox can be used to select and edit parts of Audio and MIDI Regions.

Matrix Editor A MIDI event editor that displays note events as horizontal beams. Events can be cut, copied, moved, and resized in a similar fashion to Regions in the Arrange window. The Matrix Editor is sometimes referred to as a piano roll editor.

main menu bar The bar at the top of the computer screen, offering global functions such as opening, saving, exporting, or importing songs. It does not offer access to local functions.

merge Mix, or combine, two or more MIDI events, or Regions into a single Region.

Meta Event Meta Events are internal Logic messages that are used to control certain Logic functions, but have no MIDI meaning and are never sent to the MIDI output. They are used to automate specific Logic functions, and organize notation objects which cannot be represented by MIDI Events. Meta Events can be used to remotely control the values of any transformer conditions or screensets, for example.

metronome A part of Logic that produces a sound that taps out the beat. It can set by click-holding the Metronome button in the Transport bar.

MIDI Abbreviation for Musical Instrument Digital Interface. Standardized, asynchronous, serial, and event-oriented interface for electronic musical instruments. MIDI is an industry standard that allows devices such as synthesizers and computers to communicate with each other. It controls a musical note's pitch, length, and volume, among other characteristics.

MIDI channel A MIDI channel is a "tube" for MIDI data, which flows through MIDI ports in channels. Up to 16 separate MIDI channels can pass through a port simultaneously.

MIDI clock Short MIDI message for clock signals.

MIDI message A message transmitted via MIDI consisting of one status byte and none, one, two, or many data bytes (with system exclusive commands). See event.

MIDI Multi mode Multi-timbral operating mode on a MIDI sound module where different sounds can be controlled polyphonically on different MIDI channels. A Multi mode sound module behaves like several polyphonic sound modules. General MIDI describes a 16-part multi mode (the ability to control 16 different parts individually). Most modern sound generators support multi mode. In Logic, multi mode sound modules are addressed via Multi Instrument Objects.

MIDI Region Data container for MIDI events which is shown in the Arrange window as a named horizontal beam. In earlier Logic versions MIDI Regions were called sequences.

MIDI Time Code (MTC) Translation of a SMPTE time code signal into a MIDI standard time code signal. MTC is used to synchronize Logic with MIDI devices, other sequencers, video, and audio tape or hard disk machines that support MIDI Time Code. MTC determines absolute time positions and supports start, stop, and continue messages.

mixing The process of shaping the overall sound of a song by adjusting the volume levels, pan positions, adding EQ, and other effects, and using automation to dynamically alter aspects of the song.

modifier key Computer keyboard keys used in conjunction with alphabetical keys to change functionality. Modifier keys include; Control, Shift, Option, and Command.

modulation Generally, a slight, continuously varying change. Logic's effects and synthesizers contain a number of modulators.

modulation wheel A MIDI controller found on most MIDI keyboards.

mono Short for monophonic sound reproduction. The process of mixing audio channels into a single track, using equal amounts of the left and right audio channel signals. Compare with stereo.

MP3 Abbreviation for MPEG-2 Audio Layer 3. A compressed audio file format, frequently used to distribute audio files over the Internet.

MS stereo recordings Short for middle-side stereo. Two microphones are stacked on a stand or suspended from the ceiling so that they are positioned as closely together as possible. One microphone delivers the middle signal, the other the side signal. If you want to use MS stereo recordings in Logic, you have to decode them—this can for example be done with the Direction Mixer plug-in. Also see XY stereo recording.

MTC See MIDI Time Code.

Multi Instrument Object An Object in Logic's Environment that represents a multi timbral hardware or software device that reacts to MIDI. The Multi Instrument Object is essentially 16 Instrument Objects rolled into a single package. Each of these, called sub-channels (or part-instrument), has a fixed MIDI channel and shares the same port. All other parameters can be set individually. The purpose of Multi Instrument Object is to address multi-channel MIDI devices, which receive MIDI data and play different sounds on separate MIDI channels.

multitimbral This term describes an instrument or other device that can play different sounds at the same time, using several MIDI channels at the same time.

Multi Trigger mode This term is associated with synthesizers such as the ES 1. In this mode, a synthesizer envelope usually is retriggered by every note played.

mute Switch off an Audio Object or track's audio output. You can mute a track by clicking the Track Mute button in the Track List. The output of an Audio Object is disabled by clicking the Mute button at the bottom of the channel strip.

Mute tool This tool allows you to stop a Region or events from playing by clicking on it/them.

native Native refers to host-based processing of effects and software instruments in Logic. The computer CPU "natively" calculates the effects and instruments. Native also refers to Logic's plug-in format, which is different to the Audio Unit format. Logic "native" plug-ins only work in Logic.

Node application The Logic Node application allows distributed audio processing. You can expand the processing capacity of your Logic system by offloading calculations for software instrument and/or effect generation to other, networked Macintosh computers.

nodes Positions in Hyper Draw and automation tracks that mark the positions where data manipulation begins or ends. Occasionally referred to as points.

normalize This function applies the current Parameter box settings to the selected MIDI events (by altering the actual events themselves), and clears the Parameter settings. When it comes to audio, a different "Normalize" function raises the volume of a recorded audio file to the maximum digital level without altering the dynamic content.

notch filter This filter type cuts the frequency band directly surrounding the cutoff frequency and allows all other frequencies to pass.

note number Pitch of a MIDI note, controlled by the first data byte of a MIDI note event.

Object If capitalized, the term Object is used to refer to the graphical representation of all elements in Logic's Environment. These elements can be used to create and process MIDI data in real-time, and can even be used to create processing "machines", such as virtual rhythm generators or step sequencers. Examples for Objects are Instruments, Multi Instruments, Faders, Arpeggiators, and others. In the Environment's Audio layer you also find Objects used to process audio data. These Objects are correspondingly named Audio Objects. Also see Audio Objects.

Object Parameter box The Object Parameter box displays the properties of any selected Environment Object. In the Arrange window this Parameter box is located below the Toolbox and displays the properties of the selected Track's Object.

OMF Abbreviation for Open Media Framework, also known as OMFI—Open Media Framework Interchange. This file format, typically used for data exchange with Digidesign ProTools software, can be imported and exported by Logic. The OMF file format only supports the exchange of audio data (audio media and the usage of this audio media in a song). MIDI and automation data will simply be ignored when using Logic's export function.

Open TL Abbreviation for Open Track List. This file format, typically used for data exchange with Tascam hard disk recorders, such as the MX 2424, can be imported and exported by Logic. The Open TL file format only supports the exchange of audio data (Audio Regions and their positions on tracks). MIDI and automation data will simply be ignored when using Logic's export function.

option 1) Alternative function, often in the form of a checkbox, sometimes also available as a menu entry. 2) Modifier key, in Windows terminology this key is also known as Alt key.

oscillator A synthesizer oscillator generates an alternating current, using a selection of waveforms which contain different amounts of harmonics.

Output Object Audio Object in Logic's Environment controlling the output level and pan/balance for each output on your audio interface. They are assigned to a specific hardware output in their Object Parameter box.

pan, pan position The placement of mono audio signals in the stereo field, by setting different levels on both sides.

Pan control Rotary knob directly above the Volume control on mono Objects that determines the position of the signal in the stereo image.

Parameter box Field on the left side of Logic's windows used to adjust the parameters of the selected Regions or Objects.

Parameters area Area at the left edge of the Arrange window and editors, containing the Parameter boxes, Toolbox, and channel strip (Arrange window) of the selected track.

peak 1) The highest level in an audio signal 2) portions of a digital audio signal that exceed 0 dB, resulting in clipping. You can use Logic's level meter facilities to locate peaks and remove or avoid clipping. The Search Peak command in the Sample Editor's Functions menu searches for the sample bit with the greatest amplitude value in the currently selected Audio Region.

Pencil tool Tool used to create empty MIDI Regions in the Arrange window. It can also be used to add Audio Regions to the Arrange window, when used in conjunction with the Shift key. In the Sample Editor, the Pencil can be used to draw out transient signal spikes (pops and clicks) in signals.

pink noise A harmonic noise type that contains more energy in the lower frequency range.

pitch The perceived highness or lowness of a musical sound. Corresponds to the frequency of the sound wave.

pitch bend message MIDI message transmitted by a keyboard's pitch bend wheel.

playback Playing an Audio or MIDI Region or an entire arrangement, allowing you to hear it.

plug-in Software application that enhances the functionality of the main program (in this case, Logic). Logic's plug-ins are typically software instruments or effects.

Plug-in window A window that launches when a plug-in is inserted, or the Insert/Instrument slot is double-clicked. Allows you to interact with the plug-in parameters.

Pointer tool The default Toolbox tool. Used to select and/or edit Regions, events, menu, or interface items and more in Logic.

position indicator Units: bars, beats, sub-divisions (often written simply as divisions in this manual) and ticks.

post fader Sends in analog mixers are positioned either before (pre) or after (post) the fader. Post fader means positioned after the fader in the signal flow, with the level of a signal going to the Send changing along with the fader movements.

pre fader Sends in analog mixers are positioned either before (pre) or after (post) the fader. Pre fader means positioned before the fader in the signal flow, so the level of a signal routed pre fader to a Send remains constant, regardless of any fader movements.

Preferences window A window that is accessed via the Logic > Preferences menu. All Logic preferences can be set in this window.

preset Set of plug-in parameter values that can be loaded, saved, copied, or pasted via the Settings menu in the Plug-In window header. See [setting](#) and [Settings menu](#).

pressure See [aftertouch](#)

project In Logic, the top-level folder that holds all media associated with a song, including audio files, Sampler Instruments and samples, Video and Settings of various kinds.

Project Manager A window that allows you to manage all media and file types that Logic can read/use. You can access the Project Manager by choosing [Windows > Project Manager](#).

protected track A track whose contents cannot be moved or changed.

punch in See [drop in](#).

PWM Pulse Width Modulation. Synthesizers often feature this facility, where a square waveform is deformed by adjusting its pulse width. A square waveform usually sounds hollow, and woody, whereas a pulse width modulated square wave sounds more reedy and nasal.

Q factor A term generally associated with equalizers. The Q factor is the “quality” factor of the equalization, and is used to select a narrower or broader frequency range within the overall sonic spectrum of the incoming signal.

Quantize button Button labeled with a Q. It opens the pull-down Quantization menu in the Matrix Editor or Event List. See also [Quantize tool](#) and [quantization](#).

Quantize tool Tool labeled with a Q. It is used to apply quantization to specific (selected) events, using the basis quantize value determined by the Quantization menu in the Matrix or Event List editors.

quantization Time-correction of note positions by moving them to the nearest point on a selectable grid. When quantization is applied to any selected event or Region, Logic will move all note events non-destructively to align perfectly with the nearest grid position.

QuickTime QuickTime is Apple’s cross-platform standard for digitized, data-compressed films that can be run in individual windows. You can run QuickTime movies in a Logic window or on a global Video track, in sync with the song. Whenever you move the Song Position Line, the film follows and vice versa.

RAM Abbreviation for random-access memory. A computer’s memory capacity, measured in megabytes (MB), which determines the amount of data the computer can process and temporarily store at any given moment.

real-time effects Effects that can be applied to Regions in real time, without requiring rendering before playback. Real-time effects can be played back with any Macintosh computer qualified to run Logic.

ReCycle ReCycle is the name of an application from software manufacturer Propellerheads, which mainly serves as an editing and production tool for loops (repeatedly looped audio samples). ReCycle uses specific file formats (.REX) which can be imported by Logic.

Region Regions can be found in the tracks of the Arrange window: They are rectangular beams that act as containers for audio or MIDI data. There are three different types of Regions: Audio Regions, MIDI Regions and Folder Regions. Also see: Audio Region, MIDI Region and Folder.

Region Parameter box Box in the upper left corner of the Arrange window, used to non-destructively set the playback parameters for individual Regions, including; quantization, transposition, velocity, compression, and delay. These parameters do not alter the stored data. Rather, they affect how the events are played back.

Replace mode A type of overwrite recording mode where the currently specified Region in the Arrange window is replaced with the incoming signal. To activate Replace mode, click the Replace button in the Transport bar.

resonance A term generally associated with filters, particularly those of synthesizers. Resonance emphasizes the frequency range surrounding the cutoff frequency. See cutoff frequency.

reverb Reverb(eration) is the sound of a space. More specifically, the reflections of soundwaves within a space. As an example, a handclap in a cathedral will reverberate for a long time as sound waves bounce off the stone surfaces within a very large space. A handclap in a broom closet will hardly reverberate at all. This is because the time it takes for the soundwaves to reach the walls and bounce back to your ears is very short, so the “reverb” effect will probably not even be heard.

ReWire Object Audio Object in Logic’s Environment, that allows bussing the output of Rewire audio channels into Logic. Logic also provides you with the Internal ReWire Objects, which allows sending MIDI data to ReWire compatible applications and their software instruments

ritardando A gradual slowdown of tempo (see tempo).

RMS Root Mean Square. A measurement of the effective audio signal average. Used in Logic’s analysis tools.

root note The central note of a musical scale or key, which all other notes are related to.

routing Generally refers to the way audio is sent through processing units. Also often used to describe specific input and output assignments.

rubber band selection technique for selecting consecutive Regions, objects, or events by click-holding and dragging the mouse cursor around the desired items. A rubber band selection envelope (an outline) will span from the start position of the mouse cursor. All objects touched or enclosed by the rubber band selection envelope will be highlighted.

sample A digital recording of a sound at a particular instant in time.

Sample Editor Logic's Sample Editor allows stereo or mono audio files to be destructively cut, reversed, shortened, changed in gain and processed in a number of other ways. It allows editing of individual samples within an audio file consisting of thousands or millions of samples. The Sample Editor also provides access to a number of special sample processing tools, collectively known as the Digital Factory.

sampler Device used for sampling. In Logic, this generally refers to the EXS24 software-based sampler.

sample rate When an analog audio signal is converted to a digital signal, this term refers to the number of times per second the audio file is sampled. Logic can record and edit audio at sample rates ranging from 44.1 kHz (44,100 times per second) up to 192 kHz (192,000 times per second).

sample rate converter Device or algorithm that translates one sample rate to another. The Digital Factory menu in Logic's Sample Editor features a sample rate converter.

sampling The process of converting analog audio into digital information. The sample rate of an audio stream specifies the number of samples that are captured per second (see sample rate). Higher sample rates yield higher quality audio.

saturation A term most commonly associated with a slight tape distortion or the characteristics of tube amplifiers. It basically describes a very high gain level that causes a slight distortion of the incoming signal, resulting in a warm, rounded sound.

scale A group of related musical notes (or pitches) that forms the basis of the melody and harmony in a piece of music. The most common scales are the major scale and minor scale.

scan code Each key on a computer keyboard has a scan code rather than an ASCII symbol associated with it. As an example: the number keys on the numeric keypad and the number keys above the keyboard have a different scan code, but use the same ASCII symbol.

Score Editor Logic editor that deals with standard musical notation. MIDI note events are represented as quavers, crotchets, minims, and so on. The Score Editor allows you to adjust and edit the layout of the score, and print it.

Screenset A layout of various windows, inclusive of all display parameters (zoom, position, and size of each window and so on) is called a screenset. Each Logic song may store up to 90 Screensets. You can swap between different screensets, much as you might swap between different computer monitors.

scroll bar and scroll box Gray beam at the edge of a window. A movable box inside the beam is used to select the displayed song section in the window.

scrubbing On tape machines: manually moving the tape across the tape head. In a sequencer: manually moving the Song Position Line through the song, triggering playback of MIDI events. In Logic: you can scrub through the song by starting playback, grabbing the bottom third of the Bar Ruler and moving the mouse to the left or right.

semitone Smallest interval between two pitches in the standard diatonic scale, equal to a half tone. Correspondingly a semitone is also called half step or half tone.

send Abbreviation for auxiliary sends. An output on an audio device used for routing a controlled amount of the signal to another device. Sends are for example often used to send several signals to the same effect, which is rather advisable for computationally-intensive effects such as reverb.

sequencer A sequencer is a computer application that allows you to record both digital audio and MIDI data and blend the sounds together in a software mixing console. There are editing tools that let you control every aspect of the production, down to the finest details. Effect processors and software instruments are increasingly being added to these applications. Modern sequencers such as Logic now can fulfill many, if not all, functions that were only possible in the most expensive and well-equipped recording studios a decade ago.

setting 1) A parameter value. 2) A set of plug-in parameter values that can be loaded, saved, copied, or pasted via the Settings menu. A plug-in setting is also known as preset. Also see preset and Settings menu.

Settings menu Accessible via the Arrow button found in the gray header at the top of all plug-in windows. Allows you to save, load, copy, and paste settings: the parameter values of effects and software instruments.

shelving EQ EQ type that allows reducing or increasing the frequency range above or below the specified frequency.

side chain A side chain is effectively an alternate input signal—usually routed into an effect—that is used to control an effect parameter. As an example, you could use a side chained track containing a drum loop to act as the control signal for a Gate inserted on a sustained pad track, creating a rhythmic gating effect of the pad sound.

Signature track Global track showing all time and key signatures of a song.

Signature/Key Change List A Logic window listing all time and key signatures of a song. You can access the Signature/Key Change List by choosing Options > Key/Signature Change List Editor.

Single Trigger mode This term is associated with synthesizers such as the ES 1. In this mode, envelopes are not retriggered when tied (legato) notes are played.

SMF See Standard MIDI File.

SMPTE Abbreviation for Society of Motion Picture and Television Engineers. The organization responsible for establishing a synchronization system that divides time into hours, minutes, seconds, frames, and subframes (SMPTE time code). The SMPTE time code is also used for synchronizing different devices. The MIDI equivalent of SMPTE time code is MIDI Time Code (MTC).

SMPTE ruler Logic's Bar Ruler can display time units in hours, minutes seconds and frames, and can display timecode if a video is imported into the project.

Snap menu A pull-down menu found at the top of all linear editing windows in Logic. Selection of items in the menu will cause events or Regions to “snap” to the specified value when moved.

software instrument Logic's software counterpart to a real sound source or a sampler or synthesizer module.

solo A way to temporarily highlight one or more tracks or Regions or events, allowing them to be heard in isolation.

Solo tool Click-holding on individual Regions or events with the Solo tool temporarily allows them to be heard in isolation. All other objects are muted.

song Main Logic file, containing all MIDI events and parameter settings (including mixer automation data) plus information about the audio files to be played.

Song Position Line (SPL) The Song Position Line is a vertical gray line which indicates Logic's current playback position in all horizontal, time-based windows (the Arrange window, for example). The SPL can be directly grabbed and moved with the mouse (see scrubbing).

Song Settings The Song Settings, accessible from the File menu, are a collection of program settings that are specific to the current song. These are different to the global preferences that affect all Logic songs (see preference).

S/P-DIF Short for Sony/Philips Digital InterFace; standard format for transporting digital audio data. Either an optical or a coaxial interface, depending on the type of device. The format is similar to AES/EBU, although it features unbalanced circuits and lower voltages. Nevertheless, AES/EBU and S/P-DIF coaxial interfaces can often communicate directly (depending on the type of devices involved).

Standard MIDI file (SMF) Standard file format for exchanging songs between different sequencers or MIDI file players. Standard MIDI files are not specific to a particular sequencer program, or type of computer. Any sequencer should be able to interpret at least the type 0 file format. Standard MIDI files contain information about MIDI events, including; their time positions and channel assignments, names of individual tracks, names, and positions of markers, tempo changes and copyright marks.

status byte First byte in a MIDI message, which determines the type of message.

Step Input function The Step Input function allows you to insert MIDI notes one at a time in a MIDI Region when Logic is not in a real-time recording mode. This allows you to input notes that may be too fast for you to play, or may be useful if replicating sheet music, but you don't sight read. In Logic you can use a screen, comptrroller MIDI keyboard for Step Input. Also see In button.

stereo Short for stereophonic sound reproduction of two different audio channels. Compare with mono.

subframe A sub-division of a SMPTE frame, corresponding to the individual bits of a SMPTE frame. One frame consists of 80 bits.

Sustain pedal A momentary footswitch that is connected to MIDI keyboards. It transmits MIDI controller number 64, which is recorded and played back by Logic.

Swing parameter Alters the rigid timing of a quantization grid by delaying every other note of a specified sub-division by a definable amount.

Sync button This button, found on the Transport window, activates/deactivates Logic's external synchronization mode.

synchronization Method of keeping several recording/playback devices time locked.

synchronizer Central unit used to control the synchronization of several devices.

synthesizer A device (hardware or software) that is used to generate sounds. The word is derived from early attempts with mechanical and electronic machines to emulate (or synthesize) the sounds of musical instruments, voices, birdsong, and so on. Logic features several software synthesizers, including; the ES1, ES2, EFM 1, ES E, ES P and ES M.

SysEx Abbreviation for System Exclusive data. SysEx data forms the top tier in the hierarchy of MIDI commands. These messages are tagged with an identification number for each manufacturer (the SysEx manufacturer's ID number). The actual contents of these MIDI commands is left to the manufacturer. They are used for transferring individual or banks of sound programs and/or system settings, and for addressing individual sound generation or signal processing parameters.

SysEx button Found in Logic's Event List. This button enables/disables the display of SysEx events and messages.

template Logic allows you to create and save any song as a template file, which can be used as a basis for new projects. The Autoload Song is an example of a template file, but you may wish to create several templates for; scoring tasks, audio only projects, MIDI only projects and so on, as your personal needs require. Also see Autoload Song.

tempo The playback speed of a piece of music, measured in beats per minute. Logic allows you to create and edit tempo changes in the Tempo track.

tempo change An event inserted into the Tempo track (as a node) that indicates a change in tempo at a particular bar/beat position.

Tempo track One of the Global tracks that displays tempo changes as nodes.

tick The smallest unit of timing resolution in a sequencer. In Logic, this is 1/3840th of a note.

time code A format (and signal) for assigning each frame of video or song position a unique, sequential time unit. The SMPTE time code format is measured in hours:minutes:seconds:frames and subframes.

time signature Two numerals separated by a diagonal bar that appear at the beginning of a song. Common time signatures are 4/4 and 2/4. The first number denotes the number of notes in a measure, or bar. The second number denotes a unit of time for each beat. In a 2/4 signature, each bar has two beats; each beat is a quarter note long.

time stretch Changing the length of an Audio Region without changing its pitch. In Logic, you can do this in the Arrange window or Sample Editor with various menu functions or key commands.

timing Measure of the ability to play notes at the right time. Timing can also refer to synchronization between events, Regions, and devices.

toggle To switch between two states such as on or off (applies to windows, parameter values and so on).

Toolbox A section in Logic's Parameters area that contains tools for editing, zooming, cropping, and otherwise manipulating items in the window. Toolbox tools can also be opened at the cursor position.

Touch Tracks An Environment Object that allows MIDI Regions to be assigned to, and triggered by, individual MIDI note events. This enables you to assign a number of musical phrases to different MIDI keyboard keys, and trigger (or record) them in real-time, making the process of arrangement faster and more intuitive.

track A horizontal row in the Arrange window that contains either Audio or MIDI Regions that can be played back over time. Each track has a specified destination that data is routed to. Logic allows hundreds of tracks to be used in a song.

Track List Situated to the left of the Arrange window's working area. Displays the Objects assigned to various tracks as well as the Track buttons.

Track Mixer Adaptive Mixer which automatically configures itself to show every audio and MIDI track, in the order that they appear in the Arrange window or in an open Folder. If you move the controls on the Track Mixer while recording, automation data is stored in the relevant tracks as MIDI controller information.

Track Protect button The button with the lock icon in the Track List locks and unlocks tracks. See also protected track.

Transform window Logic editor that offers a number of mathematical modification functions for the processing of various aspects of MIDI events.

transient Position in an audio recording where the signal becomes a lot louder—over a short time span (a signal "spike", in other words). As this is typical for drum recordings, transients can be used to indicate where beats occur in an audio signal.

Transport window Window used to control recording and playback functions. The Transport window offers Record, Pause, Play, Stop, and Rewind/Forward buttons plus other functions. You can also configure a fixed Transport window in the Arrange and Matrix windows by selecting View > Transport. This Transport window variation is named Transport field. The term Transport bar refers to both the Transport window and Transport field.

transposition Transposition is changing the pitch of a Audio or MIDI Region or event by a number of semitones.

Transposition track Global track component that shows the transposition of the root note of chords in the chord track.

UDL button Short for Up One Display Level button. In many Logic windows you find a button featuring a square graphic in the top left corner. Clicking this button takes you to the next highest display level. As an example, if you are looking at the events in a MIDI Regions inside a folder, clicking the UDL button will switch the display to a view of the MIDI Region in the parent folder.

Undo function Function which reverses the previous editing operation.

velocity Force at which a MIDI note is struck; controlled by the second data byte of a note event.

Velocity tool This Toolbox tool, found in Logic's MIDI editors, allows the velocity adjustment of individual or grouped note events.

Video track A component of the Global tracks that allows the viewing of video clips.

virtual memory Area of the hard disk used as an extension of RAM memory by the computer. The disadvantage is its very slow access time, in comparison to physical RAM.

VITC Short for Vertical Interval Time Code—synchronization signal for video interfacing incorporated into the video signal. In contrast to LTC, the synchronization signal can also be read in a static image. Also see LTC.

VU meter Abbreviation for Volume Unit meter. An analog meter used to monitor audio levels.

WAV, WAVE The primary audio file format used by Windows-compatible computers. In Logic, all recorded and bounced WAV files are in Broadcast Wave format, which include a high-resolution timestamp.

waveform A visual representation of an audio signal.

wet/dry mix Refers to the ratio of a signal that effects have been added to (wet), and the original, unprocessed signal (dry).

white noise Noise type that consists of all frequencies (an infinite number) sounding simultaneously, at the same intensity, in a given frequency band. Its name is analogous to white light, which consists of a mixture of all optical wavelengths (all rainbow colors). Sonically, white noise falls between the sound of the consonant F and breaking waves (surf). Synthesis of wind and seashore noises, or electronic snare drum sounds, requires the use of white noise.

window class Status of the window as a float window or a normal window. Float windows always “float” in the foreground and can not be hidden by normal windows. Also see float window.

wordclock Clock signal required by digital audio interfaces to ensure the sampling rates of connected devices run synchronously. When two devices are connected via a standard audio interface, wordclock is transmitted via the audio circuit. If you want more than two digital audio devices to communicate with each other, you will have to use separate wordclock ports for synchronization, in most cases.

word length See bit depth.

XG Extended General MIDI standard from Yamaha, compatible with Roland GS.

X/Y scroll element Gray square with crosshair icon situated at the bottom left corner of a window. By grabbing and dragging it, you can move the horizontal and vertical window section, as if you were dragging both scroll bars simultaneously.

XY stereo recordings Two cardioid microphones aligned so that they are directed to the left and right of the sound source. Also see MS stereo recordings.

zero crossing A point in an audio file where the waveform crosses the zero amplitude axis. If you cut an audio file at a zero crossing there will be no click at the cut point.

zoom An action that enlarges (zooms in on) or shrinks (zooms out from) the display in a Logic window. The Magnifying Glass in the Toolbox, and the Zoom controls found in the lower left and upper right corners of windows, are both used for zooming tasks. Also see Zoom control and zoom level.

Zoom control The control that appears at the bottom left and top right of some windows, such as the Arrange. The Zoom control slider allows you to navigate through the entire length of the currently displayed song. The lines on the left and right of the slider can be clicked to zoom in and out by a fixed percentage.

zoom level The amount that a window’s contents (tracks, Regions, and Objects, for example) are magnified. Zooming in to a high level allows you to make more precise edits. Conversely, you can zoom all the way out to see the entire song and work on very large sections.

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